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FinTech Implications for Financial Inclusion in Developed and Developing Economies

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ABSTRACT

This review paper explores the transformative role of financial technology (FinTech) in advancing financial inclusion and compares its adoption and impact across developed and developing economies. The study synthesizes evidence from 23 peer-reviewed publications published between 2020 and 2024, covering case studies in diverse contexts including India, Kenya, Egypt, the United States, and other regions. Findings reveal that while FinTech solutions have significantly reduced barriers to financial access in developing countries through mobile payments and micro-credit, developed economies have leveraged these tools to enhance service efficiency, quality, and personalization. Nonetheless, persistent obstacles such as digital literacy gaps, regulatory fragmentation, and data privacy risks constrain inclusive outcomes globally. The paper contributes by proposing a cross-cultural framework that highlights both enabling and limiting factors, emphasizing the importance of tailored policies, digital literacy, and consumer protection. It argues that sustained collaboration between governments, financial institutions, and FinTech firms is essential to harness digital finance for inclusive growth while mitigating risks of inequality and exclusion.

Keywords: Fintech, Financial Inclusion, Policy Initiatives, Regulatory Frameworks, Developing Economies, Digital Banking, Comparative Analysis, Mobile Money

1. Fintech and financial inclusion: An overview

A recent paper by Beck and Thorsten (2020) summarizes recent research on (i) financial inclusion, with a focus on developments in Asia; (ii) the extent to which advances in financial inclusion are driven by fintech; and (iii) what the rise of fintech and big tech implies for the

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structure of the financial system and the regulatory framework. The paper draws on an increasing empirical literature in this field as well as a legal and regulatory literature discussing these developments. The paper focuses on the recent wave of financial innovations, which have had a positive impact on financial inclusion, and it too discusses the impact these innovations have had on market structure in finance, especially banking, while it concentrates on the implications of the availability of big data for financial service providers and customers. The study is a policy analysis paper that contains a literature review and draws on case studies, particularly from developing countries, while referencing data from global institutions like the World Bank, GSMA, and CGAP. The authors analyze the conditions where fintech promotes or limits financial inclusion and highlights the regulatory and structural context that shape these outcomes. Particularly they identify that fintech promotes money mobility, and digital credit, while payment platforms have drastically expanded access to financial services in low-income countries. In addition, many apps allow users to save very small amounts and round up purchases to build savings over time. Fintech can reduce costs, increase speed, and expand the reach of financial services, while it does not require physical infrastructure. Fintech startups compete in terms of cost leadership, creating low costs of services for consumers. In countries like Kenya, fintech has led to financial empowerment, especially for underserved populations. On the other hand, data privacy risks increase with the lack of proper infrastructure and may reinforce system inequalities. Beck and Thorsten observe similar disparities elsewhere: in India and Egypt, platforms such as M-Pesa and UPI have expanded access but continue to mirror divides in digital literacy and connectivity, while in the United States, big-tech platforms like Amazon, Apple, Facebook, and Google illustrate how data concentration and algorithmic bias can generate new forms of inequality even amid high inclusion rates. The commercialization of fintech may prioritize profit over financial inclusion, which may lead to predatory practices. And lastly, many fintech platforms offer instant unsecured digital loans with minimal credit checks, leading to over-indebtedness from digital credit. The authors note that Fintech has a lot of potential to advance financial inclusion, but without proper safeguards, fintech may reinforce exclusion and cause harm to consumers. They propose that inclusion must be intentional and designed specifically for the needs of low-income and marginalized users. They urge that regulatory frameworks must evolve to ensure consumer protection, data security, and ethical AI usage, and policy makers must address the digital divide by promoting digital literacy, affordable internet, and ID infrastructure. Through an extensive review of the literature and the implementation of key concepts, the authors state that there is a need to balance innovation and oversight, allowing space for experimentation (through sandboxes for example) while guarding against exploitation. Considering all the above, regulatory frameworks are pertinent towards the growth of Fintech from a predominantly intentional perspective.

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The majority of prior mobile money studies have relied on technology acceptance theories which focus on factors inclined towards adoption drivers. Because of this, many other behavioral antecedents that drive or inhibit technology use are underexplored. Consequently, there is a need to understand antecedents of mobile money from a multi-theory perspective. To address these gaps in the literature, Sanyo and Osabutey's (2020) study extends existing research to create a multiple theory perspective, utilizing the Unified Theory of Acceptance and Use of Technology 2(UTAUT2) with the prospect theory. The study attempts to unearth antecedents to actual use of fintech innovations, identify the effect of both drivers and deterrents of fintech innovation and provide alternative perspectives on fintech innovation and financial inclusion by providing insights from both behavioral and technology lenses. The study first utilizes secondary research, but does not specify on the methodology, to discover prominent studies and their theoretical positions. The authors utilize this to break down the current literature into a literature review between the models as well as important factors such as performance expectancy and effort expectancy. Secondly, the study contains a survey which is based in Ghana in sub-Saharan Africa to break down specific variables and their impact on the adoption rates of FinTech. The survey contained 294 valid responses (out of 460) of which were collected. The study then utilizes the Kolmogorov-Smirvov test to compare sample distribution, to find that the two data groups did not differ statistically. The results reveal many factors that alter an individual's incentive to adopt FinTech, specifically effort expectancy, behavioral intention, performance expectancy, social influence, facilitating conditions, hedonic motivation, price value, habits, perceived risk, agent trust, service trust, and mobile money usage behavior. The confirmed hypothesis from the results was that performance expectancy heavily influenced intention, in fact, it was the strongest driver of it. Moreover, effort expectancy was also an influence to intention, and habits, and behavioral intentional led to a proportional increase towards actual usage. Perceived risk was also found to affect the magnitude of trust towards FinTech. The results confirm that performance expectancy, effort expectancy and habit and behavioral intention are antecedents to the use of mobile money services.

More significantly, the results of Sanyo and Osabutey's (2020) study offered a new insight that perceived risk negatively influences mobile money service and agent trust. In the same vein, the results also point to the positive influence of mobile money service trust on facilitating conditions to use the technology. Furthermore, aspects of the results deviated from prior studies by pointing to the insignificant effect of price value, hedonic motivation, facilitating conditions, perceived risks, and social influence on behavioral intention and actual use of mobile money services. Through these findings, the study paved the way for better appreciation of antecedents to the use of mobile money services, a crucial knowledge significantly needed to advance the financial inclusion literature. The results were especially conclusive, as it allowed us to see the variables that influenced or didn't influence certain factors related to FinTech adoption and use

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as much as originally thought. However, a core limitation of the study is that the results can only be generalized towards Ghana, which is an emerging economy, and thus may not be applicable towards developed country contexts due to social idiosyncrasies. Moreover, the authors state that the study focused on end users of mobile money services, and it would be ideal to understand the perspective of intermediaries such as merchants and agents for a more comprehensive understanding.

Looking into the case of Ghana, Odei-Appiah, Wiredu and Adjei (2022) examined how the use of FinTech influences financial inclusion, especially in the case of the digital divide. The Frameworks that were utilized were the Unified Theory of Acceptance and Use of Technology (UTAUT2) and the integrated model of Digital Inequality. The design was quantitative through the surveying of 282 adult FinTech users in Ghana. The analysis utilized Structural Equation Modelling (SEM). Reliability and validity checks were included with confirmatory factor analysis, Cronbach's alpha, Composite Reliability and Average Variance. The study found and split theory findings between significant drivers, non-significant factors, and moderators that influenced behavioral intention. Significant drivers included performance expectancy, facilitating conditions, and habit which positively influenced behavioral intention and the use of FinTech. Non-significant factors included effort expectancy, social Influence, hedonic Motivation, and price value. Moreover, moderators that may have influenced the digital divide included access, resources, and forces, meaning that the digital divide strongly affected FinTech adoption and its impact. Through the findings and results, the authors concluded that FinTech promotes financial inclusion, but its effectiveness is constrained by the digital divide. Policy measures must be implemented to reduce said inequalities in digital access, resources, and institutional support to maximize FinTech's inclusive potential. Service providers and Governments thus should focus on usability, accessibility, and habit reinforcement strategies to encourage sustained FinTech use. The study however is limiting generalizability beyond Ghana. Despite this, the overall analysis of data is executed well with proper reliability and validity checks, and the results were relatively conclusive with the exception of the low variance in Financial Inclusion. Overall, the study was very much linked to general debates in the current literature, discovering how FinTech use positively impacts financial inclusion but is moderated by digital divides.

A study by Tok and Heng (2022) states that despite the plethora of papers on the topic, there is little direct empirical evidence of the impact of Fintech on financial inclusion. The authors attribute this due to challenges in measuring FinTech as its products differ greatly in scope and scale. Their paper utilized three digital financial inclusion indicators, two traditional financial inclusion indicators, and four Fintech proxies. The four FinTech proxies are (1) leapfrog; (2) venture capital raised for Fintech business; (3) business volume raised from crowdfunding platforms; and (4) mobile money accounts.

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Table 1: Summary of Indicators Used in Regression (Tok & Heng, 2022, p. 13)

Fintech Proxies	Digital Financial Inclusion Indicators	Traditional Financial Inclusion Indicators	Measures of Digital Divide
Leapfrog (proxied by mobile phones/fixed line subscriptions)	Digital Financial Inclusion Index	Traditional Financial Inclusion Index	Gender divide: the deviation of female digital usage from male. The higher the number, the better, i.e., less divide.
Venture capital raised for Fintech companies (as % of GDP)	Digital Intelligence Index (DII)	Number of bank branches	Rural divide: the deviation of rural digital usage from the average. The higher the number, the better.
Total amount of funds raised through P2P lending platforms (as % of GDP)	Digital Adoption Index (DAI)		Class divide: the deviation of the bottom 40% from the top 60%.
Mobile money accounts			

Furthermore, the paper focuses on the Digital Financial Inclusion Index, the Fletcher School's Digital Intelligence Index (DII), and World Bank's Digital Adoption Index(DAI) to assess levels of financial inclusion with correlation to FinTech adoption. The authors found that Fintech is positively correlated with digital financial inclusion, more so than with traditional indicators such as the number of bank branches present in a country. Furthermore, FinTech is associated with narrowing class and rural divides. However, FinTech has no effect on the gender divide, as women remain disadvantaged in adopting and using Fintech. Ultimately, the paper displays that FinTech promotes financial inclusion overall but is not a silver bullet. Class and rural gaps can be reduced through fintech adoption, but gender gaps still persist, implying that targeted policy interventions are necessary to complement Fintech progress. Furthermore, Policymakers must remain aware of the "dark side" of FinTech, ensuring the reduction of potential exclusion, algorithmic bias, and predatory practices. The sampling was based on global and regional data that is appropriate for a macro-level study. The analysis was appropriately executed as regressions were conducted with recognized indices; robustness is strengthened by using multiple proxies. The results were partially conclusive, mainly because while the study establishes correlations, it does not find causation, and thus the results are not definitive. Furthermore, limitations in the data are present as the majority of data included short time series and patchiness. However, ultimately, the conclusions presented by Tok and Heng (2022) provide an inquisitive review of the current debates in literature, especially regarding the scope of FinTech and its potential role as an inhibitor when unregulated.

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Similarly, a study by Kanga, Oughton, Harris, and Murinde (2021) examines how the diffusion of financial technologies such as ATMs, mobile phones, and associated digital networks affect financial inclusion and income per capita. The dataset included in the study is a panel of up to 137 countries over 1991-2015. The variables assessed included Fintech diffusion, Financial inclusion, and GDP per capita. The sources of data for each variable are ATM networks and phone subscriptions, account ownership through the Global Findex and the Financial Development Index, and World Bank World Development Indicators respectively. The research implemented Cross-sectional Ordinary Least-Squares Regression and Dynamic panel Error Correction Models to separate short and long-run effects and test cointegration. The study found that higher GDP per capita, financial inclusion, human capital, trade, and political and economic stability all increase adoption of ATMs and mobile phones. Furthermore, urbanization accelerates diffusion. Secondly, higher GDP per capita, mobile phone and ATM penetration, education, stability, and absence of corruption increase financial inclusion. Lastly, Financial inclusion significantly boosts income per capita. Fintech Diffusion also raises income, directly and indirectly through financial inclusion. Ultimately, Kanga, Oughton, Harris & Murinde found that Fintech diffusion and financial inclusion are complementary in improving living standards and quality of life. Both channels have strong long-term effects on GDP per capita. Furthermore, the authors note that policymakers should focus on expanding digital networks, strengthening institutions, and fostering inclusion to harness FinTech for sustainable development. The results highlight that technological diffusion drives long-term prosperity. The analysis was done well, as multiple econometric methods with diagnostic checks were implemented in the study. The results were conclusive, as strong evidence of long-run effects were found, although casualty was not fully established. However, the limited time coverage of some of the measures for financial inclusion may create questions in terms of the significance of the estimates, and there is heterogeneity across the countries found from the data, and thus the generalized data may not apply to individual countries specifically in the study. Ultimately, the conclusions were linked to the general debate, especially with links towards genres of finance-growth, technology diffusion, and innovation literature making links to the importance of financial inclusion in promoting sustainable development. The next section elaborates further on this matter.

2. Fintech and financial inclusion and their role promoting sustainable development

Kishor, Bansal, and Kumar (2024) recently published a paper describing how financial technology can promote financial inclusion and thereby contribute to achieving sustainable development. Recognizing the fragmented nature prior to its research, they aimed to systematically review and analyze the literature to identify patterns, gaps, and future directions in the intersection of fintech, financial inclusion, and sustainability. The study employed a hybrid methodology combining systematic literature review and bibliometric analysis to explore the

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nexus of fintech, financial inclusion, and sustainability. Using the SPAR-4-SLR (Scientific Procedures and Rationales for Systematic Literature Reviews) protocol, the research identified 462 articles and filtered down to 189 peer-reviewed studies. These studies were analyzed using the TCCM framework (Theory, context, Characteristics, methodology) to classify theoretical models, research contexts, variables and methods. They found that research on the intersection of fintech, financial inclusion (FI), and sustainability has rapidly grown since 2018, particularly during the COVID-19 pandemic. Analyzing 189 peer-reviewed articles, it identifies a rising scholarly interest in how fintech can drive financial inclusion and contribute to the United Nations's Sustainable Development Goals (SDGs). Most publications come from the social sciences and economics fields, with India, China, and the UK leading in output. Thematic clusters include fintech delivery, fintech's impact on financial inclusion, financial inclusion's role in sustainable development, and their integrated nexus. Using the TCCM framework, the study maps key variables—antecedents like financial literacy and trust; mediators such as institutional quality; and outcomes like poverty reduction, ESG performance, and entrepreneurship. Overall, the field remains in its early stages, with significant gaps in theory and empirical evidence, especially in developing countries. The study proposes a conceptual model and agenda for future interdisciplinary research. The study concludes that fintech is a powerful enabler of financial inclusion, which in turn is essential for achieving sustainable development. By reducing costs and expanding access, fintech helps underserved populations engage in economic activity, contributing to the UN SDGs. However, the intersection of fintech, financial inclusion, and sustainability remains underexplored, with most research concentrated in developed countries and lacking in theoretical diversity. The authors propose adopting multi-theory approaches, expanding research in developing nations, and developing comprehensive frameworks that link antecedents (e.g., financial literacy), mediators (e.g., institutional quality), and outcomes (e.g., poverty reduction, ESG performance). They recommend more longitudinal and mixed-method studies, as well as increased focus on emerging fintech tools like blockchain and AI. Ultimately, the study offers a roadmap for future interdisciplinary research that can inform policies and practices aimed at leveraging fintech to promote inclusive and sustainable development globally. Through an extensive review of the literature, this publication not only analyzes the current landscape of literature, but also identifies gaps such as within the lack of sustainability focus and multidisciplinary research as a whole. However, the authors state that while they aimed to include a wide range of phrases in the search, some studies may be missing due to the lack of certain relevant terms in the search criteria.

In 2023, Danladi, Prasad, and Ghasemi led a study to discover how we can suggest effective and contextually relevant fintech adoption strategies to foster financial inclusion in Africa and thereby contribute to the continent's progress towards SDGs. In response to this gap, their research is dedicated to exploring and analyzing fintech adoption strategies developed by

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prominent institutions like the World Bank Group and other reputable authors, with a particular focus on their relevance and applicability in Africa. The study attempts to achieve a response to this research question through a literature review and an analytical review. In the literature review, the study assesses information on fintech adoption strategies, policies, and frameworks proposed by authors and organizations like the World Bank Group. The analytical review assesses the suitability and applicability of these fintech adoption strategies based on an analysis. There are a few SDGs that are especially prevalent in Africa's context, including specific SDGs. For these, there are expected impacts of financial inclusion:

1. SDG1-No poverty-Access to financial services by all will smooth consumption and help accumulate assets;

2. SDG2-No hunger-Increase in financial services will double agricultural productivity and incomes of small scale producers by 2030;

3. SDG3-Good health-Reduce delays in seeking medical services and advice for members of the household; Reduce poverty-related stress and depression in households;

4. SDG5-Gender equality-Reforms must be undertaken to give women equal rights to economic resources and access to finance;

5. SDG8-Decent work and economic growth- Strengthen the capacity of domestic financial institutions, improve insurance and financial services for all.

Moreover, the use of financial technology to increase financial inclusion and to contribute towards the SDGs in Africa are becoming increasingly important. The most prominent feature of fintech that could achieve this is through reducing the cost of financial services and helping more people gain access to such services. Furthermore, by making it easier for people with low income and small business to save, borrow, and make payments, fintech can help expand access to the financial system, improving financial inclusion. The study hoped to propose collaborative approaches between the government and private sector to improve fintech adoption for the purpose of enhancing financial inclusion, which could also boost the attainment of the SDGs in Africa. The use of fintech in Africa has a lot of potential to promote inclusion and contribute to economic development in the region. Many strategic frameworks such as the World Bank Groups Maximizing Finance for Development (MFD), the G20's High Level Principles for Digital Financial Inclusion and the Better than Cash Alliance will allow African nations to achieve their development goals. The Better than Cash Alliance pledges to accelerate secure digital payment systems adoption and enhance financial inclusion as governments can create regulations that enable its system to promote awareness about digital payment methods. The

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mSTAR project by USAID, in similar fashion, plays a role in promoting technologies and ensuring that underserved communities have access to them. Prioritizing marginalized populations can effectively utilize technologies and make substantial contributions to sustainable development. Danladi, Prasad, and Ghasemi (2023) state that these collaborative approaches will help organizations collaborate, share resources and expertise, and work towards their common goals more efficiently. The results are conclusive, as the results of the paper provide utility towards what strategies towards fintech adoption would be beneficial for countries that are seeking to adopt fintech as a banking system in the future. However, it is important to note that the strategies that were examined within the article are the most well-known and practiced strategies, and so less popular and lesser explored strategies could provide greater impacts towards fintech adoption.

Similarly, Mhlanga's study (2022) investigates how FinTech, particularly mobile money innovations, affects financial inclusion in Sub-Saharan Africa (SSA). His research questions the diffusion of mobile money fosters financial inclusion in SSA and the effects vary across different dimensions of inclusion (access, usage, and quality of financial services). The study specifically focuses on the variables FinTech (Measured primarily through mobile money penetration and mobile subscriptions) and Financial Inclusion (Measured in terms of access, usage and quality). Mhlanga implements a Generalized Method of Moments (GMM) for dynamic panel estimations. Moreover, Quantile regressions are implemented to explore distributional effects, such as comparing countries at low and high levels of inclusion. The study found that mobile money and broader FinTech penetration significantly enhances financial inclusion in Sub-Saharan Africa. The analysis describes that FinTech had the strongest impact on the usage of financial services, a moderate impact in terms of access, and a limited impact on the quality of services. Therefore, the study concluded that mobile money is a transformative FinTech innovation for SSA, driving inclusion where traditional banking fell short. However, improving quality of financial services requires complementary policies, as FinTech alone is insufficient. Mhlanga recommends policymakers to support digital ecosystems, improve regulation, and encourage interoperability to sustain gains. Lastly, the author notes that the results reinforce the role that Fintech has, showing its impact is stronger in developing regions that have limited banking reach. The GMM and quantile regressions are appropriate for the heterogenous data that was used in analysis, especially taking into consideration the sampling taken from Broad SSA, including 42 countries and ranging four decades. The measures of quality of financial inclusion are less developed, while its regional focus limits global generalization. The conclusions are linked heavily to the general debate, especially with its position on SSA's experience with Fintech inclusion.

On a similar line, a study by Arner, Buckley, Zetzsche, and Veidt (2020) examines why FinTech is important for sustainable development and how regulators and governments can design a

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comprehensive strategy to support digital financial transformation, underpinning financial inclusion and sustainable balanced development at the same time. Overall, it questions how financial technology, through enhancing financial inclusion, can be leveraged to advance sustainability and the UN SDGs. The study is conceptual and a legal-policy analysis. Some methods include the review of existing global policy initiatives such as G20, UN Task Force, Alliance of Financial Inclusion, and World Bank while also including comparative case studies of digital finance infrastructure in countries like India, Kenya, China, and others. The study proposes a framework of four pillars for digital financial transformation. The study finds that FinTech is a key driver of financial inclusion, which underpins sustainable and balanced development. Moreover, four strategic pillars are crucial for its development:

1. Digital ID & e-KYC for simplified account access
2. Open interoperable payment systems for efficient digital flows
3. Government services & payments delivered electronically to drive usage
4. Digital financial markets & systems to expand investment, credit, and risk-sharing opportunities

The authors establish that FinTech and financial inclusion are not ends in themselves but tools to achieve sustainability. Moreover, a comprehensive digital financial transformation strategy based on the four pillars is necessary for balanced development. Furthermore, regulators must embrace innovation while safeguarding client protection through measures like regulatory sandboxes, proportional regulation, and RegTech. Lastly, Financial inclusion should be recognized as a foundational enabler of all SDGs, even though it is not explicitly listed as one. The analysis was well-structured, including both comparative and policy analysis, and the propositions were realized and supported by real-world examples. Although, the study acknowledges the risks like digital exclusion, regulatory challenges, misuse of technology, and overreliance on assumptions of literacy/digital access.

In a more specific case of Central Asia, Jie, Rasool, Nassani, Mattayaphutron, and Murad's (2024) study investigates how financial inclusion, FinTech, natural resource rents, and renewable energy consumption influence CO_2 emissions in Central Asian countries. The authors focus on a 20-year period from 2000 to 2019, during which the region relied heavily on coal and fossil fuels for energy production. The central research problem is framed around the dual challenge of economic development and environmental degradation, asking how digital finance and renewable energy can support sustainability while resource rents and financial inclusion may simultaneously drive emissions. This aligns directly with global priorities like SDG 7

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(Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 15 (Life on Land). The study adopts a rigorous econometric approach, applying the Nonlinear Autoregressive Distributed Lag (NL-ARDL) model, which is well-suited for examining both short-run and long-run asymmetric relationships between variables. To ensure robustness, the researchers conducted panel unit root and cointegration tests (Pedroni, Kao, and Fisher Johansen), establishing statistical validity across the five Central Asian nations studied (Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, and Turkmenistan). The variables measured include financial inclusion (via IMF indices), fintech development (using Baidu search index and entropy method), renewable energy consumption (share of total energy), and natural resource rents (coal, oil, gas, minerals), with CO_2 emissions serving as the dependent variable. The results reveal complex and sometimes contradictory effects. Financial inclusion shows a positive relationship with CO_2 emissions in the short term, reflecting higher consumption and economic activity, but in the long term it supports more sustainable practices, consistent with the Environmental Kuznets Curve (EKC) theory. Fintech demonstrates a similar dynamic: while rapid digital innovation initially increases emissions due to energy demand, its long-run effect reduces emissions by encouraging environmentally friendly practices. Renewable energy consistently has a negative effect on CO_2 emissions, reinforcing its role as a central pillar for sustainability. In contrast, reliance on natural resource rents is positively associated with higher emissions, illustrating the ecological risks of resource dependence in Central Asia. The study concludes that fintech innovation and renewable energy adoption are promising pathways to mitigate environmental degradation in Central Asia. Financial inclusion, though beneficial for long-term sustainability, must be carefully managed in early development stages to avoid exacerbating emissions. Meanwhile, resource rents present a major challenge, requiring responsible extraction policies to balance economic gains with environmental preservation. The authors propose that Central Asian governments should craft policies aligned with SDGs, particularly by investing in renewable energy, integrating environmental assessments into technological adoption, and ensuring resource management strategies that prioritize long-term ecological health. The research methodology is well-aligned with the study's objectives, particularly due to its application of dynamic and asymmetric analytical techniques. The sampling, which encompasses five resource-rich Central Asian states over a span of two decades, is appropriately designed to address the study's aims. The analytical procedures are executed rigorously, supported by robust statistical evidence and multiple cointegration and robustness tests. However, the exclusive reliance on CO_2 emissions as the sole indicator of environmental degradation constrains the breadth and generalizability of the study's findings.

To assess how global disruptions influence FinTech adoption, Tay, Tai, Tan's (2022) study situates itself during the COVID-19 Pandemic where physical infrastructure proved to be counterintuitive, traditional financial services have made a global switch towards FinTech. The

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study assesses how the pandemic has affected digital financial ecosystems by speeding up the broad-based digitalization process for financial services, which has already partly been carried out in developed and developing countries at the time. The study attempts to address what the present stage of the development of digital financial inclusion in developed and developing countries is, and what the essential key elements for a comprehensive digital financial inclusion mechanism are. The study includes a systematic review following the PRISMA(Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria. The articles were screened using the content-centric analysis technique to respond to the two research questions. By combining prior findings, the author aims to highlight common drivers, barriers, and outcomes associated with the shift to digital financial ecosystems. The authors find that the pandemic has acted as both an accelerator and a divider. On one hand, COVID-19 has dramatically increased reliance on digital financial services such as mobile banking, contactless payment, and fintech platforms, which helped keep economies functioning under lockdowns. On the other hand, the pandemic exposed and widened inequalities, as marginalized groups lacking internet access, smartphones, or financial literacy were further excluded. More broadly, the paper argues that DFI contributes directly to 13 out of the 17 SDGs, with impacts on poverty reduction, economic participation, and gender equality, but the pandemic conditions highlighted the fragility of digital ecosystems in underdeveloped regions. Tay, Tai, and Tan concluded that digital financial inclusion is a powerful enabler of sustainable development but is highly vulnerable to shocks like COVID-19 if structural gaps are not addressed. They propose that governments and regulators must invest in digital infrastructure, simplify banking procedures, lower transaction costs, and strengthen financial literacy programs. Without such interventions, crises like the pandemic risk reinforcing financial exclusion, particularly in rural areas and among disadvantaged groups. The use of a systematic review is suitable for providing a comprehensive global overview. While the scope of the studies examined is commendably broad, the paper would have benefited from greater transparency regarding the selection criteria and weighting process. The analysis is effectively executed, positioning the COVID-19 pandemic as both a disruptor and an enabler within the broader discourse on digital finance. The findings synthesize patterns observed across prior studies rather than introducing novel empirical data, rendering the results more illustrative than conclusive. Nonetheless, the study successfully demonstrates how the pandemic accelerated the adoption of digital finance while exposing persistent inequities and gaps in technological readiness. The author appropriately acknowledges key limitations, including the uneven distribution of digital services and the absence of universal financial infrastructure. Overall, the paper is well-situated within the existing literature, particularly in discussions of financial resilience and inclusion. The next section draws particular attention to the banking sector.

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3. An analysis of fintech and financial inclusion in the banking sector

Aloulou, Grati, Al-Qudah, and Al-Okaily's (2023) recently published a review paper identifying how FinTech enables the banking industry to simplify its procedures, increase its effectiveness and efficiency and improve the delivery process to stay competitive. Moreover, the authors put an emphasis on the benefits of FinTech in terms of the improvement in delivery of services, increased satisfaction of customers, improved effectiveness and profitability, while dramatically lowering transaction costs. The study adopted a quantitative research approach utilizing a structured survey based on a literature review. Data was collected from 260 Emirati banking professionals using snowball sampling. The respondents included executives at various levels (junior, middle, and senior) from banks actively engaged with FinTech. Ultimately, FinTech adoption was found to have a strong positive impact on financial inclusion (Beta =0.87; p=0.001). Moreover, fintech had a significant influence on economic growth (Beta = 0.77). Lastly, financial inclusion and fintech adoption lead to economic growth (Beta = 0.81) The authors' concluded that FinTech adoption significantly boosts financial inclusion and economic development within the UAE banking industry, including recommendations that fintech adoption ought to be strategically aligned with business goals, supported by effective technology management, and that future contributors to research in this industry ought to expand their research across other emirates and neighboring countries for deeper exploration of human-technology integration.

In a published review paper in 2024, Nnaomah, Aderem, Olutimehin, Orieno and Ogundipe focus on researching the role that digital banking has had in enhancing financial inclusion, specifically in the United States and Nigeria, and how the disparities between the countries have led to the comparative effectiveness of digital banking on financial inclusion. Through this comparative analysis, the authors intend to offer insights into possible cross-country learning to allow other countries to adopt the best course of action when implementing digital banking. The data sources include peer-reviewed journal articles, reports from the World Bank and International Monetary Fund, policy documents from governmental and regulatory bodies, and data from academic databases such as Google Scholar, Jstor, and Pubmed. The main findings and results pertain to regulatory frameworks and policy initiatives that have had a significant influence on the landscape of digital banking with the introduction of regulatory sandboxes. Through these sandboxes, fintech innovations were able to be tested and refined in a collaborative and regulated environment, encouraging innovation in the industry. Financial inclusion was achieved significantly through promoting mobile money and digital payment systems, particularly in regions where there isn't a prominent traditional banking infrastructure. However, the authors identified issues such as digital literacy, cybersecurity, and the need for modern consumer protection mechanisms that have challenged the journey to financial inclusion

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via digital banking. The USA was at the forefront of digital banking innovation, especially in the widespread adoption of mobile banking services. Some issues that arose in USA's adoption of FinTech was the digital divide (gap in access to digital technologies between socioeconomic groups), the challenge in ensuring security and privacy with cybersecurity, and disparities in financial literacy. The presence of commercial bank branches and widespread internet accessibility have been critical drivers to the implementation of digital banking, facilitating easier access to financial services, lower costs when juxtaposed to traditional banking, empowering the economically disadvantaged segments of the population. Nigeria faced some challenges with its low financial literacy, lower uptake on digital financial services in comparison to peer countries. The paper concludes the possibility to achieve further global financial inclusion with sustained effort and innovative thinking. In terms of the studies that were included in their literature review, selections were made regarding the rigor of their methodology and their contribution to elucidating the role of digital banking in financial inclusion. Both of these reasons are appropriate in reflecting the purpose of their study. The analysis contained an in-depth review of the environment, context, and factors that contributed towards the growth of digital banking within the US and Nigeria. Moreover, the comparative analysis was relevant, as it explored the individual challenges and successes of each country—such as the USA's success in pioneering digital banking innovations and achieving widespread mobile banking adoption despite challenges like the digital divide and cybersecurity risks, and Nigeria's success in expanding mobile money usage and fostering fintech growth amid persistent barriers of low financial literacy, inadequate infrastructure, and limited regulatory capacity as mentioned earlier in this paragraph. These insights highlighted the differences in context that lead to the different challenges that each country faced. The results were also significantly conclusive and contributed to the general debate of FinTech adoption, as they identified that the digital banking opportunities in the US are vast, while Nigeria's digital banking offers different sets of challenges and opportunities.

Further, a study by Aleemi, Javaid and Hafeez (2023) explored how the entry and growth of fintech affects both financial inclusion and banks' market power within the Pakistani banking sector. The authors develop a composite Financial Inclusion Index (CFII) tailored for Pakistan, utilizing indicators across access, availability, and usage of financial services. They measure banks' market power through the Lerner Index and proxy fintech development with digital financial services as a share of GDP. The study employs panel data regression with fixed effects on 26 commercial banks from 2005-2020. The findings reveal several key insights. First, Pakistan's financial inclusion was low to medium until 2018, after which significant improvements occurred, partly driven by regulatory pushes like the National Financial Inclusion Strategy. Second, banks maintained monopolistic tendencies with high Lerner margins, though market power has declined slightly in recent years. Third, fintech grew slowly from 2005-2015

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but surged post-2016, with a sharp increase during the COVID-19 pandemic. Empirically, FinTech is found to reduce banks' market power and positively impact financial inclusion, however the relationship is non-linear. The study concludes that fintech plays a dual role as both an inclusion enabler as well as a competitive force against banks' monopolistic power. The authors propose three transmission channels: the inclusion channel, the growth channel, and the regulatory channel. They argue that promoting digital financial services, reducing intermediation costs, and strengthening regulation will expand inclusion and weaken excessive banking market power. Policy recommendations include developing digital credit scoring models, expanding fintech ecosystems, incentivizing innovation, and strengthening cybersecurity.

The methodology of Aleemi, Javaid and Hafeez's (2023) study is well-suited to the study's objectives, particularly through the construction of a composite index for Pakistan. However, the reliance on supply-side data and conventional proxies somewhat constrains the precision of the findings. The sample of 26 commercial banks ensures adequate breadth, and the econometric techniques are applied rigorously. The analysis is strong and closely aligned with the research objectives, offering valuable insight into the non-linear relationship between fintech development and financial inclusion, thereby adding conceptual depth to the discussion. The authors appropriately acknowledge key limitations, including the absence of demand-side data and the exclusion of microfinance institutions, which may introduce potential inaccuracies in the study's inferences. Overall, the conclusions are effectively connected to the broader scholarly debate, demonstrating how fintech can both promote financial inclusion and influence competitive dynamics within the banking sector, especially in emerging economies such as Pakistan.

Looking into a wider geographical context, Banna, Hassan and Rashid (2021) investigate whether fintech-based financial inclusion (FFI) influences bank risk-taking in Organization of Islamic Cooperation (OIC) countries. The authors highlight that while financial inclusion is often celebrated for boosting access and stability, its effect on institutional risk tolerance in emerging economies remains underexplored. models—specifically Generalized Method of Moments (GMM) and Fixed-Effects (FE) estimations—to control for endogeneity, unobserved heterogeneity, and reverse causality. The study also included several robustness checks (alternative specifications and sub-sample analyses) to verify the consistency of results across income levels and financial development tiers within OIC countries. The results show that FinTech-based financial inclusion significantly reduces bank risk-taking behavior across OIC countries. Banks operating in environments with greater fintech penetration tend to have higher stability (higher Z-scores) and lower NPL ratios. The findings suggest that fintech adoption encourages responsible lending, improves monitoring efficiency, and enhances credit access through digital platforms. However, the effect was heterogeneous: in high-income OIC countries,

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fintech adoption improved stability more strongly, while in low-income OIC countries, weak regulatory frameworks moderated these benefits. This underscores that institutional quality and regulatory environment play key roles in shaping the fintech-risk nexus. The authors conclude that fintech can promote both inclusion and stability in banking sectors of emerging economies if accompanied by adequate regulation. FinTech-based inclusion reduces risk-taking by expanding the customer base, improving credit screening via digital data, and diversifying income sources for banks. They propose that policymakers in OIC countries should encourage responsible fintech innovation, strengthen digital governance, and enhance cybersecurity and regulatory oversight to balance innovation with stability. Overall, fintech-driven inclusion is viewed as a "stabilizing force" rather than a destabilizing disruptor when properly integrated into formal banking systems.

The construction of a FinTech Financial Inclusion Index effectively bridges Banna, Hassan and Rashid's (2021) study of empirical measures with its underlying conceptual framework. The sampling of OIC member countries over the 2011–2019 period was appropriate, as these nations share comparable developmental and institutional characteristics, thereby enhancing the validity of cross-country comparisons. The econometric techniques employed—Generalized Method of Moments (GMM), fixed effects models, and a range of robustness tests—were applied appropriately to ensure analytical reliability. Moreover, diagnostic tests addressing autocorrelation, multicollinearity, and endogeneity further reinforced the robustness of the results. The findings were largely conclusive, consistently supporting the hypothesis that fintech-driven financial inclusion reduces bank risk-taking behavior. However, the authors prudently acknowledged partial uncertainty in lower-income OIC contexts, citing limited data availability and uneven fintech penetration as constraining factors. Each major result directly corresponded to the research objective, elucidating how fintech inclusion influences risk dynamics in the banking sector and empirically validating the theoretical propositions. The study also recognized several limitations, including data constraints on fintech indicators, potential measurement bias within the financial inclusion index, and disparities in regulatory capacity among OIC countries that may affect the generalizability of the findings. Importantly, the authors situated their conclusions within the broader scholarly debate concerning whether financial innovation stabilizes or destabilizes financial systems. By referencing prior studies that highlight both stabilizing and risk-inducing effects of fintech, they positioned their evidence as demonstrating that, under strong regulatory frameworks, fintech-based inclusion can enhance both financial stability and inclusion.

Prior to the above study, Siek and Sutanto (2019) analyze the positive and negative impacts of fintech on the conventional banking industry in Indonesia, specifically exploring whether fintech startups disrupt traditional banks or foster healthy competition. The author's two objectives in

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the study are to 1. Determine whether fintech startups have a positive or negative impact on traditional banks in both the short and long term and 2. To assess whether banks and fintech firms should collaborate or compete based on the extent of this disruption. The researchers employed a quantitative research design utilizing random sampling via Google Form questionnaires in which the data was analyzed through SPSS software that incorporated linear regression, correlation, and reliability and validity testing. Two models were developed, one incorporating variables such as promotion, ease of use, convenience, transaction speed, and merchant range to assess Payment Fintech systems, and another incorporating variables of interest rates, accessibility, approval speed, safety, and ease of obtaining loans or deposits to assess the P2P(Peer-to-peer) Lending FinTech systems. Through the analysis of data, the authors found that Fintech payment services significantly disrupt banks. Payment FinTech's (like GoPay, OVO) outperform banks in brand awareness, customer satisfaction, and loyalty. Over 90% of respondents used fintech payment apps, while promotion emerged as the strongest driver of satisfaction ($\beta = 0.349$), followed by merchant availability ($\beta = 0.153$). This disruption stems from FinTech's' customer-centric models, offering frequent promotions, seamless transactions, and broader accessibility. However, Peer-to-Peer (P2P) fintech shows limited disruption—so far. Although P2P lending offers higher interest rates and faster approval, banks still dominate in deposits and loans due to trust and safety concerns. However, the rapid growth of P2P accounts (+28.91% in one month) and loan disbursements (+784% year-over-year) signals emerging long-term risks for banks. Moreover, Banks are slowly starting to react to these technological developments. Banks have begun creating their own digital wallets (e.g., LinkAja, formed by Mandiri, BRI, BNI, and Telkomsel), but these still struggle to compete with fintech leaders due to weak branding and outdated digital strategies. The authors conclude that fintech is transforming, rather than destroying, the banking sector: Payment FinTech is already driving substantial disruption, forcing banks to adopt agile, customer-focused digital strategies. P2P FinTech poses a potential future threat but currently remains complementary to banks. The relationship between banks and fintech should be viewed as "coopetition", where both competition and collaboration can yield mutual benefits. For banks to remain competitive, they must rethink digital strategy, improve user experience, and embrace partnerships with fintech startups. Quantitative research design, centered on hypothesis testing, is well-suited for examining consumer perceptions, satisfaction, and behavioral trends. The use of random sampling through online surveys, while practical for an exploratory study, poses potential limitations regarding representativeness across diverse demographic and income groups. Nonetheless, this approach remains justifiable given the study's scope and objectives. The analytical procedures, conducted using SPSS-based statistical tools, were methodologically rigorous, with reported confidence intervals that lend credibility to the findings. However, the relatively small and geographically specific sample—limited to Indonesia—reduces the

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generalizability of the results to broader contexts. The findings effectively align with the central research question, offering insights into whether fintech operates as a disruptive or complementary force within the banking sector. The authors acknowledge several methodological limitations, including the constrained sample size, reliance on convenience sampling, and the absence of more advanced analytical techniques such as Partial Least Squares regression, which could enhance future analyses. Overall, the paper situates its conclusions within the broader global discourse on fintech, portraying financial technology as both a competitive and symbiotic influence on traditional banking systems. In order to understand deeper, the implications of Fintech, a case-based approach is required. The next section delves deeper into the cases of India, Kenya, Egypt and the US.

4. Fintech, financial inclusion and their role promoting sustainable development – Lessons from a cross-cultural perspective

4.1 India

The study researching financial inclusion in India by Kandpal and Mehrotra in 2019 questions the impact that new innovations in financial technology and digital financial services have impacted financial inclusion in India. Specifically, it analyzes issues affecting Fintech in India, such as low internet penetration, bank accounts, an absence of hardware and more hands, and a lack of funds, as well as future prospects of fintech towards financial inclusion. The study is comprised of a literature review which researches a multitude of studies such as:

- The Development Research Project (2013), which attempted to understand the financial needs of poor in the long-term and short-term;
- CRISIL (2013) which measured the extent of financial inclusion in the form of an index, calculated through the number of individuals having access to various financial services rather than loan amount;
- RBI(Reserve Bank of India) (2014a), of which focused on designing principles for maximum financial inclusion and increased access to financial inclusion through the proposition of full-service electronic bank accounts; and,
- RBI (2014b), which described the various challenges and alternatives in the domain of technology that could help large-scale expansion of mobile banking across India.

Through these sources, the study described several issues that affected the Fintech landscape in India. Primarily, low internet penetration as India does not have good connectivity and the majority of the population is still very new to the concept of smartphones; bank accounts, as the

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majority of people do not even own bank accounts, making it more difficult for Fintech to grow in the Indian economy; an absence of infrastructure and skills; and the lack of funds, as new Fintech generally stems from startups, which are often in need of more capital to fully mature.

Kandpal and Mehrotra's (2019) study concludes that (Micro, Small, and Medium-Sized enterprises) MSMEs are very important as major drivers of the economy and a critical employment generator. In addition to the large market of unserved/underserved populations that Fintech can reach out to, there is a critical need to innovate for the mass market and address challenges such as the lack of financial and digital literacy and restrictive regulatory policy. Moreover, India is a large untapped market for financial service technology startups, as 40% of the population is currently not connected to banks. However, ultimately, new technologies will not be as successful until customers are satisfied with privacy and security aspects, and it will also require some time to earn confidence among the customers even if it is easier and cheaper than traditional methods of financial service. While the study's importance is to be considered, the sampling of articles for the literature review was not stated in the paper with a limited in scope analysis. The paper, while being useful contextually, lacks depth and breadth.

Later on, Goswami, Sharma, and Chouhan's paper published in 2022 discovers the specific impacts of FinTech on Financial Inclusion in Rural India. Within the study, the authors' note how India is an extensive country, rich in minerals, marble, and tourism. However, prominent tribal and rural areas suffer from slow economic growth, poverty, and exclusion from formal financial services. In this fragmented environment, managing finances is difficult but pertinent, and so they need a variety of financial services to support their situation. The research purpose of their paper is to analyze the critical success factors that influence the adoption of financial technologies for financial inclusion in rural India, and how these implementations impact entrepreneurship, employment creation, and access to financial services in underdeveloped regions. The methodologies employed within the paper include a literature review and statistical analysis and utilize both primary and secondary sources of data. The literature review was utilized to identify concepts and factors that were significant in identifying the impact and drivers of financial inclusion through fintech adoption. Through this, the authors were able to find factors such as perceived usefulness, perceived ease-of-use, and usability. The authors' constructed a framework drawing from the Theory of Reasoned Action, Theory of Planned Behavior, Technology Acceptance Model, and Unified Theory of Acceptance and Use of Technology to understand perceived risk as influencing factors in accepting and predicting outcomes of fintech services. It is also important to note that the primary data was found through a survey to ensure representation from rural India.

The data allowed the authors to create a structural model representing how the factors interacted with Fintech Financial inclusion, presented in the figure below (Figure 1).

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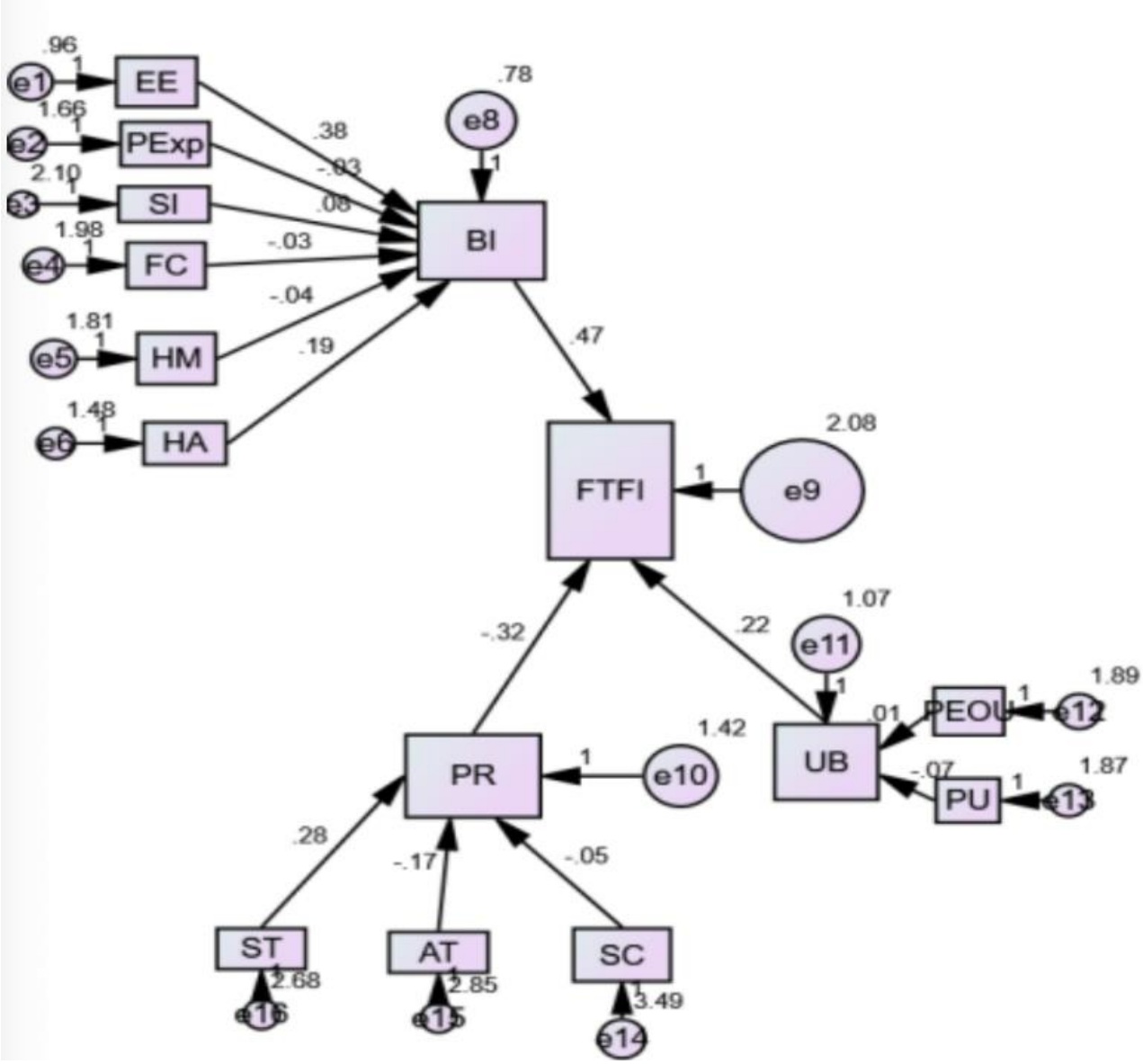
Figure 1: Path Diagram with Coefficients (Goswami, Sharma & Chouhan, 2022, pg. 10)



Goswami, Sharma and Chouhan (2022) have concluded that fintech is crucial for financial inclusion and poverty reduction, as there is still a significant portion of the rural population that still lacks access to basic banking services. Moreover, rural respondents showed strong behavioral intentions to adopt fintech for financial transactions and inclusion. Many are already utilizing them frequently and find it beneficial. Moreover, recommendations from peers and respected individuals is pivotal in the adoption of Fintech. However, there are still concerns about privacy risks, agent trust, and service trust. Ultimately, the authors propose that fintech

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adoption leads to income and savings improvements, policymakers and service providers should focus on reducing the perceived risks and enhance trust, and a citizen data registry of FinTech users could help tailor financial services and monitor inclusion progress. The results were conclusive, primarily because it provided new insights to the domain on how particular units of behavior such as effort expectancy lead to broader effects of, for example, behavioral intention, and ultimately how that leads to fintech financial inclusion, providing a comprehensive and niche result. The author takes note that research in the area of FinTech is still in its early stages, and that more contextual analysis of the current situation in the future would provide a more accurate analysis towards the critical success factors of different levels of adoption of financial technologies.

To explore the landscape of fintech and financial inclusion the case of Kenya is further explored. The next section elaborates on this.

4.2 Kenya

The research study by Kondongo and Odongo in 2023 examines how Digital Financial Services(DFS) influence financial inclusion and whether this relationship improves entrepreneurship outcomes in sub-Saharan Africa, specifically Kenya. Their research questions were structured around whether the use of digital financial services enhances financial inclusion in Sub-Saharan Africa, if increased financial inclusion stimulates entrepreneurship in the region, and what the mediating role of financial inclusion is in the relationship between DFS and entrepreneurship. Utilizing the Ordinary Least Squares regression and secondary data from the 2017 Global Findex Database, the study found a significant improvement in financial inclusion across sub-Saharan Africa with the implementation of DFS usage. Moreover, the study identifies that higher financial inclusion was associated with a greater likelihood of owning a business and that financial inclusion, indeed, does mediate the relationship between DFS and entrepreneurship. In the study, Kondongo and Odongo also note how DFS is crucial to promote inclusive entrepreneurship, especially among underserved groups in SSA(Sub-Saharan Africa). DFS achieves this by lowering the barriers to entry for financial participation by making it more accessible, especially in rural and informal settings where traditional banking is not very prominent. Undeserved groups like women, rural residents, and low-income groups benefit the most because they can access micro loans and save securely without needing a bank, reduce the cost and time of financial transactions, and support business startup and growth.

Kondongo and Odongo in 2023 then make several propositions. Policymakers should foster financial literacy, expand mobile internet connectivity, and support regulatory environments to promote innovation. To foster financial literacy, policymakers ought to promote community-based education programs targeting financially excluded populations, add financial education in

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school curriculum, and use radio and mobile platforms to deliver financial literacy. To expand mobile internet connectivity, the authors' recommend Kenya further invest in rural telecom infrastructure through public private partnerships, encourage telecom providers to extend service coverage by offering tax incentives or subsidies, and facilitate access to affordable mobile phones via device subsidies or micro-leasing loans;

Lastly, to support innovation through regulation, the authors' state the need for regulatory sandboxes that allow fintech to test new products, strengthen consumer protection laws and data privacy frameworks to build trust and minimize risk, and promote interoperability. The results conclusively identified beneficiaries of the fintech ecosystem, the channels in which fintech ecosystems work, and how the usage of products in financial institutions, financial markets, and mobile banks are affected. The authors' note that because the data was made of surveys from 2016 and 2021, the significance of this data in the present time may be limited.

Abdalla's (2023) study examines the impact of fintech strategies on financial inclusion in Kenya, focusing on fintech savings, credit, regulation, and transactions. Using secondary data from 2018–2022 collected through KBA, CBK, individual banks, and fintech firms, the study applied regression and Pearson correlation analyses to identify how these factors influence financial inclusion. The results revealed that fintech regulatory measures had the largest positive marginal effect, where a one-unit increase in regulatory development (e.g., policy improvements or consumer protection frameworks) was associated with a 10.103 point rise in the Financial Inclusion Index—a considerably higher impact than fintech transactions, which increased inclusion only marginally per unit change. In other words, regulatory improvements yielded over ten times the inclusion gains compared to transaction-based fintech activity. This indicates that regulatory clarity and consumer confidence are far more influential drivers of inclusion than transaction volume alone. Policymakers and financial institutions can therefore prioritize fintech governance and oversight frameworks to meaningfully expand access to financial services.

Abdalla (2023) recommends that there should be an emphasis on bolstering the accessibility to financial credit, stating that many methods, such as streamlining the credit application and approval processes, adopting alternative credit scoring methods, and tailoring credit products to offer the diverse needs of different segments would all be beneficial in action towards his recommendation. It is important to note that contents of the study are limited to the 4 factors examined during the study: Fintech Savings, Fintech Credit, Fintech Regulatory, and Fintech Transactions. Thus, it may not describe the full breadth of the impacts of FinTech strategies on financial inclusion.

From a broader perspective, Ololade's (2024) study examined the role of fintech innovations in enhancing financial inclusion within the distinct socio-economic contexts of Africa; identifying

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the key drivers, challenges, and outcomes of fintech initiatives aimed at promoting financial inclusion in both regions; to evaluate the impact of regulatory environments, technology adoption rates, and market needs on the effectiveness of fintech solutions in achieving financial inclusion; and to provide insights into best practices and lessons learned from fintech initiatives in Africa and the U.S., with the potential for cross-regional application and adaptation. The study employs a conceptual and comparative methodology grounded in an extensive review of existing literature, theoretical frameworks, and secondary data sources. Rather than conducting primary research, the author synthesizes academic studies, policy reports, and case examples to explore the role of fintech innovations in enhancing financial inclusion across Africa and the United States. The research is structured around key themes such as mobile money, digital banking, regulatory environments, and digital literacy. It draws on theoretical models like the Diffusion of Innovations Theory and the Technology Acceptance Model (TAM) to interpret patterns of technology adoption and user behavior. Through a qualitative, policy-oriented lens, the paper conducts a thematic and cross-regional analysis to highlight the differing drivers, challenges, and impacts of fintech solutions within each socio-economic context, offering insights that are both analytical and practical for policymakers and stakeholders.

Financial inclusion has been traditionally low due to widespread poverty, the lack of banking infrastructure, and low literacy levels. However, the study finds that fintech has improved financial inclusion in both Africa, though through different approaches—mobile money drives access in Africa. The rapid adoption of mobile money services serves as a driver to enable access to financial services. Africa faces challenges like regulatory barriers, digital literacy gaps, and trust issues. Furthermore, the paper emphasizes that tailored regulation, user-centered design, and emerging technologies are key to maximizing fintech's impact on inclusion. The study concluded that in Africa, mobile money and digital banking platforms have significantly increased access to financial services for the unbanked and underbanked populations, which addressed challenges from the inadequate physical banking infrastructure and the previous financial service barriers. Ololade specifies how Mobile money services have become synonymous with fintech innovation in Africa, allowing users to store, send, and receive money using mobile phones, pay bills, and access credit and insurance products. Moreover, Digital Banks and Neobanks such as TymeBank offer fully digital banking experiences, with low fees and services tailored to the needs of the underbanked. Lastly, Startups are looking at the blockchain or remittances, identity verification, and to secure property rights. The Central Bank of Kenya's supportive stance on mobile money has been crucial for M-Pesa's success. These regulatory frameworks aim to balance innovation with consumer protection, ensuring that fintech solutions contribute positively to financial inclusion.

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The research methodology consisted of a theoretical framework and a literature review. The research methodology fits the purpose well as the TAM(The Technology Acceptance Model) is a good model to examine question 2 and 4 because of the framework's strength in assessing challenges and outcomes in Technology Acceptance Stages for question 2, and the framework's strength of making comparison between different practices and lessons for question 4, while the literature review is helpful in answering every question overall. He identifies the primary challenges in Africa's fintech adoption with a lack of physical infrastructure to support their developments are heavily related to the general debate of literature. However, it is important to note the study's lack of emphasis towards the issue of data privacy and security towards adoption in Kenya, which was a significant similarity with a majority of other articles prevalent in the literature.

4.3 Egypt

Hussein's (2020) article identifies a major problem that represents current research findings in Egypt. Specifically, he targets the lack of vision and mapping strategy for financial inclusion in Egypt, leading to the need for collaborative efforts between relevant entities from different stakeholders to compile accurate data and information about the current landscape, especially data on the informal economy, an obstacle to achieving financial inclusion. This benefits policymakers in setting up the policy of the state in the right path. Hence, His study aimed to fill in these gaps to identify an accurate depiction of the role that financial technology has had on the impact of financial inclusion within the case of Egypt. The study's literature review focused on Fintech, Financial Inclusion and their impact on Economic Development Literature on Fintech. Through Hussein's statistical analysis of data and literature review, he calculated the odds of financial inclusion in certain countries in the middle east such as Bahrain, Ethiopia, and Jordan, and that education had a significant effect on financial inclusion.

Hussein (2020) also found that financial inclusion can be based on multiple dimensions: Access to financial products and services, Financial ability, Quality of financial services and products, and effective regulation and oversight to ensure the delivery of financial products and services in an environment of financial stability. Furthermore, the literature review provided insights on the positive effects of Fintech on macroeconomic situation related to economic growth; Hussein describes benefits such as a reduction of informal economy and integration in formal economic activities of the government in compliance with local labor laws; automating government payment and collection transactions by avoiding risks of tax collection like fraud and manual money transfer by improving less cash methods of different payment transactions cash or cheque. improving financial innovation like savings and e-payments including P2P lending, E-commerce and introducing new credit scoring instruments; allowing the government to reduce spending by improving and providing subsidies to the right target poor groups in lower

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transactions and minimum administrative costs; Supporting and enhancing financial inclusion by facilitating those who are living in remote areas i.e. rural areas to access finance rather than travelling outside the village and connecting them to urban areas; providing affordability of saving money and executing basic transactions like bill payments i.e. electricity and money transfers (remittances); and decreasing operational costs when lending, transfer or paying small sums which are almost impossible with traditional ways when using banks. Lastly, the literature review studies how very limited academic research on the role of fintech development, and how this paper aims to make contributions in this aspect to provide greater context of their situation.

Ultimately, Hussein (2024) identifies that the CBE acknowledges the potential to access that fintech provides. However, there are still many current challenges that come with these implementations, such as Egypt's strong cash culture, expansion and restricted accessibility, and acceptability to digital financial services, and the digitalization of payment systems and other financial services. In terms of regulatory challenges, there are issues in the agent network distribution, the development of electronic know your customer infrastructure (E-KYC), the implementation of payment service provider interoperability, and the lack of financial and consumer literacy. The author recommends a vibrant more dynamic network of agents for the delivery of digital financial products, the enabling of e-KYC to easily embark and verify customers, rendering payment systems interoperable and interconnected, improving financial literacy and consumer protection through the preparation of a national strategy in collaboration with banks, a stable internet connection, cybersecurity and privacy protection, and the completion of the G2P(Government to Person) payment roadmap through Meeza Cards (Special Debit cards used by Egypt)

4.4 The U.S.

While financial technology has exacerbated effects in developing countries, it also has a significant impact in developed countries such as the US. Following Ololade's (2024) comparison of African and U.S initiatives. The paper examined the role of fintech innovations in enhancing financial inclusion within the distinct socio-economic contexts of Africa and the US; identifying and comparing the key drivers, challenges, and outcomes of fintech initiatives aimed at promoting financial inclusion in both regions. Specifically in the U.S., the study finds that FinTech has improved financial inclusion in the U.S., digital tools enhance service quality. The U.S. has a well-established financial infrastructure, but still faces disparities in access to financial services, particularly in low-income households, minorities, and rural populations. Fintech innovations in the U.S. have a greater focus on enhancing the quality of their financial services. Digital banking, P2P lending, and financial management apps are prevalent drivers in enhancing such quality. The country still faces challenges like regulatory barriers, digital literacy gaps, and trust issues. The paper emphasizes that tailored regulation, user-centered design, and emerging

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technologies are key to maximizing fintech's impact on inclusion. The study concluded that in the US, financial services have also become more accessible, efficient, and tailored to consumer needs with payment apps, Robo-advisors, and P2P lending platforms. Due to the complex regulatory environment that the U.S. has, the Office of the Comptroller of the Currency's (OCC) fintech charter aims to provide a clearer framework for fintech operations. Technology startups are also at the forefront of fintech innovation, driving US competition and collaboration with traditional banks. Moreover, government policies like the JOBS Act have provided a foundation for fintech growth through the easing of securities regulations, incentivized crowdfunding, and fostering innovation. However, in some segments of the U.S., there still remain a population in which individuals are less familiar with digital technologies. Moreover, trust in financial institutions plays a role, especially in the U.S., where concerns around data privacy and security with the constant threat of cyber-attacks and data breaches are present, have created insecurity in the adoption of new FinTech solutions.

On similar grounds, Khan, Haque, Azim, Samad, Jafor, Aziz, Faruq, and Khan's (2024) article explored the disrupting power of Fintech on the structure and functioning of the financial services sector in the U.S. (how it will change old financial institutions), explore the difference in progressive effects while comparing developed and developing economies, and the changing regulatory regime that influences FinTech activities and how regions are attempting to adapt with changes in the industry. Specifically, it looks into how these are applicable in the views of developing and developed economies. They collected their data through the World Bank, the International Monetary Fund (IMF) reports, and performance financial data of the Fintech companies' leaders. The domain of collection was through the case of developed countries and developing countries to develop a comparative analysis in different economic conditions.

The study found that there were many differences in the effects of the implementations of FinTech technology in comparing developed and developing economies, as shown below:

Table 2: Comparative Impact of FinTech on Developed vs. Developing Economies (Khan, Azim, Samad, Jafor, Aziz, Faruq & Khan, 2024, p. 6)

Factor	Developed Economies	Developing Economies
Market Efficiency	High improvement	Moderate improvement
Financial Inclusion	Moderate improvement	High improvement
Regulatory Challenges	Complex regulations	Developing regulations
Economic Growth	Steady growth	Rapid growth

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Developed countries generally had an improvement in financial systems, improving sophistication and efficiency on existing financial systems. For example, Blockchain technology. There were also improvements in the cost of financial services and positive investment returns. However, for developing countries, more unbanked people were able to participate economically through money transfers using mobile devices, improving financial inclusion by providing services to unbanked individuals. Ultimately the authors suggest that policymakers take part in the promotion of practical but robust regulatory systems to orchestrate the fusion of Fintech with the financial sector with possible risks in mind.

The numbers conclusively provided meaningful insights towards how specific factors such as market efficiency, financial inclusion, regulatory challenges, and economic growth are impacted through the implementations in fintech in comparing developed economies and developing economies. Moreover, we gained insights to key trends that are drivers of financial inclusion. It is important to note that the data in the study stemmed from self-reported responses that may have led to self-report bias, the data availability variation as financial data is not uniformly available or reliable across different countries, and the rapid evolution of Fintech meaning the paper could become outdated very fast.

In sum, the U.S. experience shows how FinTech can deepen inclusion primarily by improving service quality and personalization within a mature financial system, even as persistent gaps—digital literacy, trust, privacy, and a fragmented regulatory landscape—temper its reach for low-income, rural, and minority communities. These dynamics mirror a broader pattern across contexts: the same tools that enhance efficiency can also reproduce existing divides if design and oversight are not explicitly inclusive. This sets the stage for a cross-cultural framework that distinguishes universal enablers (e.g., interoperable payments, e-KYC, consumer protection) from context-specific levers (e.g., agent networks, mobile coverage, ID systems), clarifying when and how FinTech translates into meaningful access, usage, and quality. The next section develops this framework and distills propositions to guide policy and practice across developed and developing settings.

5. A cross-cultural holistic conceptual framework

To ground the analysis, we present a comparative conceptual matrix of FinTech elements that promote (Table 3) and hinder (Table 4) financial inclusion. These levers are broadly applicable across contexts, but their strength and interplay vary. Organized into five recurring themes, the tables link concrete mechanisms to inclusion outcomes—access, usage, and quality. Read them as a consolidated toolkit whose effects are widely relevant, with impact magnitudes shaped by local conditions. The propositions that follow separate universal patterns from those amplified by context.

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Table 3: Summary of FinTech elements that promote Financial Inclusion

Main Themes	FinTech elements that promote FI
1.Digital Access and Money Mobility	Mobile money and digital payment systems
	Money mobility (sending, receiving, and storing money digitally)
	Digital credit and e-payments
	Digital banks and neobanks offering low-fee, fully digital services for the underbanked
2. Cost Efficiency and Affordability	Lowering transaction costs and operational expenses
	Reduced need for physical infrastructure (branchless banking)
	Affordable microtransactions (e.g., small remittances, bill payments)
	Round-up savings features (automated savings through small digital transactions)
3. Policy and Regulatory Frameworks	Tailored regulation and user-centered design in fintech policy
	Frameworks promoting inclusive and secure digital finance
	Regulations reducing risks of fraud and improving tax collection systems
4. Financial Innovation and New Technologies	P2P lending platforms and e-commerce payment systems
	New credit scoring instruments
	Blockchain for property rights security

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	Emerging technologies supporting financial literacy and access
5.Social and Developmental Impact	Expanded access to financial services in low-income countries
	Empowering marginalized and economically disadvantaged populations
	Reducing the size of the informal economy
	Supporting sustainable development through digital access and literacy

Table 4: Summary of FinTech elements that hinder Financial Inclusion

Main Themes	Fintech elements that hinder FI
1.Digital Access and Money Mobility	Digital divide (gap in access to technology between socioeconomic groups)
	Restricted accessibility and weak agent network distribution
	Data privacy and security concerns
	Cyberattacks and data breaches
2. Cost Efficiency and Affordability	Commercialization of fintech prioritizing profit over inclusion
	Predatory lending or high-interest digital loans causing over-indebtedness
	Regulatory barriers increasing service costs
	Regulatory barriers and inconsistent enforcement

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3. Policy and Regulatory Frameworks	Developing E-KYC infrastructure challenges
	Struggles to compile accurate data in informal economies
4. Financial Innovation and New Technologies	Instant unsecured digital loans with minimal credit checks
	Inaccurate or incomplete data affecting alternative credit scoring reliability
5.Social and Developmental Impact	Digital literacy gaps limiting effective usage
	Lack of trust due to data misuse or opaque fintech practices
	Uneven adoption deepening socioeconomic inequalities

Viewed together, the two tables outline a coherent inclusion playbook: entry is unlocked by low-friction onboarding and interoperable rails, sustained by trust, literacy, and usable design, and threatened when rapid commercialization outpaces safeguards or gaps in access persist. What ultimately matters is how these levers are sequenced and combined in each setting. Building on this synthesis, the next section articulates concise propositions that specify which mechanisms travel universally and which gain or lose force under particular infrastructural, regulatory, and human-capital conditions.

6. Conclusion

The comparative findings emphasize that FinTech's contribution to financial inclusion depends heavily on contextual and institutional factors. In emerging economies such as Kenya, India, and Egypt, digital financial services have reduced access barriers through mobile money networks, digital credit, and payment interoperability. In contrast, developed economies like the United States showcase FinTech's focus on efficiency, data analytics, and personalized services rather than basic access. Figure 2 below illustrates these differences through stakeholder-to-impact flows, showing how distinct actors, regulators, fintech companies, and policymakers—shape inclusion outcomes across varying economic contexts. Across these varied settings, the extent to which FinTech mitigates or amplifies inequality is determined by regulatory oversight, digital infrastructure, and the inclusivity of national financial systems.

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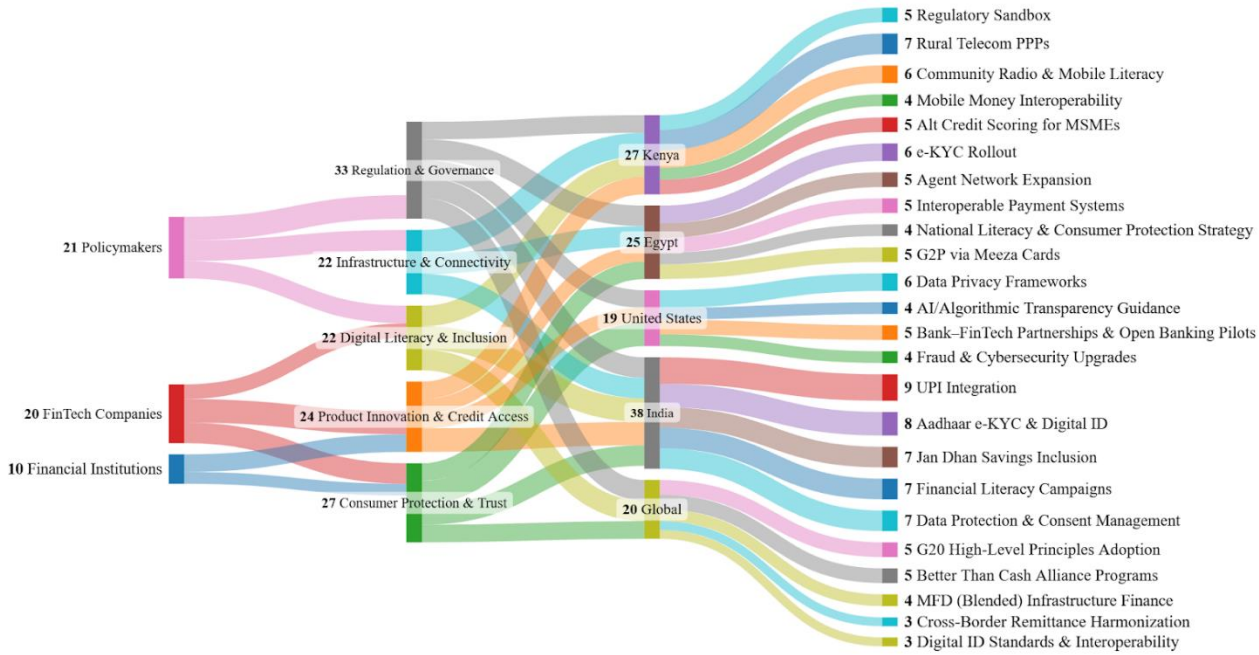
Figure 2: Stakeholder-to-Impact Flows in Financial Inclusion



This review underscores FinTech's transformative role in reshaping financial inclusion worldwide, while revealing stark contrasts in outcomes between developed and developing economies. In countries such as Kenya and India, mobile money and low-cost digital solutions have extended financial access to underserved populations, catalyzing poverty reduction, entrepreneurship, and broader participation in the formal economy. By contrast, in developed contexts such as the United States, FinTech has been most impactful in enhancing efficiency, reducing costs, and delivering more personalized financial services, though structural gaps persist among low-income and rural communities.

These comparative findings highlight that the potential of FinTech is contingent on context, shaped by regulatory environments, infrastructure, and digital literacy levels. While innovation has expanded financial access, unresolved challenges, including cybersecurity vulnerabilities, data privacy concerns, over-indebtedness from digital credit, and the commercialization of inclusion, pose risks of reinforcing exclusion. The study emphasizes that inclusion cannot be assumed as a by-product of technological progress; rather, it must be deliberately embedded within design, regulation, and practice.

The paper advances a cross-cultural framework and policy recommendations aimed at balancing innovation with oversight. Governments should strengthen regulatory clarity, expand digital

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literacy, and invest in inclusive infrastructure; financial institutions should co-develop affordable, user-centric products; and FinTech firms must prioritize security, transparency, and accessibility. Ultimately, FinTech's promise lies not only in technological disruption but in its capacity to foster equitable, sustainable, and resilient financial ecosystems.

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