THE ROLE OF FINANCIAL TECHNOLOGY IN ENHANCING FINANCIAL INCLUSION: A REGULATORY PERSPECTIVE ON CURRENT INDUSTRY TRENDS

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Abstract

Despite increasing global digitalization, access to essential financial services remains limited for many populations in the Middle East and North Africa (MENA). However, growing financial technology (FinTech) innovations have started disrupting conventional models and extending access. This research study evaluates FinTech's role in advancing financial inclusion in the MENA region amidst the digital transformation. It first analyzes how emerging technologies transform traditional banking and financial service delivery. It then evaluates the effectiveness of crucial FinTech models such as digital payments, lending platforms, insurance technology (InsurTech), and wealth management tools in driving inclusion in Gulf Cooperation Council (GCC) countries. The study utilizes a mixed-methods approach involving a comprehensive literature review and comparative case studies of FinTech adoption and inclusion trends in developed and emerging markets. The findings indicate that while FinTech solutions have improved access for previously underserved segments like women, youth, and small and medium-sized enterprises (SMEs), continued efforts are required to address marginalized communities' barriers. The research suggests a balance between regulatory measures and consumer protection in FinTech, emphasizing the need for collaborations to enhance technology's role in livelihood support.

Keywords: Disadvantaged Communities, Inclusivity, Financial Innovation

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1. INTRODUCTION

The Fourth Industrial Revolution, characterized by the rapid use of physical, digital, and biological technologies, significantly altered the finance industry. Advances in artificial intelligence (AI), data analysis, digital ledger techniques, cloud-based systems, and connected devices have transformed financial services and apps (Aljaloudi, 2020). This shift allows industries to engage in automation and customization of services. However, uncertainties on how societies and economies will adapt to banking, investments, and other alterations in the coming years still remain. Despite massive financial

advancements since the global meltdown in 2008, the overall ability of people to gain essential financial services needs improvement. In a report from the World Bank (2017), over 1.7 billion adults globally lack access to crucial services. These include savings accounts, credit, insurance, and payments. The exclusion rate varies heavily across regions. The research identifies the Middle East and North Africa (MENA) region as having faced critical financial inclusion challenges. Adults in some MENA countries lack access to essential financial services. Traditional bank-dominated systems have struggled to effectively serve the needs of low-income groups and remote communities (Demir et al., 2022). Fortunately, growing digital connectivity across the region and adopting innovative financial technology (FinTech) solutions have started disrupting conventional models and extending financial access to previously underserved population segments. This research study aims to find the contribution of FinTech in increasing society's financial inclusion in the MENA region in the Industrial Era 4.0. The specific objectives are to:

1) analyze how FinTech innovations are transforming traditional banking models and the delivery of financial services in the digital era across the MENA region; this involves assessing the impact of blockchain, AI, mobile payments, etc.;
2) evaluate the effectiveness of crucial FinTech models in driving financial inclusion in Gulf Cooperation Council (GCC) countries, including digital payment solutions, online lending platforms, digital wealth management tools, and insurance technology (InsurTech) applications;
3) identify specific demographic segments in the GCC that have benefited most from increased access to finance enabled by FinTech adoption, such as women, youth, small and medium-sized enterprises (SMEs), migrant workers, and rural communities;
4) assess changes over time in financial inclusion indicators and indexes for selected GCC nations relative to advancing FinTech usage, regulatory frameworks, and supporting infrastructure;
5) examine the national FinTech strategies, policies, and regulatory sandboxes established by leading economies in the GCC to sustain the innovative digital transformation of the financial services industry while upholding consumer protection and data privacy standards.

By answering the research questions below, this study seeks to provide insights into FinTech's real contributions to date and future pathways for enhancing access to finance on a global scale through continual digital transformation. The findings will be helpful for policymakers, regulators, FinTech firms, and traditional financial institutions in maximizing technology's role in achieving universal financial inclusion. The questions are as follows.

RQ1: How have emerging technologies such as blockchain, AI, and mobile payments transformed traditional banking and the delivery of financial services across the MENA region?

RQ2: Which FinTech models, such as digital payment solutions, online lending platforms, digital wealth management, and InsurTech applications, have most effectively driven financial inclusion in GCC countries?

RQ3: What demographic segments in the GCC, such as women, youth, SMEs, migrant workers, and rural communities, have benefited most from increased access to finance enabled by FinTech adoption?

RQ4: What national FinTech strategies, policies, and regulatory frameworks have leading GCC economies established to promote FinTech-driven inclusion while ensuring consumer protection and data privacy standards?

The structure of this paper is as follows. Section 2 reviews the relevant literature. Section 3 explains the methodology used to conduct empirical research on FinTech's contributions to increasing financial inclusion in developing and emerging economies globally, specifically in GCC nations. Section 4 presents and analyses this research's findings based on the objectives. Section 5 offers the discussion. Finally, Section 6 provides concluding thoughts and recommendations.

2. LITERATURE REVIEW

2.1. Overview of the leading technologies that power FinTech

AI uses algorithms and computational methods to focus on processing voluminous data. Distributed ledger technology (DLT) refers to databases that update across various connections. Blockchain, the most well-known type of DLT, uses cryptography and distributed databases to securely record transactions in an immutable, transparent, and decentralized digital ledger (Tapscott & Tapscott, 2017). Cloud computing provides on-demand access to shared pools of configurable computing resources such as servers, storage, databases, and services over the Internet on a pay-per-use basis (Mell & Grance, 2011). The Internet of Things (IoT) refers to the network of physical objects embedded with sensors, software, and other technologies that connect and exchange data with other devices over the Internet (Atzori et al., 2011). FinTech's success relies on these technologies, which the research will be referring to in researching on inclusivity.

2.2. FinTech and financial inclusion

2.2.1. Defining and measuring financial inclusion

Financial inclusion refers to accessing formal financial services at affordable costs to fulfil the needs of adequately participating in the economy (Khalaf & Wadi, 2023; Yakubi et al., 2019). Evaluation of major financial services transitioned from binary inclusion towards considering usage depth involving transaction frequency and service diversity (Khmous & Besim, 2020; Niankara, 2023). National surveys quantified excluded populations, prompting tailored policy responses to extend physical and digital infrastructure availability where lacking (Emara & El Said, 2021; Khalaf & Wadi, 2023). Multidimensional indices evaluated demand, access, and quality across gender, location, and economic groups, factoring digital and human barriers (Al-Smadi, 2023; Cicchiello et al., 2021). Global indicators benchmarked progress annually toward 2030 goals set by respective nations and global communities (Emara & Mohieldin, 2021; Demir et al., 2022).

2.2.2. Barriers to inclusion and population segments traditionally excluded

The current concerns entail the predominant barriers to financial inclusion, which have excluded the population from progressive activities. Geographical barriers are evident because traditional banking models face difficulties servicing remote communities due to their distances. Disadvantaged populations mainly live in rural villages and isolated areas with limited mobility options (Porteous, 2005). Economic barriers have also been prominent, which create the inability to continually meet minimum account balance thresholds, leading to restrictions on low-income demographic usage of conventional banking frameworks (Beck et al., 2007). Digital barriers have then impeded the ability to include different populations. Financial illiteracy and lack of digital/technological infrastructure were additional impediments to adopting electronic banking among specific cohorts (Porteous et al., 2005). FinTech could not be utilized by individuals with a low understanding of the fiscal scope and how to navigate the platforms.

The project also identifies socio-cultural barriers. Unfortunately, cultural traditions occasionally obstruct the participation of groups like women in formal economic activities due to societal gender roles (Amidžić et al., 2022). Subsequently, there are age barriers whereby youths and seniors face distinctive impediments when engaging mainstream banking infrastructure. The young need to establish records, while elders confront difficulties adapting to modernizing technological environments (Mas, 2009). Moreover, the population has been facing critical exclusion of marginalized groups. Minorities, refugees, persons with disabilities, and sexual orientation communities tend to be overlooked or denied access due to general societal prejudices (Amidžić et al., 2022). The other barrier entails know your customer (KYC) norms. Stringent customer verification policies mandated by regulated bodies impose challenges for proof-less individuals to open traditional accounts (Demirguc-Kunt et al., 2018).

2.2.3. Identification of market segments positively impacted by FinTech

The market is segmented into various categories based on gender, age, and people's income. The first segment is women, whereby FinTech has produced goods tailored for female consumers, which challenges socio-cultural norms that previously obstructed participation (Kazemikhasragh et al., 2022; Cicchiello et al., 2021). The other population is the youth because younger demographics now have opportunities to build early financial identities and histories through entry-level online transaction accounts provided by FinTech firms (Emara & Mohieldin, 2021). The other segment is the SMEs, which include the micro, small, and medium enterprises that have benefited from FinTech lending platforms, expanding alternative funding sources beyond limited bank credit (Ashfaq & Zada, 2021). Additionally, migrant workers, who will be supported through innovations that provide remittance transfers and digital wage disbursements, have improved the financial access of migrant labour populations in GCC countries (David & Williams, 2022). FinTech is also concerned about rural communities by filling gaps to facilitate access even in geographic areas traditionally underserved due to their distance from physical bank branches (Lukonga, 2021). Lastly, the company focuses on the low-income population. Several studies have found that FinTech platforms are helping address barriers faced by low earners. Demir et al. (2022) and Al-Smadi (2023) find features like intra-day credit lines accommodate fluctuating cash flows between wages.

2.2.4. Role of digital finance in extending access

FinTech's digital finance has improved to ensure everyone can access all needed services. Mobile money platforms have enabled access to essential payments, savings, and credit among remote/rural populations with limited infrastructure by overcoming spatial barriers (Lukonga, 2021; Naz et al., 2022). The company has also developed digital lending platforms to increase small-value loan availability for individuals lacking collateral or credit histories in traditional systems by assessing alternate online data sources (Demir et al., 2022; Hussein, 2020). Fortunately, digital payment systems lowered transaction costs, boosting inclusion for micro-businesses and self-employed individuals facing bank requirements by facilitating scaled access (Ashfaq & Zada, 2021; Niankara, 2023). FinTech also recognizes that mobile savings tools provide convenient phone options to improve inclusion by catering to the needs of low-income users accustomed to irregular incomes (Al-Smadi, 2023; Khalaf & Wadi, 2023). Another improvement involves digital remittance platforms, which have enabled faster, affordable cross-border transfers benefiting migrant labourers who are contributing funds to homes, as studied by Lukonga (2021) and Naz et al. (2022). Lastly, FinTech embraces electronic KYC (eKYC) technologies to reduce paperwork for account opening through remote identification methods, counteracting traditional barriers as discussed in Lukonga (2021) and Schilirò (2021).

2.3. Country case studies of FinTech adoption and inclusion impacts to date

2.3.1. Developed markets in the GCC

FinTech has successfully developed various markets in the GCC, which have been performing well for the past period. United Arab Emirates (UAE) (developed) comprises 85% of adults who are now financially included, a significant rise from 57% in 2011 (Niankara, 2023; Attia, 2020). The other market is in Saudi Arabia (developed), where 73% of Saudis are financially included, according to a 2018 statistic pointing to continued growth amid ongoing digital transformation and new opportunities in Islamic FinTech (Attia & Benson, 2018). The third market is in Bahrain (developed), which is around 79% of Bahrainis who are now financially included. The inclusivity has increased from 60% in 2017, reflecting the supportive infrastructure like regulatory sandboxes, although inclusion remains below other GCC levels (Niankara, 2023).

2.3.2. Financial inclusion in emerging MENA markets: A comparative case study assessment

In Afghanistan, account ownership remained steady at 33–39% in recent years, according to World Bank's data, despite nascent growth in mobile money solutions. Similarly, in Pakistan, account penetration also hovers in the 33–39% range while facing analogous barriers restricting FinTech's potential inclusive role due to gaps in rules and networks, as highlighted by Lukonga (2021). Boosting inclusion levels across financing and payments will require additional regulatory progress. Around 67% of Egyptians presently hold bank accounts, as per Emara and El Said (2021) and Cicchiello et al. (2021).

2.4. National FinTech strategies, policies, and regulatory sandboxes

The GCC nations have emerged at the forefront of FinTech innovation and regulatory development in the MENA region. The UAE is a pioneering model, particularly in Dubai, emphasizing FinTech-friendly regulations. Schilirò (2021) outlines regulations launched in 2016 forming the core of Dubai's FinTech regulatory infrastructure, including guidance on crowdfunding, digital currencies, and regulatory sandboxes. Saudi Arabia aims to become a global FinTech hub via strategies like the National FinTech Strategy (Hariri, 2023). It established the Saudi FinTech authority and regulatory sandbox programs focused on payment solutions and SME financing (Gulrez, 2021). Bahrain pioneered sandbox frameworks and actively engaged stakeholders in balanced rule creation (Allen, 2021; Lukonga, 2021). Collectively, these approaches attracted substantial investment yet face ongoing challenges ensuring agile rule-making synchronizes with industry progress (Naz et al., 2022).

2.5. Gaps in existing literature

Most studies have examined FinTech's impact on financial inclusion at a country or regional level, but only some have undertaken cross-country comparative analyses. More research is needed to compare FinTech adoption and inclusion trends across different GCC nations. Additionally, many studies have separately analyzed discrete FinTech models/applications like digital payments, lending, etc. However, the combined effect of multiple FinTech innovations working in an integrated fashion has yet to be deeply explored. Qualitative research complementing quantitative data is still limited. Studies have noted FinTech's benefits to specific groups like women, youth, and SMEs. However, further research is needed to identify other population segments that may be missing out, such as people with disabilities. Studies have focused on developed GCC countries, but FinTech's inclusion impacts in less-developed MENA markets still need to be researched comparatively.

3. METHODOLOGY

3.1. Research design

This study employs an explanatory qualitative research design to achieve the research objectives. As only secondary sources are used, a qualitative research methodology relying on non-numerical analysis is adopted. The research questions aim to explore and explain FinTech's contributions to driving financial inclusion through qualitative analysis of existing case studies, literature reviews, reports, and regulatory documents sourced from the nominated databases. By examining emerging themes from prior qualitative studies, the objectives seek to provide insights on FinTech adoption trends, impacts on inclusion, favoured business models, and policy frameworks through an explanatory research approach.

The study's sample was chosen by evaluating credible resources that provided insights about financial inclusion. The criteria utilized involved credibility analysis, whereby articles had to be related to the research topic. Peer-reviewed reports were also prioritized as resources for the study. However, the currency of the chosen articles was not considered. Past information was needed to understand financial challenges and practices.

3.2. Alternative methods

Some alternative research methods that could also be suitable for this study include:

- *Qualitative research design*: This would involve in-depth interviews and focus group discussions with key stakeholders such as FinTech firms, banks, policymakers, and consumers. This could provide richer insights into experiences and perspectives. However, due to the scope of this study, which aims to analyze FinTech's contributions across multiple GCC countries, a qualitative-only approach may not allow for comparisons across contexts.
- *Survey research*: Administering surveys to a sample of the population in GCC countries could generate quantitative data on FinTech usage patterns, barriers faced, and perceptions of financial inclusion. Surveys were not chosen as the sole method because developing and distributing a standardized survey to multiple countries could pose logistical and translation challenges.
- *Case study research*: In-depth case studies of select GCC countries could provide a deeper comparative understanding of how national policies and market conditions influence FinTech adoption and inclusion outcomes. While case studies would offer valuable insights, analyzing only a few case study countries may not sufficiently capture the diversity of market environments across the GCC region.
- *Secondary data analysis*: Analyzing existing government reports, industry studies, surveys, and financial inclusion indexes could leverage pre-existing information sources. A limitation of solely relying on secondary data is the lack of primary data to fill potential gaps and answer research questions not covered in existing literature and reports.

3.3. Data sources

This study relied solely on secondary data sources due to the constraints of conducting primary research within the timeline. Secondary data sources included international databases like the World Bank

Findex, national financial inclusion surveys, reports from central banks, and industry bodies sourced from ResearchGate, SSRN, and DOAJ. Academic literature and research papers available through the nominated databases also formed part of the secondary data analysis.

3.4. Data collection

Qualitative data was extracted from prior case studies, literature reviews, reports, and analyses in academic literature sourced from the nominated databases. Case studies, themes, and insights on FinTech adoption trends, inclusion impacts, favoured models, and policy frameworks were collected for the target nations. Secondary sources provided contextual qualitative information on country profiles to support the comparative case study analysis. The research addressed the objectives by examining emerging perspectives and views in prior explanatory studies.

3.5. Data analysis

A qualitative data analysis approach was used. Case study analyses of the selected countries were conducted to integrate qualitative findings from prior literature reviews. Comparative case studies examined themes on FinTech adoption trends, inclusion impacts, practical models, and policies that emerged from secondary sources. Relationships between contextual factors and FinTech contributions in driving inclusion were explored through comparative analysis across the case study nations. The study analyzed how qualitative perspectives and insights from previous explanatory studies addressed the research objectives.

3.6. Case study selection

Case studies of six countries represented regions with different economic contexts to draw comparative qualitative insights. The countries selected were the UAE, Saudi Arabia, Bahrain (developed in the GCC region), Afghanistan, Pakistan, and Egypt (developing/emerging in the MENA region). This allowed an examination of FinTech's contributions to inclusion across nations at varied economic and technological development stages through a comparative case study approach.

4. DATA ANALYSIS AND FINDINGS

4.1. Impact of FinTech innovations on traditional banking models and financial services delivery

The literature reviewed shows that FinTech innovations significantly transform traditional banking models and financial services across the MENA region in the digital era. Technologies such as blockchain, AI, and mobile payments are playing a significant role in this transformation.

Mobile payment platforms, in particular, have enabled expanded access to financial services. Studies by Lukonga (2021) and Naz et al. (2022) found that mobile money platforms introduced by various banks and FinTech firms in the region have boosted access to payments, savings, credit, and other essential services, especially in remote/rural areas with limited traditional banking infrastructure. This is by overcoming spatial barriers and enabling account access and fund transfers remotely through affordable mobile phones.

Digital lending platforms are also increasing access to small-value loans for individuals previously unable to access credit from traditional banks due to a lack of collateral or credit history. By assessing alternative online data sources through AI/machine learning models, platforms address information asymmetry challenges (Demir et al., 2022; Hussein, 2020). This widened the availability of affordable credit, especially for emergencies.

Further, digital payment systems incorporated in FinTech applications are lowering transaction costs and boosting inclusion, especially among micro-businesses and self-employed individuals facing stringent requirements from banks (Ashfaq & Zada, 2021; Niankara, 2023). Features like intra-day credit lines in mobile savings tools also help accommodate the needs of low-income users with irregular cash flows between incomes (Al-Smadi, 2023; Khalaf & Wadi, 2023).

Remittance platforms leveraging blockchain enable quicker, low-cost cross-border money transfers, benefitting the large migrant labour populations in GCC contributing funds home (Lukonga, 2021; Naz et al., 2022). EKYC technologies powered by AI reduce paperwork for account opening through remote identification, counteracting traditional barriers (Lukonga, 2021; Schilirò, 2021).

Overall, empirical studies evaluating survey data, adoption levels, and usage patterns over time consistently point to FinTech substantially increasing financial inclusion indicators, primarily by extending the reach of digital financial services to remote areas and demographic segments previously unserved or underserved by conventional bank-led models across the MENA region (Khalaf & Wadi, 2023; Hussein, 2020; Niankara, 2023; Al-Smadi, 2023).

By capitalizing on advanced technologies, non-traditional players, and new partnerships, FinTech innovations are transforming the financial industry landscape and driving inclusion on a scale impossible within traditional frameworks alone. Both incumbents adapting to digital shifts and startups introducing disruptive solutions play essential roles in this transformation process, improving lives.

4.2. Effectiveness of key FinTech models in driving financial inclusion in GCC countries

4.2.1. Digital payment solutions

Mobile money platforms like M-Pay by Emirates NBD have expanded access to payments and financial services by overcoming barriers to traditional banking infrastructure (Lukonga, 2021; Naz et al., 2022). They allow users to conduct transactions remotely via their mobile phones. Digital wallets provided by companies like PayPal have facilitated growing e-commerce and peer-to-peer transactions in GCC countries like the UAE (Alblooshi, 2022; Schilirò, 2021). Moreover, prepaid payment cards issued by GCC banks have increased financial access for both banked and unbanked populations, including migrant workers who rely on remittances (Gulrez, 2021; David & Williams, 2022).

4.2.2. Online lending platforms

Digital lending platforms have increased the availability of small-value loans by assessing alternate online data to identify the creditworthiness of those lacking collateral or credit histories (Demir et al., 2022; Hussein, 2020). This has addressed information asymmetries.

4.2.3. Digital wealth management tools

Digital platforms have enabled increased access to retail investment services through features like automated robo-advisory tools and simplified online portfolio management interfaces (Palmié et al., 2020; Rabbani, 2022).

4.2.4. InsurTech applications

The apps help individualize data and devices like telematics through InsurTech models, allowing customized insurance offerings tailored to individuals' needs (Rabbani, 2022; David & Williams, 2022; Schilirò, 2021).

Studies have found these FinTech models have been effective in improving critical financial inclusion indicators like account ownership, savings, credit usage, and insurance penetration among demographic groups in GCC countries that had previously faced barriers, such as women, youth, SMEs, migrant workers and low-income populations (Hussein, 2020; Khalaf & Wadi, 2023; Lukonga, 2021; Niankara, 2023; Al-Smadi, 2023). The literature provides empirical evidence that these FinTech innovations have positively contributed to greater financial inclusion across the GCC region.

4.3. Demographic benefits of FinTech adoption in the GCC

Based on the literature review, several key demographic segments in the GCC have benefited most from increased access to finance enabled by FinTech adoption:

- *Women*: Several studies cited in the literature review found that FinTech has improved financial access for women in the GCC. Products tailored specifically for female consumers challenge socio-cultural norms that previously obstructed women's participation in financial services (Kazemikhasragh et al., 2022; Cicchiello et al., 2021). Digital services are modernizing perceptions and empowering women's economic roles independently of traditional barriers.
- *Youth*: Younger demographics now have opportunities to build early financial identities and histories through entry-level online transaction accounts provided by FinTech firms (Emara & Mohieldin, 2021). This early exposure socializes responsible financial habits and includes young adults previously considered "unbankable" by conventional standards.
- *SMEs*: Micro, small, and medium enterprises have benefited from FinTech lending platforms that expand alternative funding sources beyond limited bank credit (Ashfaq & Zada, 2021). Digital financial services also help SME cash flow and payment needs through services optimized for their size and cashflow cycles (Hariri, 2023). This promotes entrepreneurship, especially among startups.
- *Migrant workers*: Innovations catering to remittance transfers and digital wage disbursements have improved the financial access of migrant labour populations in GCC countries (David & Williams, 2022). Remittances through digital platforms bear cost savings compared to traditional methods, while digital salaries ease earnings management abroad.
- *Rural communities*: FinTech is filling gaps by facilitating access even in geographic areas traditionally underserved due to their distance from physical bank branches (Lukonga, 2021). Mobile and digital banking overcome spatial constraints that disadvantaged remote rural villages by lowering physical access requirements.
- *Low-income populations*: Several studies found that FinTech platforms are helping address barriers low earners face. Features like intra-day credit lines accommodate fluctuating cashflows between wages (Demir et al., 2022; Al-Smadi, 2023). Simplified mobile interfaces also promote financial literacy and inclusion among less educated populations (Chinnasamy et al., 2021; Aloulou et al., 2023).

In summary, the literature indicates that FinTech has most positively impacted financial inclusion among women, youth, SMEs, migrant workers, rural communities, and low-income populations in the GCC by addressing barriers they previously faced in the traditional financial system.

4.4. How key financial inclusion indicators evolved with FinTech and regulations in GCC nations

Key financial inclusion indicators and indexes have positively changed over time for selected GCC nations as FinTech usage, regulatory frameworks, and digital infrastructure have evolved:

Studies have found that indices measuring access, usage, quality, and consumer protections for financial services have generally trended upwards across the GCC as FinTech adoption advanced (Al-Smadi, 2023; Cicchiello et al., 2021).

Global indicators benchmarking countries' progress towards 2030 financial inclusion targets set by the United Nations (UN) and other international bodies show most GCC states improving their standings relative to expanding digital transformation supported by public policy (Emara & Mohieldin, 2021; Demir et al., 2022).

National surveys assessing the proportion of populations with transaction accounts, savings, loans, and insurance show exclusion rates steadily decreasing over time alongside growing FinTech usage catalyzed by enabling regulations in countries like Saudi Arabia, UAE, etc. (Emara & El Said, 2021; Khalaf & Wadi, 2023).

Consumer usage diversification and transaction frequency metrics incorporated into updated measurement frameworks also point to deepening inclusion due to enhanced access facilitated by digital platforms under regulatory experiments in GCC pioneering FinTech innovation through sandboxes (Khmous & Besim, 2020; Niankara, 2023).

Case studies of individual GCC nations demonstrate financial inclusion progress correlating positively with milestones like new FinTech strategies, updated privacy laws supporting digital eKYC, expanded broadband networks, and economic diversification blueprints mainstreaming FinTech across sectors (Naz et al., 2022; Lukonga, 2021; Gulrez, 2021).

In summary, the literature reviewed indicates that financial inclusion indexes and indicators for GCC countries have improved progressively and are aligned with growing FinTech solutions, services, gradual regulatory reforms, and enhanced digital infrastructure underpinned by public-private cooperation on sustainable inclusion.

4.5. National FinTech strategies and regulatory frameworks in GCC/MENA

Several GCC and MENA nations have instituted progressive FinTech policies and regulatory sandboxes to sustain innovation while protecting consumers. Saudi Arabia established its Financial Sector Development Program in 2016, which laid the foundations for the Saudi FinTech ecosystem (Schilirò, 2021). Key aspects included the FinTech Saudi initiative launching an incubation hub and regulatory sandbox (Aloulou et al., 2023). Studies show that the sandbox enabled experimentation and piloting of new business models (BRILL, 2018; Allen, 2021).

The UAE launched its Smart Dubai initiative in 2017, pursuing the vision of making Dubai a globally leading FinTech hub (Demir et al., 2022). The Dubai Financial Services Authority sandbox permitted regulated testing of innovative products and services (Schilirò, 2021) — complementary initiatives like FinTech Hive advanced startup support (Palmié et al., 2020). Bahrain has developed into a regional FinTech hub, particularly for Islamic finance technology. The Central Bank of Bahrain regulates the financial sector. It established a regulatory framework and sandbox for testing innovations. Bahrain also launched initiatives like FinTech Bay and Bahrain FinTech Bay to support the FinTech ecosystem. The Bahrain Economic Development Board works to attract foreign FinTech investments and partnerships under the Kingdom's Economic Vision 2030 plan. Comprehensive guidelines have been introduced for crowdfunding, digital assets, and payments.

Egypt introduced regulatory amendments in 2020, classifying FinTech companies under specialized legislation streamlining rules (Naz et al., 2022). Guidelines addressed crowd investing, payment services, and digital banking (Emara & Mohieldin, 2021). The derivatives law permitted FinTech-backed activities on a limited basis through licensing pending further reforms (Lukonga, 2021).

The GCC/MENA nations emphasized consumer protection through tiered risk-based oversight, data privacy laws, financial literacy initiatives, and cybersecurity requirements (Emara & Mohieldin, 2021; Naz et al., 2022). Cross-border digital remittances also faced guidelines from leading Islamic finance standard-setting bodies (Hassan et al., 2022). Coordinated regional frameworks support financial inclusion goals through responsible FinTech growth.

5. DISCUSSION

5.1. Interpretation of findings

The following findings relate to the research objectives based on the analyses conducted in Section 4. The information related to objective one on how emerging technologies transformed banking in MENA is that digital technologies like blockchain, AI, and mobile payments have enabled new digital banking models. FinTech firms will likely merge the technologies to provide more convenient, accessible services than traditional banks. This has disrupted established banking models and increased competition. Objective two was based on the effectiveness of FinTech models in driving inclusion in GCC. The study finds that digital payment solutions, platforms, and remittance services have been highly influential in extending financial access to remote/low-income populations by lowering costs and spatial barriers. Online lending platforms also addressed information gaps. The third objective involved demographic segments benefitting most from FinTech. Studies showed that women, youth, SMEs, migrant workers, and rural communities in GCC have particularly benefited from increased access to finance enabled by FinTech solutions. Features like digital payments and wallets facilitated greater participation.

The research also delved into objective four, which concerned the changes in inclusion relative to FinTech's over-time adoption. Notably, as FinTech usage has grown across GCC nations, inclusion indicators like account ownership and usage of digital finance products have improved, according to studies comparing data over multiple years. This points to FinTech contributing to advancing inclusion goals. Objective five on the established national FinTech strategies and policies helped identify that leading GCC economies have introduced regulatory sandboxes, proportionate rules, and national digital strategies to support FinTech-driven inclusion and innovation. These regulations have safeguarded consumer protection through new frameworks. The findings prove that FinTech innovations positively transform banking and drive greater financial inclusion across demographic segments in the GCC region's developing digital financial ecosystem.

5.2. Theoretical and practical implications

5.2.1. Theoretical implications

The study provides empirical evidence to support theories around how FinTech and digital innovation can help address barriers to financial inclusion, like information asymmetry, high transaction costs, and spatial constraints. This validates theoretical frameworks around the role of FinTech in inclusion. The paper further tests and expands on frameworks defining financial inclusion and conceptualizing its multidimensional nature (e.g., access, usage, quality). The findings contribute to a deeper understanding of inclusion. Lastly, the study contributes to theories examining the relationships between FinTech adoption, regulatory environment, infrastructure development, and changes in inclusion levels over time across markets.

5.2.2. Practical implications

The research has generated significant practical implications. Notably, the study offers insights for policymakers on designing regulatory sandboxes, data privacy frameworks, and other enablers to maximize FinTech's inclusion impacts while

ensuring oversight. Traditional financial institutions also receive guidance on collaboration opportunities, areas of strategic focus, and benchmarking inclusion metrics relative to FinTech sector development. FinTech businesses are further informed on target customer segments, products/models, and partnerships that have proven effective for advancing inclusion aims. Subsequently, the research helps development organizations and investors identify focus areas and evaluate returns from programs/initiatives that boost inclusion through technology applications. The plications provide a baseline for inclusion-oriented organizations to benchmark progress, monitor impacts, and refine strategies based on evidence of what financing/business models have meaningfully moved inclusion indicators. Lastly, the project raises awareness among end-users about existing inclusive FinTech tools they may benefit from adopting to improve their financial well-being and standard of living.

5.3. Recommendations for FinTech in increasing society's financial inclusions in the Industrial Era 4.0

FinTech is expected to endorse several recommendations emerging from the research. The company should establish national FinTech strategies and regulatory sandboxes to support innovation while ensuring consumer protection. Leading GCC countries that have developed FinTech roadmaps and innovation hubs, such as Bahrain and UAE, can serve as examples. FinTech should be enhanced through coordinated efforts between the public and private sectors. Coordination will be achieved by developing centralized regulatory frameworks for identity verification and credit reporting to strengthen digital lending. Standardizing alternate data sourcing and reporting through regulatory bodies can help address information gaps that are challenging online lending platforms. Subsequently, FinTech should enhance digital and financial literacy programs targeting women, youth, the elderly, and low-income groups. Fostering an understanding of available FinTech services and their prudent use through multimedia initiatives in schools, workplaces, and communities can unlock participation barriers.

The company should increase investments in robust national digital payment infrastructure, benefiting rural and remote areas. Initiatives to expand affordable broadband connectivity and technological access across geographical divides can multiply FinTech's financial inclusion effects exponentially. The other recommendation is to incentivize collaboration between FinTech startups and traditional financial institutions through sandbox policies. Co-creation models between new innovators and incumbents leveraging their respective strengths through Open APIs and partnerships can stimulate inclusive blended solutions. Additionally, the company should develop specialized FinTech services and regulations supporting SME finance, migrant workers, and freelancers/gig economies. Tailored products, underwriting mechanisms, and consumer safeguards can address the shifting needs of emerging segments amidst evolving work patterns.

The study recommends leveraging digital identity systems, regulations, and skills to positively transform inclusion among vulnerable groups such as women, youth, the elderly, and the disabled. Mainstreaming appropriate customizations upholding ethics and inclusion principles everywhere FinTech expands. Monitoring financial inclusion metrics periodically to evaluate ecosystem impacts and progression is also crucial. Updates to national strategies may then guide further policy refinements as technologies and usage patterns change over time, iteratively advancing overall access and quality. Chouaibi et al. (2021) showed that independent boards encourage greater transparency around issues of non-financial impact. This suggests that board independence may positively affect inclusion efforts by facilitating open communication around sustainability initiatives.

The completed study maintains the utmost authenticity and distinctiveness from previous studies. Therefore, this report has key differences with Aomar Ibourk and Zakaria Elouaourti's report on the MENA region. Ibourk and Elouaourti (2023) affirm that financial technologies are inappropriate for ensuring financial inclusion within MENA. On the other hand, this report emphasizes FinTech as the basis for promoting inclusivity within contemporary society. The contrast may call for extensive research to determine why financial technologies would be necessary in MENA countries.

This research outlines different and more extensive barriers to financial inclusion. The barriers are grounded in various social and technological aspects that are witnessed within the MENA region. Another difference is in the findings, as this research points out the implications on service delivery. In contrast, Ibourk and Elouaourti (2023) focus on economic growth and the population excluded by financial technologies. This research was also based on a research objective different from that of Ibourk and Elouaourti (2023), which concentrated on addressing literature gaps.

6. CONCLUSION

This study aimed to evaluate the contribution of FinTech in increasing financial inclusion in the MENA region, as outlined in the abstract. Specifically, it sought to analyze how FinTech is transforming finance delivery, assess the effectiveness of inclusion models, identify benefiting demographic segments, and examine supportive national strategies. The findings provide several important implications for researchers and practitioners advancing inclusion through continued digitalization. Firstly, the transformation of traditional banking noted in objective one highlights that inclusion efforts require adapting to evolving user needs and behaviours with new technologies. Flexible regulation balancing innovation and consumer protection will be crucial to maximize benefits over the long term.

In terms of objective two, the case studies underscore how different FinTech applications are most impactful depending on local market contexts. Comparative multi-country analyses can optimize lesson-sharing between systems at varying development levels. Identifying women, youth, and other groups positively impacted per objective three reveals segments still facing barriers. More nuanced qualitative research discerning user experiences can ensure a comprehensive approach addressing all exclusion drivers. Regarding objective four, leading nations demonstrate strategic planning attuned to cultivating synergies between regulations,

infrastructure, and business models, which holds value for realizing inclusion outcomes. Longitudinal cohort studies tracking dynamic policy impacts could offer additional guidance to policymakers. While providing valuable insights, limitations within the broad scope necessitate cautious interpretation through future mixed methods research surveying a more comprehensive range of settings.

This study's scope is limited in analyzing FinTech's contributions to financial inclusion levels, specifically in developed and major developing nations, during the current era of Industry 4.0 since approximately 2010, when relevant technologies began maturing. As such, it does not comprehensively cover inclusion impacts in all countries globally or examine innovations predating the most recent digital transformation wave.

In summary, this study contributed to understanding FinTech's current and potential future role in advancing universal access aligned with global development goals. However, continual reassessment attaching importance to localized contextualization remains integral to maximizing digital finance's transforming impact on lives and livelihoods. The paper gives the foundation for future studies to explore how FinTech has become integrated within rural regions. Therefore, future researchers would find this report vital to identify areas where FinTech must be introduced and the challenges that must be solved for global success. Changes such as inclusivity and infrastructural development will then be reviewed in future studies.

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