DIGITAL TRANSFORMATION OF PAYMENT SYSTEMS IN OIC MEMBER COUNTRIES 2024

COMCEC COORDINATION OFFICE

Ankara, Türkiye

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ACAPS	: Autorité de Contrôle des Assurances et de la Prévoyance Sociale
ACH	: Automated Clearing House
ADD	: Agency for Digital Development
AFMGM	: ASEAN Finance Ministers' and Central Bank Governors' Meeting
AI	: Artificial Intelligence
AML	: Anti-Money Laundering
APIs	: Application Programming Interfaces
AT	: Autoridade Tributária – Revenue Administration
BAM	: Central Bank of Morocco
BCG	: Boston Consulting Group
BI	: Bank Indonesia
BIS	: Bank for International Settlements
BM	: Bank of Mozambique
BNM	: Bank Negara Malaysia
BNPL	: Buy Now, Pay Later
BoE	: Bank of England
BOT	: Bank of Thailand
BRSA	: Banking Regulation and Supervision Agency
BSP	: Bangko Sentral ng Pilipinas
CBDCs	: Central Bank Digital Currencies
CBRT	: Central Bank of the Republic of Türkiye
CDG	: Caisse de Dépôt et de Gestion – Management and Deposit Fund
CeFi	: Centralized Finance

CMB	: Capital Markets Board
CMI	: Centre Monétique Interbancaire
CNDP	: Commission Nationale de Protection des Données à Caractère Personnel National Commission for the Control of Personal Data Protection
CPMI	: Committee on Payments and Market Infrastructures
CSR	: Corporate Social Responsibility
CX	: Customer Experience
DeFi	: Decentralized Finance
DGSN	: General Directorate of National Security
DLT	: Distributed Ledger Technology
DPS	: Digital Payment Systems
DTL	: Digital Turkish Lira
EAC	: East African Community
EAPS	: East African Payment System
EFT	: Electronic Funds Transfer System
e-Government	: Electronic Government
EMV	: Europay, MasterCard and Visa
EU	: European Union
FAST	: Instant and Continuous Transfer of Funds System
FCA	: Financial Conduct Authority
FDIs	: Foreign Direct Investments
FIs	: Financial Institutions
FinTech	: Financial Technology
FinTIP	: Financial Sector Cyber Threat Intelligence Platform

FMIs	: Financial Market Infrastructures
FOTEGAL	: Latin American Government Treasury Forum
FPX	: Financial Process Exchange
FSA	: Financial Services Act
FSB	: Financial Stability Board
FX	: Foreign Exchange
G2P	: Government-to-Person
GCC	: Gulf Cooperation Council
GDP	: Gross Domestic Product
GPBM	: Professional Group of Banks of Morocco
ICC	: Interbank Card Center
ICIEC	: The Islamic Corporation for the Insurance of Investment and Export Credit
ICT	: Information and Communication Technology
ICTF	: Interoperable Credit Transfer Framework
IFSA	: Islamic Financial Services Act
IFTS	: Interbank Funds Transfer System
INAGE	: National Institute of Electronic Government
INAS	: National Institute of Social Action
INSS	: National Social Security Institute
IoT	: Internet of Things
MAS	: Monetary Authority of Singapore
MDEC	: Malaysia Digital Economy Corporation
MOU	: Memorandum of Understanding

mPOS	: Mobile Point-of-Sale
MPS	: Mobile Payment Systems
MST	: Magnetic Secure Transmission
MTC	: Ministry of Transport and Communication
NFC	: Near Field Communication
NPS	: National Payments System
OIC	: Organization of Islamic Cooperation
P2G	: Person-to-Government
P2P	: Peer-to-Peer
PADIM	: Mozambique Digital Acceleration Project
PAPSS	: Pan-African Payment & Settlement System
PCI DSS	: Payment Card Industry Data Security Standard
PFMI	: Principles for Financial Market Infrastructures
POS	: Point-of-Sale
PSA	: Payment System Act
PSR	: Payment Systems Regulator
PvP	: Payment versus Payment
RPC	: Regional Payment Connectivity
RRP	: Real-Time Retail Payments Platform
RTGS	: Real-Time Gross Settlement
RTPS	: Real-Time Payment Systems
SADC	: Southern African Development Community
SC	: Securities Commission of Malaysia
SEPA	: Single Euro Payments Area

SIMO	: Interbank Company of Mozambique
SIMT	: Moroccan Interbank Remote Clearing
SIPA	: Sistema de Interconexión de Pagos – Payment Interconnection System
SMEs	: Small and Medium Enterprises
SNIF	: National Strategy for Financial Inclusion
SRBM	: Moroccan Gross Settlement System
SSDS	: Scripless Securities Depository System
TIPS	: TARGET Instant Payment Settlement
TL	: Turkish Lira
TUBITAK	: Scientific and Technological Research Council of Türkiye
UK	: United Kingdom
UPIs	: Unified Payment Interfaces
USSD	: Unstructured Supplementary Service Data
VC	: Venture Capital

CHAPTER 1: INTRODUCTION

This introductory chapter provides a general overview of the report with specific focus on the objective, scope and significance of the study. In achieving the objective of the study, the chapter clearly outlines the research methodology it adopts and provides a conceptual framework which both provide a background to the study. To conclude the introduction, this chapter also provides a brief high-level overview of each of the chapters in the report.

1.1 Background

The increasing unbridled proliferation of technological advancement across various sectors of the economy has created a situation where state actors continue to amend existing laws and policies to address the risks associated with such developments and protect the citizenry. The onset of the Fourth Industrial Revolution and most recently Covid-19 pandemic where almost everyone was forced to utilize technology in all economic activities have further deepened the unfeigned relevance of technology in economic developments across the world.

As of 2022, the global smartphone penetration rate was about 68% relative to the global population of 7.4 billion people. In terms of smartphone subscriptions, an estimated 6.3 billion subscriptions were recorded in the same year (Laricchia, 2023). These statistics are relevant in estimating the potentials of e-commerce and the utilization of such platforms. Accordingly, the tremendous increase in e-commerce transactions during the pandemic was facilitated through robust payments systems. While in 2019, global e-commerce sales were estimated at $26.7 trillion, there was a dramatic rise in the number of sales by 2020 when the pandemic hit the world. It was revealed that in 2020, 19% of total retail sales globally came from e-commerce which was a 16% increase from 2019 (E-commerce Market and Analysis, 2023). This impact of the pandemic accelerated the general shift to digital commerce which exacerbated the relevance of digital payment gateways in the modern world. E-commerce has come to stay in the global economy, as buyers and sellers across various jurisdictions will continue to be connected. An underlying facilitative technology for

such transaction boom will undoubtedly be efficient and robust digital payment systems (DPS).

Payment systems in modern times have evolved through some interesting developments, which include economic needs, consumer behavioral patterns and of course technological advancements. Starting with the barter system during the ancient times, payment systems have evolved through exchange of commodities; commodity money such as grains, livestock or precious metals; metal coins and paper money; banknotes; cheques, electronic funds transfer, credit and debit cards; online banking and internet payment gateways; mobile payments and digital wallets; real-time payments and instant settlement; cryptocurrencies; Open banking Application Programming Interfaces (APIs); tokenization; and the Central Bank Digital Currencies (CBDCs) (United Nations, 2021). Therefore, from barter to DPS, the world has witnessed significant developments in the past centuries. As the journey continues with varying user preferences, regulation and technological advancement, the role of supervisory and regulatory authorities cannot be overemphasized. There is a need for the regulatory and supervisory authorities to always be ahead of the curve to ensure proper regulation of an increasingly diversified global hi-tech payment systems landscape. In national, regional, and global economy, payment systems play a fundamental role through the availability of a range of mechanisms and platforms which are utilized for real-time settlement of transitions (Bank for International Settlement, 2003). As emphasized by Maechler and Moser (2019), "Central banks can reduce payment-related risks very effectively. By establishing security and confidence, they contribute decisively to the efficiency of the payment system." Therefore, the central bank's role in reducing risks associated with the payment systems and promoting efficiency in such systems is paramount (Fry, et al., 1999).

The OIC member countries as a bloc is the largest international body after the United Nations and it has huge potentials to revolutionize the global payment systems. Cross-border collaboration is designing a robust DPS infrastructure that will promote economic activities among member countries. To ensure efficient economies within the bloc, there is a need for functioning payment systems across member countries. Though the Organization of Islamic Cooperation (OIC) member countries can be grouped into varying development levels in terms of their payment systems, lessons can still be drawn from the experiences of

some matured economies within and outside the bloc. Learning from each other's experiences and getting feedback from users and experts will help to assess the current state of payment systems development in various OIC member countries and identify areas that require further policy reforms.

1.2 Aim and Scope

The main objectives of this study are to provide an analysis and elaboration on (i) payment systems in different jurisdictions, with a particular focus on the initiatives in OIC Member Countries and the need for digitalization in payment systems, ii) emerging technologies on DPS, iii) key components and parties involved in the digital transformation, iv) the challenges and prospects of DPS in OIC Member Countries. Based on the analysis of the framework, the study will also provide concrete policy recommendations to the OIC Member countries, particularly considering the lessons learned from the practices to be analyzed and the case studies to be conducted within the framework of this report. In particular, the report will provide guidelines for the digital transformation of the payment systems of OIC member countries who are still at the infancy or developing phases. This study will be prepared for the members of the COMCEC Financial Working Group, and the findings and policy advice will be presented for their consideration.

Given the increasing importance of DPS, this study provides an in-depth analysis on the level of digitalization in payment systems among OIC Member Countries with some additional lessons to be learnt from other initiatives outside the OIC Member Countries. Best practices at the international level spearheaded by some international bodies as well as unique emerging trends from some developing countries will provide good insight into prospects of DPS in the modern world. However, the study also identifies challenges and risks associated with such developments in the DPS landscape. When addressed properly through this study with practical policy recommendations, such challenges and risks would help shape the prospects of DPS across the world.

The scope of this study is limited to digitalization in payment systems of OIC member countries where the study has reviewed emerging trends and explored best practices with a view to providing policy recommendations. The study also focuses on challenges and prospects of DPS in facilitating payments within jurisdictions and for cross-border

payments. Based on the findings, the study has proposed concrete policy recommendations to OIC Member countries, particularly considering the lessons learnt and analyzed from the best practices and the case studies conducted within the framework of this report.

1.3 Significance of the Study

The study aims to provide practical policy recommendations to the OIC Member countries who need considerable reforms in their payment systems with a view to enhancing cross-border collaborations for DPS. The findings and recommendations shall be beneficial to policymakers of the OIC and non-OIC member countries, the international community, as well as international organizations. Based on the findings, the key best practices and prospects were identified for policy reforms. Hence, effective strategies are recommended to the policy makers of the selected countries. Additionally, the study has determined which of the selected countries are more successful in using DPS to boost their economic activities. Beyond national frameworks, the study has also considered the prospects of introducing a regulatory framework for an effective cross-border digital payment system for OIC member countries.

With the nature of payment systems as enablers that help boost economic activities, the role of regulators and supervisory authorities cannot be overemphasized in an increasingly digitalized world. A major challenge of largely unregulated parallel payment systems, which emerged as part of the cryptocurrency revolution, has further exacerbated the need for regulators and supervisory authorities to be ahead of the digitalization curve. Even though the cryptocurrency boom often basks in the euphoria of being transparent and traceable on the blockchain, more often than not, the unregulated payment systems utilized on such platforms are fraught with transactional opacity; hence, the need for regulators and supervisory authorities to come up with regulated alternatives such as the CBDCs.

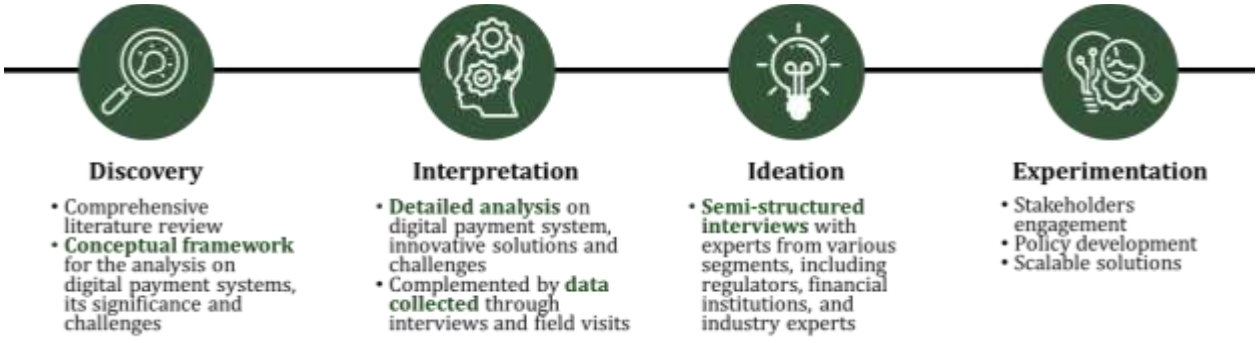
The convenience of using DPS and the seamless experience of users will continue to help boost economic activities. Such tremendous growth has been seen in e-commerce; hence, the need to come up with practical policy recommendations that would help regulators and supervisory authorities further streamline their policies with a view to enhancing customer experience and mitigating associated risks. While these steps are useful at the national level, it is also expedient to proffer practical recommendations on both regional and international

collaboration among the OIC member countries and beyond. Given the ubiquitous nature of payment systems and the fluid nature of e-commerce platforms beyond borders, cross-border collaborations are key in the successful design of payment systems. Such lessons are drawn from existing collaborative initiatives as well as identifying practical experience of successful country-level models for consideration by other OIC member countries.

1.4 Research Methodology

To understand the core issues and create innovative solutions that underpin digital payment systems, the study has adopted a design thinking approach. This involves integrating the specific needs of users of the digital payment systems, technology, business requirements, and regulatory expectations. It is expected that this approach would help proffer creative solutions and recommendations on enhancing digital payment systems in OIC Member Countries. This is accomplished by following five defined phases of design thinking – *discovery, interpretation, ideation, experimentation,* and *evolution* – to translate observations into feasible and successful solutions. (see Figure 1.1 below).

Figure 1.1: Five Defined Phases of Design Thinking



The *discovery phase* involves a comprehensive literature review that has provided the conceptual framework for the analysis on digital payment systems, its significance and challenges. The *interpretation phase* involves a detailed analysis on digital payment system, innovative solutions and challenges. Findings from the literature survey are complemented by data collected from stakeholders through semi-structured expert interviews and field visits.

The survey was prepared in accordance with the study's purpose to obtain fundamental information about the needs, expertise, experience, attitudes, and opinions of regulators, international institutions, and private sector representatives. Based on the primary data collected through the semi-structured interviews, univariate and multivariate analytical coding models (i.e., hierarchical linear modelling) were used to comprehensively explore the most pressing issues and concerns of digital payment systems among the OIC Member Countries.

Further to the output from the previous phases, the *Ideation phase* adopted the approach of semi-structured interviews with experts from various segments, including regulators, financial institutions, and industry experts. The in-depth insights derived from these interviews are helpful for a better understanding of the coordination practices of the selected case countries.

Case Country Selection Criteria

The study has applied four criteria in selection of case countries (see Table 1.1 below): *firstly*, four case countries represent the OIC member countries and one non-OIC country; *secondly*, they represent different geographic regions; *thirdly*, based on their legal systems/regimes; and *fourth*, based on their different levels of payment systems development.

Table 1.1: List of Criteria

Criteria	Description	Approach/Source
I	OIC member countries	COMCEC List[1]
II	Geographic regions: African, Arab, and Asian	COMCEC List
III	Legal system/regime	World Factbook
IV	Development level of digital payment systems	World Bank (Global Findex 2021)

Source: Authors

[1] See COMCEC website: https://www.comcec.org/member-states/

Analysis of Development Level of Digital Payment Systems

According to the Global Findex 2021 report by the World Bank, Morocco is classified as developing country that has experienced double-digit growth in bank account ownership since 2017 when 42.2% of adults, 33% of women, and 34% of poor adults own account. Regarding digital payment activity, 20.34% of individuals aged 15 and above made a digital payment, 30.3% either made or received a digital payment, 21.43% received digital payments, and 31.79% own a debit or credit card (World Bank, 2021).

Comparatively, only 8% of Mozambique's adult population paid their utility bills in cash in 2021, a drop of 5% since 2017. The improvement has been slightly seen in paying utility bills digitally or through a financial institution, as this has increased to at least 12% in 2021. Even though only approximately half of the population owns mobile phones and there is limited access to the internet (only 20%), the Mozambican population exhibits a notably higher ratio, 14%, compared to Morocco (10%), in utilizing a mobile phone or the internet to make payments, buy things, or send or receive money using a financial institution account. Moreover, in 2021, 42% made or received digital payments up from 34% in 2017.

On the other hand, Malaysia and Türkiye's numbers reveal that they are more mature in terms of digital payment development levels. The proportion of the population who own mobile phones are 92% and 97% respectively, while those who have access to the internet are 87% and 71% respectively. In 2021, only 22% of Malaysians and 18% of the Turks paid their utility bills using cash. Conversely, the proportion who paid their utility bills via a mobile phone or through an account ranged between 23% to 36% for Malaysians and 21% to 35% for the Turks. These numbers are clearly higher than those occurring in Morocco and Mozambique. Furthermore, 45% of Malaysians and 37% of Turks used a mobile phone or the internet to make payments, buy things, or send or receive money using a financial institution account. While Malaysia and Türkiye have made significant strides in digital payments, there is still room for improvement to attain a level of maturity comparable to countries like United Kingdom (UK).

Table 1.2 below provides information on the five selected countries, namely Malaysia, Morocco, Mozambique, Türkiye and UK in relation to their membership in OIC, their

geographical group, their respective legal systems, in the digital payment development levels in their jurisdictions.

Table 1.2: OIC Countries by Geography, Legal System, and Digital Payment Development

Case Country	OIC Member	Geographic Group	Legal System	Digital Payment Development Level
Malaysia	Yes	Asian	Mixed (Common Law + Sharīʿah)	Mature
Morocco	Yes	Arab	Mixed (Civil Law + Sharīʿah)	Developing
Mozambique	Yes	African	Civil Law	Infancy
Türkiye	Yes	Asian	Civil Law	Mature
UK	No	European	Common Law	Very Mature

Source: Authors

1.5 General Overview

The general overview of the report is organized as follows:

1. **Introduction**: This chapter provides an overview of the study, including its aim, scope, significance and methodology. It outlines the methodology and conceptual framework employed and provides definitions of key terms. The chapter also provides an outline of the remaining chapters in the report.
2. **Digital Payment Systems**: This chapter provides a general overview and historical evolution of payment systems and proceeds to discuss digital payment systems. It discusses the underlying technologies for digital payment systems and the impact of the digitalization of payment systems on the economies. It also discusses the main objectives of digital payment systems such as financial inclusion, environment conservation and cost efficiency, etc. In view of the proliferation of Financial Technology (FinTech) and Artificial Intelligence (AI), the chapter briefly explains the various types of FinTech-based digital payment systems. Furthermore, the chapter explains that identifying the role of the stakeholders, such as the government

authorities, the regulators, financial institutions and even the users is paramount to a successful digital payment system.

3. **Global, Regional, and Local Trends**: This chapter presents a comprehensive and detailed analysis of payment systems and relevant innovative applications in OIC Member Countries. It highlights the structural, regulatory, and technical challenges that prevent an effective digital payment system at the OIC level. The chapter also provides information about the pioneering OIC Member Countries with a supportive regulatory framework for digital payment systems that are worth emulating. Moreover, the chapter evaluates digitalization of the payment systems and initiatives taken by some member countries. It explains in detail how the level of the financial sector development in a country, particularly in OIC member countries, impacts the digitalization in payment systems. In addition, this chapter examines the Sharī'ah and accounting issues related to payment systems. It analyses the various government approaches and compares them, considering industry experiences, feedback, and criticisms. Finally, the chapter highlights existing collaboration among OIC Member Countries, whether on a bilateral or multilateral level, in establishing a digital payment system for cross-border transactions.
4. **Case Studies**: This chapter presents case studies of five countries, one of which is a non-OIC country, based on the level of financial sector development and digitalization. The selected countries are examined in detail, focusing on their efforts in digitalization of the payment system, considering their legal and regulatory framework, as well as current initiatives, coverage, challenges, and issues. It explains the case countries selection criteria, reviews their legal regimes and systems, and assesses their current state of digitalization efforts towards payment systems. It also evaluates the needs, challenges, and trends in each case country on the subject matter, including legal, regulatory, taxation, academic, and technical challenges. The lessons learned from each case country are examined, and good practices of leading countries for knowledge and experience sharing are analyzed to identify ways and means for transferring knowledge and increasing cooperation between OIC member countries. Specific recommendations and needs are given for each case study, and these

recommendations as well as identified needs are used to derive general advice for all the OIC member countries.

5. **Policy Recommendations**: This chapter provides practical policy recommendations for enhancing collaboration and cooperation among OIC member countries in enhancing their individual digital payment systems and the possibility of an OIC-wide collaboration in establishing a digital payment system platform for cross-border transactions. They are presented in a step-by-step approach and designed as a roadmap, considering short-, medium-, and long-term structures. The recommendations are tailored to the level of financial sector development and digitalization in each OIC member country, and the rationale behind each of them is clearly explained to encourage the transfer of knowledge and experience among OIC member countries.

The policy recommendations are formulated based on the findings and insights from the following five major sources:

1. **Literature Review:** The study has conducted in-depth review of written and visual literature, analyzed information from related documentation to comprehend the experiences of relevant countries (the OIC member countries as well as countries from the rest of the world) and international institutions, and has used the resources of relevant national institutions.
2. **Surveys and interviews:** The online structured survey were administered to collect data from the stakeholders, such as government authorities and the private sector representatives of the OIC member countries. Moreover, to support and improve surveys and to get deeper insights, phone and face-to-face expert and expert interviews with related industry leaders and influencers were conducted to identify the needs and best practices.
3. **Case Studies:** The study has applied the case country selection criteria to select five countries, including one non-OIC country, as case studies on desk research and/or field visits. The cases have specifically focused on the subject matter considering the findings of the previous chapters and considering the legal and regulatory framework as well as current trends and sizes. The structural, regulatory, and

technical challenges that hinder digitalization of payment systems and cooperation among central banks on local, OIC, and global levels were analyzed.

4. **Data Analysis:** The study has conducted descriptive/empirical analysis on collected survey data to derive meaningful conclusions and formulate policy recommendations.
5. **Focused Group Discussion**: The study formulated the preliminary policy recommendations and obtained feedback from the focused group discussion among members of the Financial Cooperation Working Group of COMCEC where the recommendations are further enriched based on different level of development of payment systems in various OIC member countries.

CHAPTER 2: DIGITAL PAYMENT SYSTEMS

This chapter provides a general overview and historical evolution of payment systems and proceeds to discuss digital payment systems. It discusses the underlying technologies for digital payment systems and the impact of the digitalization of payment systems on the economies. It also discusses the main objectives of digital payment systems such as financial inclusion, environment conservation and cost efficiency, etc. Furthermore, with the proliferation of FinTech and AI, the chapter briefly explains the various types of FinTech-based digital payment systems. Moreover, the chapter explains that identifying the role of the stakeholders, such as the government authorities, the regulators, financial institutions and even the users is paramount to a successful digital payment system.

2.1 Historical Evolution and Nature of Payment Systems

The evolution of payment systems is intrinsically linked to the development of human civilization and economic structures (Peneder, 2022). While the precise origins of economic exchange remain a subject of debate among historians and economists, the trajectory of payment systems provides valuable insights into the progression of human societies, trade relations, and technological advancements. Following a survey of relevant literature, payment system seemed to have evolved in seven different phases.[2] Before each of the phases is briefly discussed, it is pertinent to note that "payment systems predate the emergence of central banks" (Andrew, et al, 2008). Hence, one can arguably conclude that payment systems, which were initially premised on exchange of value, existed even before money itself. This understanding provides a good basis for modern innovations in payment systems, including ubiquitous digital payment systems.

The first phase in the evolution of payment systems is the *Prehistoric and Ancient Economies phase*. This stage is the earliest form of economic exchanges likely predated formal currency systems. Anthropological evidence suggests that prehistoric societies engaged in gift economies and rudimentary barter systems. However, the limitations of direct barter, such as the double coincidence of wants, necessitated more sophisticated

[2] https://www.icterra.com/the-history-and-future-of-payment-trends/

methods of value exchange. The second phase is the emergence of *Commodity Money*, providing solution to the limitations of barter. Items with intrinsic value, such as salt, shells, or precious metals, served as mediums of exchange.[3] This development marked a significant step towards standardization in payment systems. The third phase brought about the advent of *Coined Money* that was typically attributed to the Lydians in the 7th century CE, which revolutionized payment systems. Coins, with their standardized weight and purity, facilitated more efficient and widespread trade. This innovation quickly spread across civilizations, becoming a cornerstone of economic systems for millennia.[4]

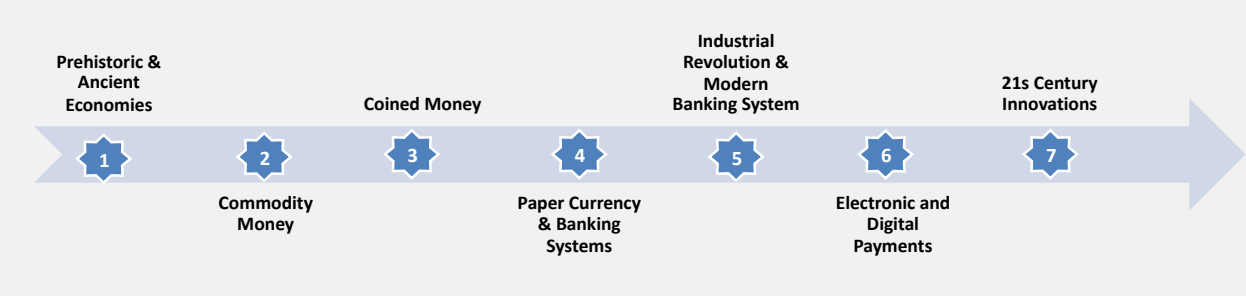
Subsequently, the *Paper Currency and Banking Systems phase* ushered in the fourth phase and was pioneered by the Song Dynasty in China (960-1279 CE) with the use of paper money, which eventually spread to Europe through trade routes. Concurrently, the development of banking systems in medieval Europe introduced new payment mechanisms, such as bills of exchange and promissory notes, further facilitating long-distance trade. The fifth phase brought about the *Industrial Revolution and Modern Banking system* which led to significant changes in payment systems. The rise of central banks, the gold standard, and the widespread use of cheques transformed the financial landscape. These developments allowed for more complex economic interactions and laid the groundwork for modern financial systems. Furthermore, the advent of *Electronic and Digital Payments* is the sixth phase representing the latter half of the 20th century that saw rapid technological advancements and revolutionized payment systems globally. The introduction of credit cards in the 1950s, followed by electronic fund transfers and ATMs, marked the beginning of the digital payment era. The advent of the internet in the late 20th century further accelerated this trend, giving rise to online banking and e-commerce. The last phase is classified as the *21st Century Innovations* which has tremendously scaled up the earlier gains in the electronic and digital payment era. The 21st century technological advancements in the financial industry have led to unprecedented innovation in payment systems. Mobile payments, cryptocurrencies, and blockchain technology are reshaping the financial landscape. These developments are not only changing how transactions are

[3] https://blog.remita.net/evolution-of-payment-systems-the-changing-landscape-of-money/

[4] https://fastercapital.com/content/Payment-Service-Valuation--Payment-Innovations-and-Their-Impact-on-Company-Valuation.html

conducted but also challenging traditional notions of currency and financial intermediation. Figure 2.1 below illustrates the seven different phases explained above.

Figure 2.1: Seven Phases of the Historical Evolution of Payment Systems



Source: Authors

Beyond the above seven phases of the historical evolution of payment systems, no one knows what the future holds. But one thing that remains constant is the policies adopted today to transform digital payment systems and enhance users' experience while ensuring consumer protection. While there is an increasing dominance of virtual currency, it is believed that it is not a recent innovation and that it predates modern economic developments. When parties in a transaction adopt an imagined representation of value to determine the exchange of goods and services, one can arguably conclude that they have utilized a virtual currency.[5] When this whole idea of imagined representation of value is transposed to the digital world, it remains the same abstract value which helps to facilitate exchange of goods and services. Therefore, even though payment systems have evolved over time, it appears that there is still a constant element which is the abstract representation of value while determining economic exchanges.

2.2 Digital Payment Systems

Digital payments, also referred to as electronic payments, encompass the transfer of value between payment accounts through digital channels or devices (Patil et al, 2017). This broad category includes various transaction methods such as bank transfers, mobile money services, QR code-based payments, and transactions facilitated by payment instruments like

[5] https://www.stlouisfed.org/publications/page-one-economics/2024/01/02/payment-systems-evolution-how-does-money-move-from-a-buyer-to-seller

credit, debit, and prepaid cards.[6] Digital payments encompass a range of transaction types, varying in their degree of digital integration. These systems can be categorized into partially digital, primarily digital, and fully digital payments, each representing a different stage in the evolution from traditional cash-based transactions to a fully digitized financial ecosystem. Partially digital payments involve cash transactions by both payer and payee through third-party agents, with payment providers digitally transferring funds between agents, bridging traditional cash use with digital infrastructure. Primarily digital payments occur when the payer initiates a digital payment to an agent, who receives it electronically, but the payee ultimately receives cash from the agent, combining digital initiation with traditional cash disbursement. Fully digital payments represent complete digital integration, where the payer initiates the transaction digitally, the payee receives it digitally, and the funds remain in digital form for subsequent use, exemplifying the potential for entirely cashless transactions (Franciska, and Sahayaselvi, 2017).

2.2.1 Types of Digital Payment Systems

There are various types of digital payment systems, which takes place on digital or electronic platforms, without the need for cheques or even cash. While there are many popular types, which have been branded in various ways, it is important to discuss a broad categorization of digital payment systems.

The first is electronic payment systems generally, which digitally facilitate financial transactions between various parties. As online shopping continues to accelerate, electronic payment methods are forcing stakeholders to reevaluate their strategies. Online electronic payments include bank transfers, eChecks, and buy now, pay later (BNPL) solutions.

Secondly, there are Mobile Payment apps which enable users to transfer funds to individuals or companies via mobile devices, including smartphones and tablets. According to Liu (2022), by the end of 2023, it was expected that $1.152 trillion would have transacted via mobile peer-to-peer (P2P) apps. Popular examples include Cash App, Venmo, PayPal, Zelle, and Google Pay.

[6] https://www.betterthancash.org/define-digital-payments

Thirdly, there are also Mobile Wallets which are platforms that hold card information directly on a mobile device, managing everything from credit cards and rewards cards to memberships and IDs. Consumers are increasingly turning to mobile wallets due to their convenience and ability to reduce fraud. Popular options include PayPal, Apple Pay, Google Pay, and Samsung Pay.

Fourthly, another category of digital payment systems is Contactless Payments. These are touch-free digital payment methods that use radio-frequency identification or near field communication (NFC) for making transactions. Their adoption rose during the pandemic due to health restrictions and safety precautions. Contactless payments can be made via credit and debit cards with NFC technology, as well as mobile wallets like Apple and Samsung Pay.

Beyond the above types of digital payment systems, there are other non-state regulated payment systems such as those underpinned by the distributed ledger technology (DLT). The cryptocurrency payment system utilizes digital tokens for payments for goods and services. Even though they are largely not regulated, cryptocurrencies are considered digital currency which are utilized for payments through the blockchain without any intermediary whatsoever (Titov, et al, 2021).

2.2.2 Digital Payment Technologies: Enabling Modern Financial Transactions

The landscape of digital payments is underpinned by a range of sophisticated technologies that enhance security, improve user experience, and facilitate seamless transactions. These technologies are continually evolving, driven by advancements in artificial intelligence, machine learning, and secure communication protocols. Digital payment technologies have helped deepen modern financial transactions in various ways. For instance, Machine Learning and AI play a crucial role in digital payment services. As consumers make purchases using cards, mobile wallets, or applications, these technologies study transaction patterns to improve user experiences over time. This ongoing learning process enhances fraud protection and security measures, making digital payments increasingly safe and efficient.

Furthermore, Contactless Digital Payments rely heavily on NFC and Magnetic Secure Transmission (MST) technologies which are used in various transactions globally. NFC

enables short-range connections between electronic devices, allowing consumers to pay with mobile wallets via tablets, smartphones, or smartwatches. MST technology, on the other hand, uses magnetic signals to emulate traditional magnetic stripes, ensuring compatibility with most existing payment processors.

Similarly, APIs have revolutionized the financial sector by allowing legacy banks to share data and information through third-party applications. This technology enables financial institutions to embed their products into non-financial platforms, creating new revenue streams and fostering innovation in financial services. However, in order to ensure digital payment security, Biometric Verification has become an integral part of digital payment systems. This technology uniquely identifies individuals through biological traits such as fingerprints, retina patterns, voice recognition, or signatures. In financial services, biometric verification is used by mobile apps and digital payment agents to authenticate transactions, adding an extra layer of security and convenience for users.

DLT, particularly blockchain, offers a secure and efficient way to create tamper-proof logs of sensitive activities. By removing third parties from the process, blockchain technology reduces operational inefficiencies in the finance industry, saving time and money for institutions while enhancing transaction security and transparency. While blockchain technology has been widely adopted in Decentralized Finance (DeFi), there is an increasing call for Centralized Finance (CeFi) where the supervisory and regulatory authorities will play a bigger role in ensuring proper regulations are put in place without necessarily stifling innovation in digital payment systems (Basu, 2022).

These technologies collectively form the backbone of modern digital payment systems, enabling faster, more secure, and more convenient financial transactions. As these technologies continue to evolve, they promise to further transform the landscape of digital payments, offering new possibilities for financial inclusion and innovation.

2.3 Impact of Digitalization of Payment Systems

Extensive scholarly literature has examined the profound influence of payment digitalization on individuals, corporations, governments, and international development organizations. The emergence of digital payment systems has precipitated a transformative force, yielding a multitude of advantages that resonate across individual and corporate

spheres, positively impacting businesses across diverse sectors and geographical boundaries. The benefits of digital payment systems are manifold and include enhanced efficiency and speed, cost-effectiveness, improved security measures, global accessibility, increased financial inclusion, sophisticated data insights and analytics, and streamlined business operations (Póta and Becsky-Nagy, 2022). However, it is imperative to acknowledge the potential drawbacks associated with these systems, including security concerns, technological infrastructure gaps, the digital divide, transaction costs, and privacy issues. Several key areas have been identified below where digital payment systems have demonstrated significant impact.

Digitalization of payment systems has had far reaching effect on economic growth through inclusive growth impact. By facilitating economic opportunities for the financially excluded and enabling more efficient resource allocation, digital payments contribute to inclusive growth. Research in Bangladesh suggests that digital payments could boost the country's annual GDP by 1.7% (Mahmud, 2024), while evidence from Kenya indicates a correlation between widespread digital payment adoption and poverty reduction (Soutter, et al. 2019). In addition, digitalization helps promote financial inclusion. Digital payments serve as a gateway to a broader range of financial services, including savings accounts, credit, and insurance products. The Bank for International Settlements (BIS) has extensively documented the role of digital payments in advancing financial inclusion (Aguilar, et al, 2024).

In addition to the impacts above, the implementation of digital payment systems can generate significant efficiency gains and cost savings for both governments and individuals. For instance, digitizing revenue collection and payments could yield annual savings of USD 1.1 billion for Latin American Government Treasury Forum (FOTEGAL) member countries (Varea and Arosteguiberry, 2010). Beyond cost savings, significant impact has also been seen in the aspect of transparency and security in transactions facilitated through digital gateways. Digital payments enhance payment traceability and accountability, potentially reducing corruption and theft. Studies in sectors such as Ghana's cocoa industry have highlighted the risks associated with cash-based systems and emphasized the importance of transparency in digital payment providers.

Digital payments can play a crucial role in enhancing climate resilience by facilitating access to funds during emergencies and enabling long-term investments in climate-friendly assets and infrastructure. In addition to climate resilience, digitalization can also help enhance women's economic participation. Digital payments have the potential to empower women by providing greater control over their financial lives and expanding economic opportunities. Initiatives such as the "Reaching Financial Equality for Women" action plan exemplify efforts to prioritize women's financial inclusion in the post-COVID-19 recovery.

2.4 FinTech and AI-Based Digital Payment Systems

The integration of AI into FinTech is catalyzing a radical transformation of the financial services landscape. This synergy extends far beyond predictive analytics, encompassing personalized customer experiences and enhanced security measures. FinTech, a comprehensive term denoting the application of technology within financial services, has evolved significantly from its initial manifestations in central bank computer systems and rudimentary consumer applications such as ATMs. Contemporary FinTech AI, powered by sophisticated digital tools and algorithms, is revolutionizing financial services and management for both consumers and organizations. This transformation leverages a diverse array of technologies within the financial sector, fundamentally altering operational paradigms and wealth generation strategies.

Financial institutions, including banks and investment firms, are increasingly recognizing the multifaceted potential of AI to enhance operational efficiency and drive wealth creation. The pervasive influence of AI in FinTech is precipitating a profound disruption in the financial industry, as articulated by Deloitte (2024): "The emergence of AI is disrupting the physics of the industry, weakening the bonds that have held together the components of the traditional financial institutions, and opening the door to more innovations and new operating models."[7] This makes a good case for supervisory and regulatory authorities to be ahead of the curve in their payment system and monetary policy objectives. The disruption witnessed in the past decade in the financial industry requires cross-border collaboration and innovative regulatory practices to avoid having parallel

[7] https://www.deloitte.com/ng/en/services/risk-advisory/services/how-artificial-intelligence-is-transforming-the-financial-services-industry.html

financial systems within the same jurisdictions. This requires regulatory and supervisory authorities to adopt AI in its regulation of the digital payment systems.

This comprehensive integration of AI into FinTech is not merely an incremental improvement but represents a paradigm shift in the delivery and consumption of financial services. As AI technologies continue to evolve, their potential to further transform the financial landscape remains substantial, promising continued innovation and disruption in the sector. Applying the use of AI in FinTech include the use of Automated Financial Advisory Services. Robo-advisors, a manifestation of automated financial advisory services, have undergone significant refinement and customization in recent years. These systems, particularly popular among retail investors with limited resources and expertise, utilize extensive investor and market data to algorithmically generate optimal investment strategies. Their utility extends to experienced investors, assisting with complex tasks such as portfolio rebalancing and tax-loss harvesting. Though the use of Automated Financial Advisory Services may not be directly linked to digital payment systems, its end-result remains the utilization of a payment gateway.

Another application of AI in FinTech is the AI-Powered Credit Scoring and Risk Assessment. AI has substantially automated and enhanced the efficiency of credit scoring and risk assessment processes, which are fundamental to investment vetting. As noted by SP Global (2023), "We believe the use of artificial intelligence, in connection with firms' alternative datasets (i.e., digital fingerprints) can...generate more accurate and timely signals for credit risk management and investment purposes."[8] While the full potential of AI in this domain remains to be realized, its impact is already significant.

Furthermore, AI's capacity to analyze vast quantities of customer data is revolutionizing the field of customer experience (CX). This technology enables the extraction of profound insights into individual consumers' financial preferences, habits, and objectives. FinTech professionals can leverage these insights to deliver highly tailored CX solutions that address specific, personalized financial needs and aspirations.

[8] https://www.spglobal.com/en/research-insights/special-reports/artificial-intelligence-and-alternative-data-in-credit-scoring-and-credit-risk-surveillance

More importantly, AI can help in fraud detection and prevention, particularly in digital payment system gateways. AI-driven systems have revolutionized fraud detection in digital payments. Generative artificial intelligence demonstrates remarkable efficiency in identifying suspicious behaviors and reducing false decline rates. The self-learning capacity of these systems enables them to adapt to new fraudulent patterns, analyzing vast amounts of transactional data in real-time. This continuous learning process allows financial institutions to stay ahead of evolving fraud tactics, significantly enhancing the security and reliability of digital payment ecosystems. By leveraging AI's analytical power, financial services can provide more robust fraud prevention measures, thereby fostering greater trust and adoption of digital payment systems among consumers and businesses alike.

2.5 Towards a Cashless Society: Priorities and Prospects

The global trend towards a cashless society has accelerated significantly, particularly in the wake of the COVID-19 pandemic. In 2020, cash transactions accounted for merely one-fifth of all in-store payments globally, substantially trailing behind credit cards (50%) and mobile wallets (26%). Projections indicate that cash usage may further decline to less than 13% of worldwide payments within the next five years. This shift towards cashless transactions has been observed across all age demographics, with the highest cash usage (26%) recorded among individuals aged 65 and older, while the 25-34 age group demonstrated the least preference for cash transactions. The trend is particularly pronounced in Asian economies, characterized by a strong middle class, robust digital banking infrastructure, and thriving e-commerce sectors. However, the transition to a cashless society presents significant challenges, particularly for marginalized and economically vulnerable populations. The COVID-19 pandemic has exacerbated economic disparities, pushing many into poverty and delaying national digital banking agendas in numerous developing markets. This raises critical questions about the survival strategies for the poor and newly impoverished in an increasingly cashless economy, and the necessary support mechanisms for those at risk of being left behind.

A cashless society is characterized by the digital storage and exchange of currency, primarily utilizing e-wallets, credit cards, and debit cards. While most digital payment services are based on real money transactions linked to traditional bank accounts, the rapid

adoption of cryptocurrencies adds a new dimension to this digital landscape. However, a substantial population, especially in developing and emerging markets, remains unbanked or underbanked. FinTech innovations have played a crucial role in reaching these underserved populations, facilitating financial inclusion in remote areas. The transition towards cashless societies has been driven by various factors, including high smartphone penetration rates, real-time mobile payments, the emergence of neo banks, widespread e-commerce adoption, and supportive government policies. However, the pandemic has disproportionately affected certain demographics, potentially exacerbating existing inequalities.

The shift to a cashless society poses potential challenges for marginalized sections of society, necessitating the exploration of strategies to secure their economic future. In Asia, which hosts over 60% of the global millennial population (1.1 billion out of 1.8 billion worldwide), millennials are driving the demand for cashless solutions. However, it is crucial to address the needs of less affluent sections of society, particularly in light of the pandemic's severe economic impact.[9] Developing and implementing enablers for economic recovery and long-term sustainability for these vulnerable populations is of paramount importance in ensuring an inclusive transition to a cashless society.

2.6 Effective DPS: Structural, Regulatory and Technical Challenges

The transition towards a cashless society presents a complex landscape of challenges and opportunities, necessitating a nuanced approach to address the multifaceted implications of this shift. This section examines the key dimensions of this transition, considering diverse stakeholder perspectives and potential strategies for implementation. There is no doubt that effective digital payment systems are extremely crucial for modern economies given the seamless experience and convenience in concluding transactions. Nevertheless, there are a number of challenges that require all the stakeholders to address to ensure reliability and user confidence.

[9] https://histoire.bnpparibas/en/barter-cash-contactless-a-brief-history-of-the-means-of-payment/

Structural challenges include the need to ensure that the payment systems are better prepared for high volume of transactions while ensuring security and fraud prevention. The digital nature of cashless transactions introduces new vulnerabilities to cyberattacks and hacking, contrasting with the physical risks associated with traditional bank notes. However, advancements in encryption and authentication technologies, particularly blockchain, offer promising solutions for enhancing transaction security and reducing fraud risks.

From the regulatory perspective, the very nature of the digital economy presents significant challenges that transcend just a single jurisdiction. Therefore, in navigating complex landscape of multiple legal systems in a single transaction, regulators are faced with the challenge of dealing with transactions that have multi-jurisdictional character in cross-border payments. This requires collaboration and integration of global financial services. For instance, regulators among the OIC member countries can come together to solve cross-border challenges associated with the regulation of cross-border payments across the region and beyond.

Technically, there are numerous challenges which require the attention of regulators and other stakeholders to ensure effective digital payment systems. Since technology continues to evolve, cybersecurity threats will also continue to plague the digital payment systems. Therefore, there is a need for continuous monitoring, development and innovation in advanced counter cybersecurity measures such as advanced encryption. In addition to addressing security threats, there is also the need for regulators to ensure and facilitate interoperability and user accessibility. To achieve this, a comprehensive legal framework would help a great deal. Such legal framework must not only keep pace with technological advancements but must also ensure it anticipates potential new developments related to privacy, security, consumer rights and data protection. The digital footprint left by cashless transactions raises substantial privacy concerns. Balancing the convenience of digital payments with the need for personal privacy necessitates robust regulatory frameworks and technological safeguards, including advanced data encryption and stringent access controls.

Cashless systems have the potential to significantly expand financial inclusion, particularly in underserved areas. Mobile payment platforms have demonstrated efficacy in facilitating transactions in regions with limited physical banking infrastructure, thereby empowering individuals economically through access to essential financial services. The transition to a cashless society must address the challenges faced by demographics with limited technological proficiency, particularly the elderly. Comprehensive education and support programs are crucial to ensure universal participation in the digital economy.

The future of currency in an increasingly cashless society demands careful consideration of security, inclusion, privacy, accessibility, and environmental factors. A balanced approach that leverages the strengths of both physical and digital systems can foster a secure, inclusive, and sustainable financial future. This transition necessitates ongoing dialogue among policymakers, financial institutions, technology providers, and diverse societal stakeholders to ensure that the evolution towards a cashless society serves the broader public interest.

2.7 Global Trends and Best Practices in Digital Payment Systems

The global digital payment market is projected to reach $14.78 trillion by 2027, with an 11.58% growth rate from 2024 to 2027 (Statista, 2024). China leads with a transaction value of $3.49 trillion in 2022, followed by the U.S. at $1.76 trillion and Europe at $1.55 billion.[10] Key trends shaping the industry include seamless commerce, mobile payments, biometric authentication, Europay, MasterCard and Visa (EMV) technology, mobile Point-of-Sale (mPOS), voice-based payments, AI and machine learning in security, BNPL, and Mobile wallets.

Seamless Commerce is the integration of payment processes across online, in-store, and P2P transactions and it is becoming increasingly crucial. This trend focuses on enhancing usability to improve conversion rates and consumer adoption. High security standards are being implemented throughout the payment process, with biometric methods like fingerprint authentication gaining prominence. The emphasis is on creating a frictionless payment experience while maintaining robust security measures.

[10] Digital & Trends/Digital Payments/Market Insights report by Statista May 2023

In addition, for Mobile Payments, the impact of mobile devices on both Point-of-Sale (POS) and e-commerce transactions continues to grow significantly. The global mPOS payment market is projected to grow at 13.45% (2024-2027), reaching $5.52 trillion by 2027. This trend extends to the integration of P2P payments into messaging platforms and social networks, making transactions more convenient and accessible. The rise of mobile payments is transforming how consumers interact with businesses and each other in financial transactions.

This technology of Biometric Authentication is emerging as a highly secure method for user verification in digital payments. Utilizing facial scans, fingerprints, iris scans, and vein mapping, biometric authentication aims to ensure the legitimacy of users accessing payment systems. The biometric payment cards market is expected to reach $4.79 billion by 2030, indicating significant growth potential. A new form of this technology, liveness detection, challenges users with real-time prompts like facial movements or voice commands to prevent sophisticated fraud attempts.

The adoption of EMV technology marks a shift from traditional card recognition methods to more secure, computerized mechanisms. EMV uses temporary transaction codes that change with each transaction, significantly enhancing bank account security. This trend indicates a gradual replacement of traditional plastic cards with more advanced digital payment methods, reflecting the evolving landscape of payment security.

mPOS systems are revolutionizing how businesses process payments, allowing transactions via mobile devices like smartphones and tablets. With a projected growth to $5.52 trillion by 2027, mPOS is becoming increasingly popular due to its flexibility and convenience.[11] These systems often include features like offline mode capacity and integrations with accounting and invoicing software, enabling businesses to conduct transactions from any location and streamline their operations.

In a similar vein, the global voice-based payments market is expected to reach $14.66 billion by 2030, signaling a significant shift in how consumers interact with payment systems. This trend is closely tied to the rise of smart speakers and virtual assistants.

[11] Digital & Trends/E-commerce worldwide/Statista2023

Currently, 35% of smart speaker users utilize them for purchasing products like groceries and clothing. The technology enables secure payments through speech recognition, leveraging advancements in natural language processing and voice biometrics for user authentication.

As discussed above, AI and Machine Learning are becoming crucial in enhancing payment security. The global AI market, valued at $150.2 billion in 2023, is expected to reach $1,354.2 billion by 2030. These technologies enable real-time analysis of large volumes of customer data, instantly flagging suspicious activities and unauthorized access attempts. They are particularly effective in automating fraud detection tasks, improving account onboarding processes, and enhancing authentication and authorization procedures.

BNPL services are rapidly gaining popularity, with global users anticipated to reach around 900 million by 2027. This short-term financing option allows consumers to make purchases and pay for them later, often without interest if paid within a specified period. BNPL is attracting both young customers who enjoy flexible payment options and older customers who may not have access to traditional credit cards. Its growing adoption is reshaping consumer financing and retail strategies.

Finally, Mobile wallet usage is experiencing exponential growth, with transactions projected to increase from $9 trillion in 2023 to $16 trillion by 2028, representing a 77% rise. As of 2024, there are nearly 2.8 billion mobile wallets in use globally. These digital wallets offer fast, secure, and effective payment methods with just a few taps in an app. They support various payment technologies like NFC, QR codes, and tap-and-pay, while also integrating customer loyalty programs to enhance user engagement and retention.

These trends collectively indicate a rapid evolution in the digital payment landscape, driven by technological advancements, changing consumer preferences, and a growing emphasis on security and convenience. The integration of these technologies is not only transforming how financial transactions are conducted but also reshaping the broader financial services industry (Cusolito, et al, 2022).

CHAPTER 3: GLOBAL, REGIONAL, AND LOCAL TRENDS

3.1 Payment Systems: Emerging Trends in OIC Member Countries

The increasing prominence of mobile technologies in facilitating financial transactions is leading to greater financial mobility and rapid consumer adoption, especially with the widespread use of smartphones. Due to advancements in mobile technology and the widespread adoption of e-commerce, online payments have experienced exponential growth, with a significant portion of transactions now being conducted through various platforms and applications. However, as noted in a previous COMCEC report (2015), there is an emerging trend towards distinguishing between payment systems operated by banks and other revenue-generating payment systems. This shift is largely driven by advancements in technology and evolving consumer preferences.

Specific technologies like mPOS equipment, QR codes, contactless cards, and biometric data processing are becoming popular, driven by innovations in retail payment systems. The 2015 COMCEC report highlighted that network effects and bandwagon effects significantly contribute to the proliferation of these payment systems (COMCEC, 2015). Despite this, convergence among systems has not yet been observed. This trend continues to persist today.

Consequently, mobile payment systems are highlighted as distinct from traditional retail payment systems, often not requiring accounts with traditional financial institutions. The ecosystem developed, typically with advancements in FinTech innovations, leading to greater financial inclusion especially in the developing OIC countries. This evolution has witnessed non-financial institutions, such as telecommunications companies, taking on financial services (El Amri et al., 2021). For instance, Orange Money now facilitates cross-border payments in many African countries, including OIC countries like Mali, enabling individuals to send and receive money efficiently (El Amri et al., 2021).

Unlike developing OIC nations, developed OIC countries such as Türkiye, Malaysia, and those in the Gulf Cooperation Council (GCC) predominantly utilize mobile and online

banking for their daily transactions (Asli et al., 2022). This contrast highlights the advanced technological infrastructure and widespread accessibility of banking services in these developed countries, compared to the challenges faced by developing or underdeveloped nations.

3.2 Digital Payment Systems: Issues and Challenges

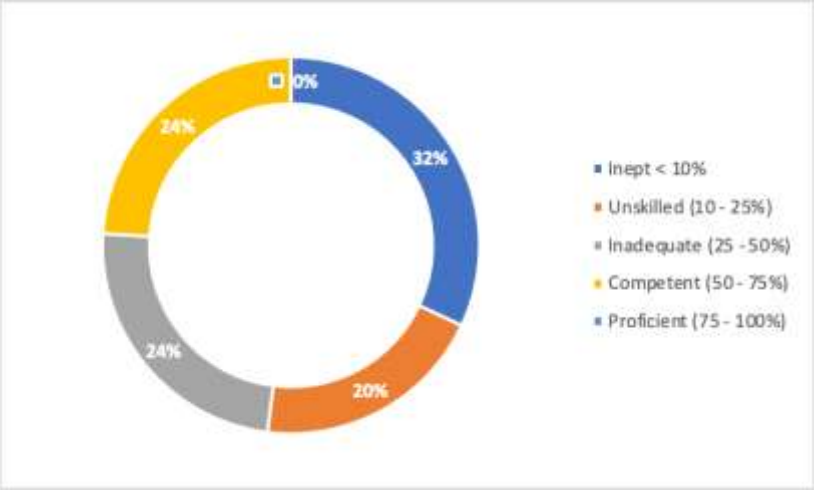
3.2.1 Structural Issues and Challenges

There are several structural issues and challenges that can impede the transformation progress to digital payment systems. The majority of OIC member countries experience lack of technical literacy, economic structure challenges, government effectiveness issues, and challenges in adopting frameworks conducive for effective decision-making.

3.2.1.1 Technical Literacy

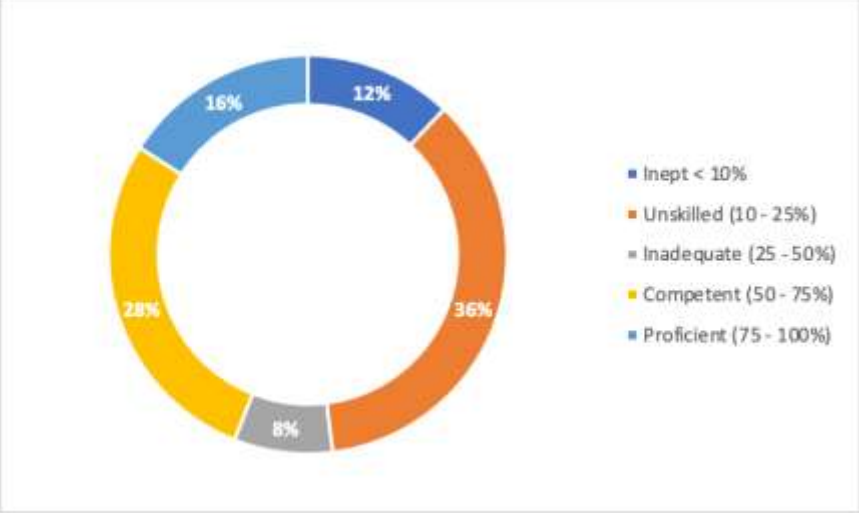
In order to transform to a digital payment system, it is imperative that the society as a whole is well prepared and made ready to have the minimum level of technical literacy to conduct digital payments. Otherwise, many people will be left behind leading to a considerable gap that might hinder any future progress in digital payment improvements. Drawing from the UN SDGs indicators for ICT skills data as set by the Telecommunication Development Center (ITU-D, 2024), OIC member countries collectively lag in having an adequate and competent technical literacy for a digital payment system. The following charts depict the percentage of OIC member countries in each of the five technical categories – Inept (less than 10 percent of the country's population have the skill), Unskilled (only 10 to 25 percent of the country's population possess the skill), Inadequate (only 25 to 50 percent possess the skill), Competent (50 to 75 percent possess the skill), and Proficient (more than 75 percent possess the skill).

Figure 3.1: File Transfer Competency Levels of OIC Countries



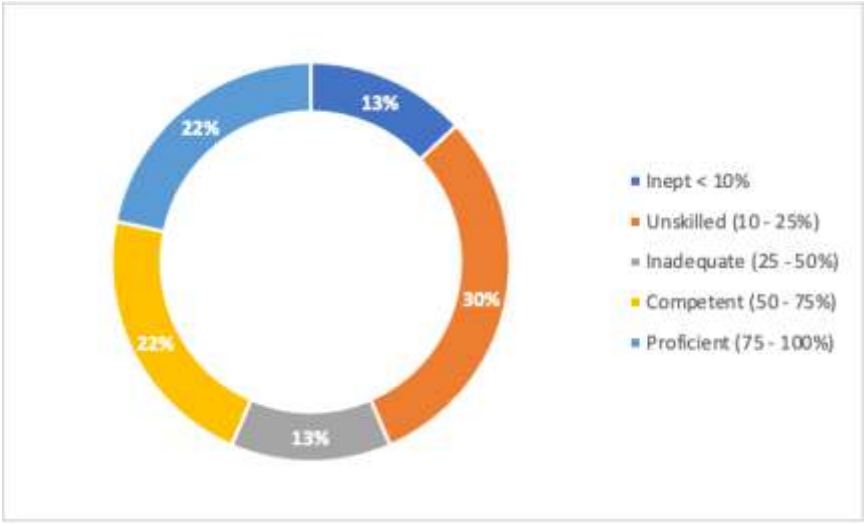
Source: Authors

Figure 3.2: Using Copy and Paste Competency Levels of OIC Countries



Source: Authors

Figure 3.3: Sending Emails with Attachments Competency Levels of OIC Countries



Source: Authors

None of the OIC member countries fall in the proficient category for the percentage of their population who are capable of transferring files. What is alarming is that more than 40 percent of OIC member countries fall under the inept or unskilled range in all of the three skills – 'transferring files', 'using copy and paste', and 'sending emails with attachments'. More than 50 percent fall under the inept or unskilled range for the skill of transferring files.

While none of the OIC member countries fall under the proficient range for the skill of transferring files, 16 and 22 percent of them fall under the proficient range for the skills of 'using copy and paste' and 'sending emails with attachments' respectively. These proficient populations are usually characteristic of developed OIC countries – particularly the middle east gulf area. For instance, the populations of Malaysia, Oman, Saudi Arabia, and UAE are proficient in 'using copy and paste'. As for 'sending emails with attachments', the populations of Bahrain, Egypt, Oman, Saudi Arabia, and UAE are proficient.

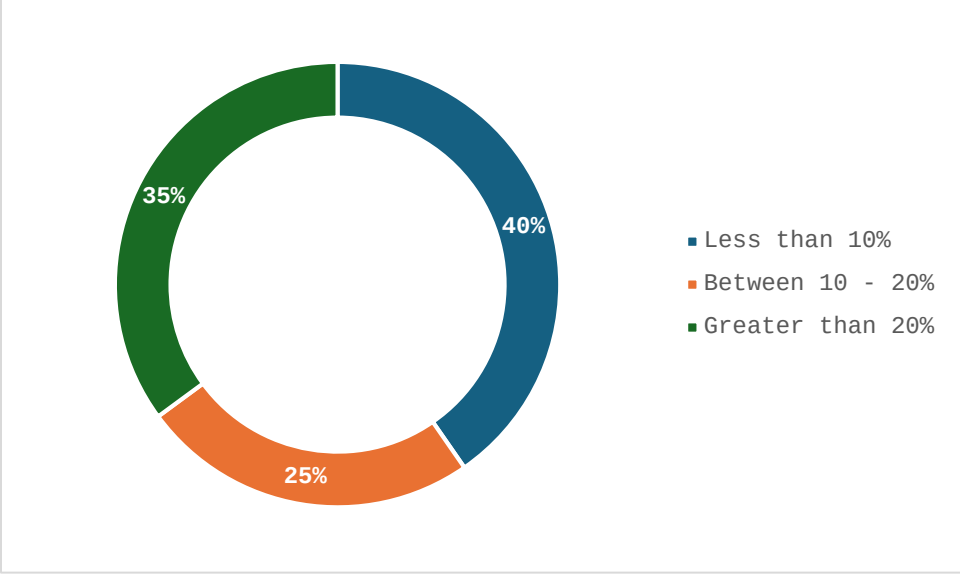
On the other hand, it has to be noted that the populations of countries under conflict, war, or occupation perform poorly on these skills. However, the low numbers recorded more probably reflect the difficulty in retrieving that statistical data or the difficulty to have access to the internet rather than actually reflecting the illiteracy of the population. For

example, only 1.16 percent of the population of Iraq know how to send emails with attachments, while only 11.3 percent of the Palestinians know how to do that. Moreover, 1.5 percent of the Iraqis know how to use copy and paste, while only 9.57 percent of the Palestinians can do that.

3.2.1.2 Economic Structure Challenges

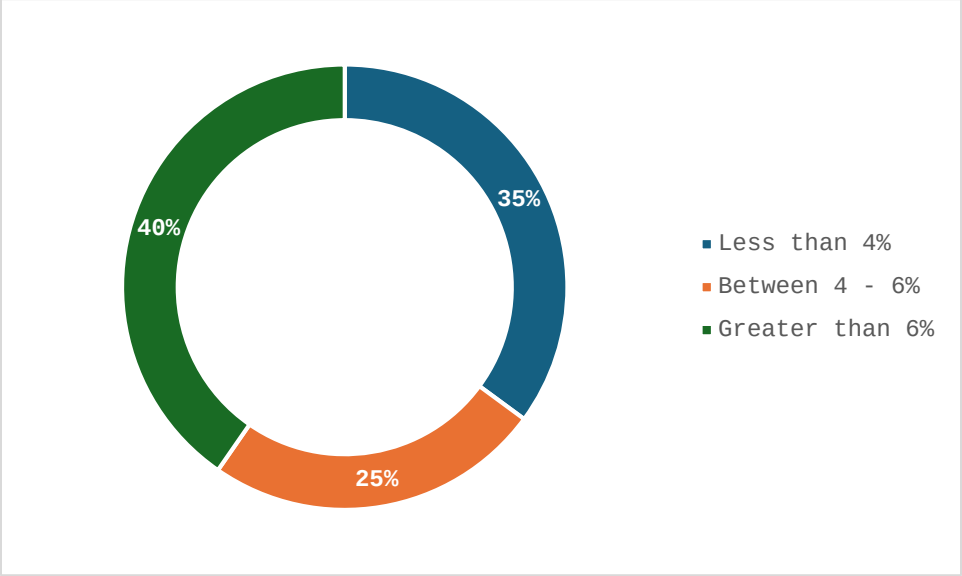
Overcoming economic challenges hinges significantly on achieving financial inclusion and access, ensuring that all individuals and businesses have the opportunity to participate in the financial system. Access to finance is paramount as it facilitates investment, entrepreneurship, and consumption, thereby driving economic activity. However, income inequality persists as a challenging obstacle, creating conditions for other inequalities to play out (Ahmed & Mohamed, 2022). Such a situation exacerbates systemic barriers to economic opportunity, particularly for those living in poverty. These barriers, often entrenched within societal structures, impede the equitable distribution of resources and hinder the upward mobility of marginalized communities, in turn affecting the transformation to a digital payment system.

Figure 3.4: Percentage of OIC Countries by Unemployment Rate – Ages 15 – 24



Source: Authors

Figure 3.5: Percentage of OIC Countries by Unemployment Rate – Age 15+



Source: Authors

A good indicator of the economic ability of individuals and households is the employment rate. This is important because low employment rates, or high unemployment rates, can lead to further income and wealth inequality. Extracted from World Bank (2022), on such indicators, OIC member countries show high unemployment rates. Particularly, about 60 percent of the OIC member countries have high unemployment rates, greater than 10 percent, among the ages between 15 and 24. In contrast, 40 percent of OIC member countries suffer higher than 6 percent of unemployment among the people aged 15 and above.

According to the World Bank, many OIC countries fall into the fragile and low-income categories which means that the positive shared prosperity premiums are lower on average than other economies (Ahmed & Mohamed, 2022). Yet, according to 2022 data of the World Inequality Database, OIC countries collectively have similar wealth inequality to the world's average. But there are variances among different OIC regions. For example, in the GCC countries, 73 percent of the wealth is owned by the top ten percent of the people which is higher than the world's average of 63 percent. On the other hand, the Southeast Asian OIC countries collectively have a lower wealth distribution of 60 percent for the top 10 percent.

3.2.1.3 Government Effectiveness and Policy Framework Issues

The World Bank provides the Government Effectiveness estimates that "captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (World Bank, 2022). According to the World Banks Databank's 2022 statistics, the indicator shows that the governments of the majority of OIC countries are ineffective. Only three OIC countries score above 1 on a scale ranging from – 2.5 to 2.5: Brunei Darussalam, UAE, and Qatar. Particularly, the government of Brunei Darussalam ranks 20th among the world's effective governments on this scale with a score of 1.422245. UAE ranks 25th with a score of 1.299962 while Qatar ranks 38th with a score of 1.136829. Malaysia scores short of 1 on this scale and ranks 45th. Besides these four countries, eight other countries rank in the range between 60 and 100 with scores ranging from 0.022 to 0.64. The remaining 45 countries measure poorly on the indicator, all securing negative scores and ranking in the bottom 113 countries.

Additionally, with the exception of a few countries, OIC nations grapple with high corruption rates. According to the World Bank Databank's 2022 statistics, the Corruption Control indicator gauges the extent to which public power is exploited for private gains (World Bank, 2022). Among these countries, the GCC and a select few others exhibit the lowest corruption control scores, while the remainder contend with elevated corruption levels. Notably, Brunei Darussalam, UAE, and Qatar secured the highest scores, approximately 1.175, 1.155, and 0.804 respectively, ranking 34th, 35th, and 41st worldwide. Such statistics underscore the extent of inefficiencies and ineffectiveness within governments, which are critical factors requiring improvement for the successful digital transformation of payment systems.

3.2.1.4 Infrastructure

According to the OIC Megatrends 2022 Report, OIC are behind the curve in terms of channeling the biggest chunk of venture capital (VC) funding into startups in high-impact sectors such as FinTech, retail tech, and digital health (Ahmed & Mohamed, 2022). This lag

in VC investment can be attributed to several underlying structural issues that hinder the development of a robust startup ecosystem in these nations.

One of the primary challenges is the lack of adequate infrastructure that can support the growth of startups, particularly in the technology sector. In many OIC countries, there are significant gaps in digital infrastructure, including limited access to high-speed internet and modern communication technologies, which are essential for tech-driven industries. Without these foundational elements, startups in sectors like FinTech and digital health struggle to scale, limiting their ability to attract substantial VC investment.

Another significant challenge is the lack of a well-established entrepreneurial culture and support networks. Unlike in more developed startup ecosystems, such as those in Silicon Valley or Europe, many OIC countries do not have a mature ecosystem of accelerators, incubators, and mentorship programs that can nurture early-stage startups. This lack of support further exacerbates the difficulties in attracting VC funding, as investors may be wary of backing ventures that lack the necessary guidance and resources to succeed.

3.2.2 Regulatory Issues and Challenges

Technological innovation in trade is hindered by cross-border regulations and lack of standardization in documentation. However, there are some initiatives such as the Africa Trade Gateway and the Regulatory Sandbox in Egypt that are aimed at addressing these challenges as highlighted by The Islamic Corporation for the Insurance of Investment and Export Credit (ICIEC). The Africa Trade Gateway aims to improve transparency and access to information for businesses, particularly focusing on intra-African trade complexities. The Regulatory Sandbox provides a testing ground for FinTech startups to navigate regulatory frameworks, fostering innovation while ensuring compliance. (ICIEC, 2022). Nonetheless, these two initiatives are clearly not sufficient for a diverse regulatory framework across 57 members of the OIC. Moreover, there is lack of data and information on the progress of such initiatives.

3.2.3 Technical Issues and Challenges

OIC markets collectively lag the latest digitalization development to face the challenges of automation (Ahmed & Mohamed, 2022). None of the OIC member countries were

classified on the Economist Intelligence Unit's Automation Readiness Index as mature; however, UAE was the only OIC member country to be classified as developed with an index value just above the average of 62.1 (Economist Intelligence Unit, 2018). Four other OIC member countries – Malaysia, Türkiye, Saudi Arabia, and Indonesia – were categorized as emerging with index values below the average (Economist Intelligence Unit, 2018).

On the 2023 Global Innovation Index, UAE, Malaysia, and Türkiye progressed to the top 40 since the 2022 index values (World Intellectual Property Organization, 2023). Other OIC member countries made significant progress as well where Qatar and Saudi Arabia entered the top 50. Other notable improvements in their innovation rankings include Middle East economies Bahrain and Oman making it in the top 70. Although a few OIC member countries are making good progress, the progress of the OIC member countries varies widely. Ahmed & Mohamed (2022) express their concern that OIC member countries might be left behind by digitalization if they don't act.

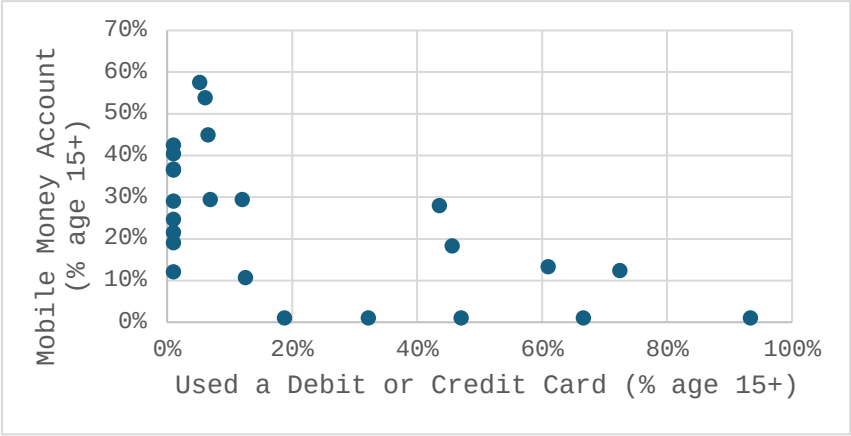
3.3 Payment System Classification of OIC Member Countries

According to the Global Findex report, less than 45 percent of the population aged 15 or older in 21 OIC countries has access to the internet, significantly lower than the global average of 75.7 percent, as reported in the 2023 Statista report (E-commerce Market and Analysis, 2023, p. 34). This statistic underscores the inadequate state of digital connectivity infrastructure in these nations. In five of these countries, 60 percent or less of the population owns a mobile device – Chad (50 percent), Niger (52 percent), Mozambique (55 percent), Sierra Leone (59 percent), and the Republic of Yemen (60 percent). This figure is again substantially lower than the global average of 74.5 percent smartphone penetration, as indicated by the 2023 Statista report (p. 34).

3.3.1 Mobile Money Account: Characteristic of Poor Banking

With the exception of a few, drawing from the World Bank's Global Findex Database (World Bank, 2021), OIC countries where the populace utilizes credit or debit cards do not rely on mobile money accounts. Conversely, those nations with a low percentage of their population using credit or debit cards exhibit a greater dependence on mobile money accounts for transactions.

Figure 3.6: Bank Cards vs. Mobile Money Account



Source: Authors

Africa emerges as the region where nations rely mostly on mobile money accounts for transactions. Many countries situated to the left of the chart are African members of the OIC organization, such as Chad, Mozambique, Sierra Leone, Burkina Faso, Mali, Togo, Benin, Cote d'Ivoire, Cameroon, Uganda, Senegal, and more. Conversely, countries represented to the right of the 20% mark on the chart predominantly depend on credit and debit cards issued by financial institutions. This trend is primarily observed in non-African OIC countries.

3.3.2 Mobile and Online Banking: A Feature of Developed Economies

In contrast, developed OIC countries, particularly those in the Middle East, heavily rely on mobile or online banking for their transactions, with a much weaker reliance on mobile money accounts. For instance, in countries like Türkiye, Malaysia, Iran, Kazakhstan, Saudi Arabia, and the UAE, the percentage of the population using mobile or online banking to send or receive money stands at 37%, 45%, 48%, 51%, 59%, and 41%, respectively. In contrast, only 18% of Türkiye's population uses mobile money accounts, highlighting the disparity and relative weakness in the adoption of mobile money services in more developed economies.

3.4 Impact of Financial Development Level on Digitalization of Payment Systems

Understanding the level of financial development is essential to understand its impact on the extent of digitalization of payment systems. World Bank development indicator CPIA

Financial sector ratings, on a scale from 1 (low) to 6 (high), are used to assess the development of each OIC country's financial sector. In essence, this indicator assesses the structure of the financial sector and the policies and regulations that affect it. The percentage of the population aged 15 and older who have made or received a digital payment serves as an indicator of digital payment adoption.

The following Table 3.1 lists the values of these indicators for 19 OIC countries for which such data is available. CPIA financial sector rating is taken for the base year 2022.

Table 3.1: CPIA Financial Sector Ratings for a Selection of OIC Countries

Country Name	CPIA Financial Sector Rating (2022)	Made or received a digital payment (% age 15+)
Afghanistan	1.5	8%
Bangladesh	2.5	45%
Benin	2.5	44%
Burkina Faso	3	33%
Cameroon	3	50%
Cote d'Ivoire	3.5	48%
Guinea	3	28%
Kyrgyz Republic	3	39%
Mali	3.5	38%
Mozambique	2.5	42%
Nigeria	2.5	34%
Pakistan	3.5	18%
Senegal	3.5	53%
Sierra Leone	2.5	27%
Tajikistan	2	33%
Togo	3	44%
Uganda	3.5	63%
Uzbekistan	3	42%

Source: Authors, adapted from (World Bank, 2022)

Low Financial Sector Rating (1-2)

Afghanistan has a financial sector rating of 1.5, with only 8% of its population using digital payments. Tajikistan, with a rating of 2, has 33% adoption. These low figures highlight the challenges in digital payment adoption in countries with underdeveloped financial sectors.

Moderate Financial Sector Rating (2.5-3)

Countries with a financial sector rating of 2.5, such as Bangladesh, Benin, Mozambique, and Nigeria, have varying adoption rates from 34% to 45%. Burkina Faso, Cameroon, Guinea, Kyrgyz Republic, Togo, and Uzbekistan, with ratings of 3, show adoption rates ranging from 28% to 50%. This range indicates that even moderate financial sector development can significantly impact digital payment adoption, but other factors also play a role.

Higher Financial Sector Rating (3.5)

Countries with a rating of 3.5, including Cote d'Ivoire, Mali, Pakistan, Senegal, and Uganda, show a wide range of adoption rates from 18% to 63%. Notably, Uganda has the highest adoption rate at 63%, indicating that a higher financial sector rating generally correlates with greater digital payment usage, although there can be significant variability.

The data indicates a general trend where countries with higher financial sector ratings tend to have higher digital payment adoption rates. However, the relationship is not linear, and other factors such as infrastructure, regulatory environment, and public trust also influence adoption rates.

3.5 Sharīʻah Analysis of Digital Payment Systems

Traditionally, Islamic law mandates that a sales transaction satisfy conditions encompassing offer and acceptance, contractual parties, the product, and the price. The advent of digital payments presents distinctive challenges in upholding these principles within a Shariah framework. Fundamental among these challenges is delineating the nature of price receipt and the permissible timeframe for its realization. Furthermore, ensuring resilience against technological failures and security breaches is imperative, as such

incidents may engender major gharar, thereby contravening Shariah tenets. Consequently, there exists a heightened demand for secure technological infrastructures and trusted operational practices.

The proliferation of accessible, high-speed internet, coupled with widespread mobile phone penetration, has catalyzed the rise of mobile money services, particularly in developing economies (El Amri et al., 2021). This phenomenon has seen a shift away from traditional financial intermediaries toward digital payment providers. The transparency previously afforded by traditional intermediaries has not been matched at the same level by these new digital payment providers (Shuib et al., 2024, p. 16). Consequently, there is an increased impetus for regulatory bodies to take a more proactive role in ensuring Shariah compliance within this rapidly evolving digital landscape. This underscores the paramount importance of fostering clear communication and transparency among new digital payment providers, regulatory oversight entities, and regular consultation with Shariah scholars (Shuib et al., 2024).

The swift proliferation and technological strides have led to a proliferation of diverse digital payment methods and systems. This has expanded the scope of e-commerce digital payments, transcending the confines of traditional credit card transactions and presenting a myriad of options. Consequently, each approach and method necessitates rigorous Shariah analysis and personalized treatment to uphold adherence to Islamic principles.

For instance, the contract governing most of the conventional electronic wallets is a loan contract (Hamsin et al., 2023, p. 57). Such wallets can potentially result in usury transactions. Moreover, the ruling of the National Shariah Council-Indonesian Ulema Council No: 116/DSN-MUI/IX/2017, for example, requires that the funds that settle from a Sharīʿah-compliant electronic money must be placed in an Islamic, non-conventional, bank (Hamsin et al., 2023). The stipulation is rooted in providing a digital payment with no side-effects of usury, gambling, gharar, deception, bribery, or extravagance.

Concurrently, cryptocurrencies and crypto-wallets have emerged as innovative digital P2P payment methods. The global trend towards embracing and integrating these technologies places renewed emphasis on reexamining the subject with a more

comprehensive and informed Shariah perspective. While practices such as short-selling, margin trading, and leveraging are in clear violation of Sharīʿah principles and are considered usurious, cryptocurrencies offer a streamlined means of conducting digital transactions. However, it is imperative that cryptocurrency projects, services, and associated coins/tokens adhere rigorously to Shariah guidelines, refraining from engaging in activities such as trading in impermissible goods, facilitating usurious transactions like liquidity pool investments, or impeding immediate access to funds.

3.6 Existing Bilateral and Multilateral Collaborations: Cross-Border Transactions

Enhanced, faster, cheaper, more transparent, and inclusive cross-border payments can provide widespread benefits to individuals and global economies by supporting economic growth, international trade, development, and financial inclusion (FSB, 2020). However, traditional cross-border transactions face significant issues, including low speed due to the involvement of multiple intermediaries, high costs with substantial fees even for low-value transactions, and limited to negligible transparency. Additionally, these challenges are exacerbated for the unbanked and financially excluded populations.

Multilateral collaborations hold great potential for addressing these issues and challenges. These platforms aim to develop cross-border payment systems that, according to the Committee on Payments and Market Infrastructures (CPMI), "can substitute for or operate alongside traditional correspondent banking relationships or bilateral interlinking of domestic payment infrastructures" (CPMI, 2023). Operating as substitutes or in competition with traditional financial institutions, multilateral collaborations and platforms are thought to eliminate many of the traditional intermediaries, providing more direct transactions across different jurisdictions, or even direct P2P payments.

3.6.1 Bilateral/Multilateral Collaborations Versus Other Cross-border platforms

The CPMI has identified seven key frictions that hinder the efficiency and effectiveness of cross-border payment systems. These frictions include: (i) legacy technology platforms; (ii) fragmented and truncated data formats; (iii) funding costs; (iv) long transaction chains; (v) weak competition; (vi) complex processing of compliance checks; and (vii) limited

operating hours (FSB, 2020). It is thought that multilateral collaborations can address some or all of these frictions.

Multilateral platforms are set apart by their capacity to engage cross-border talks among various parties related to their management. According to CPMI, any such platform involves coordination among numerous public and private sector stakeholders across various jurisdictions to reach consensus on the platform's design, governance, operation, and oversight. A key design for such platforms is to rely on new technologies and reduce dependencies on legacy systems which delay transactions with old payment message standards. This helps to reduce intermediary chains while maintaining security and increasing the speed of transactions. Furthermore, multilateral platforms can also offer extended operational hours to address different time zones within their cross-regional coverage.

However, such arrangements are deemed to form more complicated legal and operational issues than in a domestic payment system (CPMI, 2023). This can vary depending on the regional or global coverage of the platform. Other factors that can play a role in determining the legal complexity is the extent of political and economic cooperation among the different countries and regions. While these might be very important considerations, the approach and design by which the multilateral platform is planned can have a substantial effect on the legal consequences.

3.6.2 Key Features and Design Choices

Multilateral platforms cover a wide range of payment functions and their related features, shown in the following Table 3.2.

Table 3.2: Functions and Related Features of Multilateral Platforms

	Function	Related Features
1.	Liquidity management	Intraday credit facilities Liquidity-saving mechanisms Collateral management functions
2.	Payment messaging including authentication, initiation, submission, and conditionality	Standardized messaging Proxy lookup registries Pre-validation services APIs for technical integration with third parties Limited or 24/7/365 operating hours Quantity and time limits Capital flow management measures
3.	Compliance and data processing	AML/CFT and fraud monitoring KYC registries Privacy and data management
4.	Clearing including netting (where applicable)	Single or multi-cycle Bilateral or multilateral
5.	Settlement	Legal finality and technical settlement Real-time gross or deferred net settlement Settlement currency Type of settlement asset (commercial bank money, central bank money, crypto) Settlement risk management measures
6.	Foreign exchange (FX)	Currency conversion Payment versus payment (PvP)

Source: (CPMI, 2023)

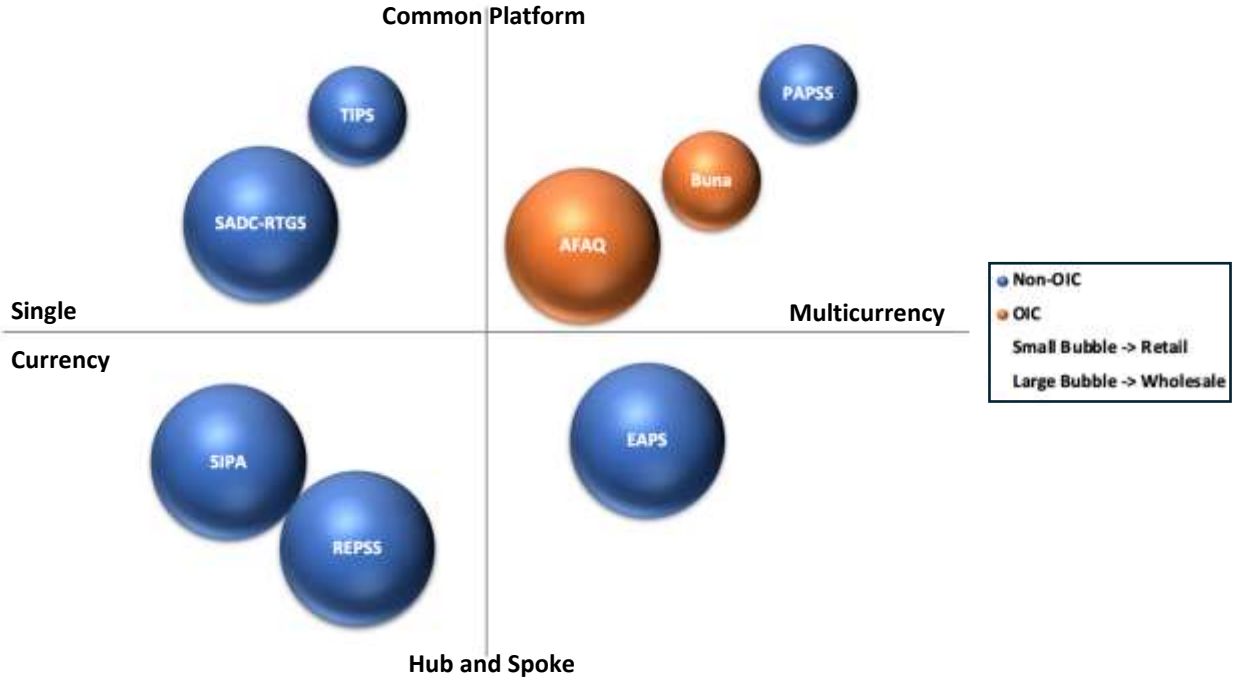
However a key design according to CPMI is the network model (hub and spoke; common platform) and the currency arrangement (single currency; multicurrency; cross-currency) (CPMI, 2023). The choice of network model can significantly affect whether different jurisdictions should adopt consistent rules (like the finality of payment) or each should adopt its own to mitigate the risks arising. In a common platform network model, participants are payment service providers that delegate the payment gateway tasks to a shared payment system. Conversely, in a hub-and-spoke model, each participant within each jurisdiction manages its own payment gateway tasks while interacting with other common payment gateways. On the other hand, the choice of currency arrangement depends on where the multilateral platform operates – does it operate within markets that deal with a single currency or within a union or agreement that encourages the use of national currencies.

3.6.3 Regional and Global Multilateral Collaborations

Globally, there are few payment networks coordinating with numerous financial institutions worldwide, primarily serving the retail payment segment. In contrast to these global collaborations, numerous regional multilateral collaborations exist, some of which operate exclusively within OIC countries. Figure 3.7 portrays the classification of regional multilateral payment collaborations which provides a clear visual representation of how these collaborations are structured and their operational characteristics in the realm of regional multilateral payments.

In essence, the chart classifies various regional multilateral payment collaborations based on their network model, currency arrangement, market segment, and OIC affiliation. Each collaboration is represented by a bubble placed within one of four quadrants. The size of the bubble denotes the market segment: large bubbles represent wholesale payments, while small bubbles represent retail payments. The color of the bubble indicates whether the collaboration is OIC-affiliated (orange) or non-OIC (blue).

Figure 3.7: Classification of Regional Multilateral Payment Collaborations



Source: Authors

The placement within the quadrants indicates the network model and currency arrangement: collaborations in the first quadrant utilize a common platform network model with a multicurrency arrangement, those in the second quadrant use a common platform network model with a single currency arrangement, the third quadrant represents hub and spoke network models with single currency arrangements, and the fourth quadrant depicts hub and spoke network models with multicurrency arrangements. The subsequent subsections will discuss instances of regional non-OIC collaborations, regional OIC collaborations, and global collaborations.

3.6.3.1 Regional Non-OIC[12] Multilateral Collaboration Cases

Several regional non-OIC multilateral collaborations exist, with more solutions focusing on the wholesale market segment than the retail one. According to CPMI studies, retail market collaborations typically follow a common platform network design. In contrast, wholesale market collaborations exhibit diverse currency arrangements and network designs.

TARGET Instant Payment Settlement (TIPS)

One notable regional multilateral collaboration utilizing a common platform network design and the euro as a single currency is TIPS. Developed by the Euro system, TIPS is a fast payment, real-time gross settlement (RTGS) system providing a pan-European solution for instant payments using central bank money (4CB, 2019). This system ensures continuous availability, operating 24/7/365, and excels in liquidity management. TIPS aligns with the Single Euro Payments Area (SEPA) Instant Credit Transfer scheme, offering standardized functionalities across different countries and jurisdictions. While TIPS currently operates with the euro as its sole currency, there is potential for it to evolve into a multicurrency platform (CPMI, 2023).

Pan-African Payment & Settlement System (PAPSS)

PAPSS is yet another retail-targeted cross-border settlement system enabling payments across Africa that operates using a common platforms network design (CPMI, 2023). The partners of PAPSS are various African central banks, African-based commercial banks, payment service providers, and other financial intermediaries (PAPSS, 2024). This multilateral system is capable of providing instant and secure cross-border payments while simplifying the process to reduce costs and foreign exchange complexities. As such PAPSS is not bounded by a single currency.

[12] Non-OIC multilateral collaborations refer to initiatives started based on geographical or cultural basis and as such while these collaborations might include some OIC countries within, the bulk constituent of such collaborations are non-OIC.

Southern African Development Community (SADC) RTGS System

SADC-RTGS, an automated interbank settlement system, enables businesses and individuals to execute real-time payments within the SADC region (Bank of Zambia, 2024). This system's partners include central and commercial banks from 16 member states in Southern Africa (SADC, 2024), including two OIC member countries: Comoros and Mozambique. Operating on a common platform network design, SADC-RTGS employs a single currency arrangement, exclusively settling payments in South African rand, with a potential to include other national currencies. Although individuals can utilize this system for payments (SADC, 2024), its primary focus is on the wholesale market segment (Bech et al., 2020), aimed at fostering trade and investment within the SADC region.

Payment Interconnection System – Sistema de Interconexión de Pagos (SIPA)

SIPA represents a regional multilateral collaboration among the Central Banks of Central America (Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua) and the Dominican Republic (Secmca, 2024). Established by the Central American Monetary Council, SIPA operates on a hub and spoke network design (CPMI, 2023). This system facilitates electronic fund transfers exclusively in US dollars, allowing clients of participating banks and affiliated financial institutions to seamlessly transact across these countries.

East African Payment System (EAPS)

Established by the East African Community (EAC), EAPS is a multicurrency multilateral collaboration for settling payments of wholesale transactions utilizing a hub and spoke network design (Bech et al., 2020; CPMI, 2023). EAPS serves the EAC countries: Burundi, Kenya, Rwanda, Tanzania, and the OIC member country Uganda. According to the BIS, the system offers the flexibility for payees to select the currency in which they wish to settle their transactions. However, it has been reported that EAPS primarily focuses on high-value transactions between commercial banks and has experienced low uptake from regional governments, making it inaccessible for micro enterprises, which are the backbone of East Africa's economy (Anyanzwa, 2024).

3.6.3.2 Regional OIC Multilateral Collaboration Cases

Two notable OIC multilateral collaborations are Buna and AFAQ[13]. While the former focuses on retail payments, the latter payment system is intended for wholesale transactions among businesses and industries.

Buna (Arab)

Fully owned by the Arab Monetary Fund and supported by Arab central banks, Buna is a multilateral cross-border system that allows sending and receiving payments in Arab currencies as well as key international currencies in a safe, cost-effective, risk-controlled, and transparent environment (Buna, 2024).

AFAQ

Provided by the Gulf Payments, AFAQ is a regional real-time payment system to execute financial transactions in the GCC local currencies focusing on low fees while providing a safe, secure, and stable ecosystem (Gulf Payments, 2024). The partners in this system are the central and commercial banks of five OIC member countries in the GCC region: United Arab Emirates, Bahrain, Saudi Arabia, Oman, and Kuwait. By utilizing the RTGS of each GCC member state, AFAQ ensures instant processing and same day settlement finality.

3.6.3.3 Global Non-OIC Multilateral Collaboration Cases

The global payment networks play a crucial role in facilitating seamless and secure financial transactions across different jurisdictions. The two most prominent examples of such networks are Visa and Mastercard, which have established themselves as leaders in the global payment industry.

Both Visa and Mastercard collaborate with numerous financial institutions on a global scale, but they do not issue their cards. Rather, the institutions they partner with issue cards that enable holders to conduct retail payment transactions across their extensive networks (Kagan, 2024b). The terms and benefits of each card are freely determined by the issuing

[13] AFAQ is not an abbreviation, rather it is an Arabic word which means 'Horizons'.

institutions, which are also responsible for all underwriting and issuance processes (Kagan, 2024a). Consequently, Visa and Mastercard represent two of the few global multilateral payment platforms catering to the digital retail sector, utilizing a common platform network design and allowing for multicurrency arrangements.

3.6.4 Non-Multilateral Collaborations

Mobile payment systems such as Orange Money across multiple African countries and MPesa in Kenya have significantly contributed to financial inclusion efforts for the unbanked population in Africa. These FinTech-based payment systems leverage telecommunications infrastructure to facilitate both national remittances, exemplified by MPesa, and cross-border remittances, as seen with Orange Money (El Amri et al., 2021). However, while these solutions show potential for evolving into bilateral or multilateral payment collaborations, they currently do not meet the criteria for such classifications. These systems typically rely on a single telecom operator and a network of widely dispersed kiosks for converting cash into digital remittances, lacking the collaborative frameworks and interoperable payment gateways characteristic of established multilateral platforms.

CHAPTER 4: CASE STUDIES

4.1 MALAYSIA

4.1.1 Introduction

Malaysia, a dynamic Southeast Asian nation with a population of approximately 34.3 million and an estimated GDP of $465.541 billion in 2024 (International Monetary Fund, 2023), boasts high levels of human development, urbanization, and digital adoption. With robust internet and smartphone penetration rates of 97.56% and 89.06% (Statista, 2024a; Statista, 2024b), respectively, in 2023, it reflects a progressive and inclusive society, accommodating various ethnicities, religions, and cultures harmoniously. Export-oriented industrialization in the 1990s marked a transformative period for Malaysia, shifting its economic landscape from one of labor surplus to deficit, and back to surplus by 2000 This economic evolution significantly impacted poverty rates, which saw a notable decline of half since the early 1980s (Demery & Demery, 1991; Asadullah, Mansor & Savoia 2021). A pivotal driver of Malaysia's economic progress has been its robust trade policies, which facilitated structural transformation and modernization (Julian & Ahmed, 2009). By embracing open external trade, Malaysia avoided the fate of remaining economically backward, unlike some less developed countries. This strategic approach not only expanded market access but also attracted substantial foreign direct investments (FDIs). The integration of innovative payment system methods, such as electronic payment platforms and real-time gross settlement systems, further propelled Malaysia's economic growth path. These systems streamlined financial transactions, enhanced efficiency, and facilitated seamless domestic and international trade (Khiaonarong & Tanai, 2004). Moreover, they bolstered investor confidence by providing secure and reliable payment infrastructures, crucial for attracting FDI (Ng, 2015).

In this context, prioritizing payment systems assumes paramount importance for Malaysia's economic trajectory. Such emphasis aligns with broader objectives of shaping national monetary policy, fortifying financial stability, and fostering sustainable economic growth. Through concerted reforms, Malaysia aims to bolster the safety, efficiency, and

inclusivity of its payment infrastructure, in line with global standards outlined by the BIS (Aziz, 2013). The nation's proactive stance, particularly evident in its response to the Asian Financial Crisis and the formulation of the Financial Sector Master Plan 2001, underscores its commitment to modernizing payment systems (Basir, 2009). These initiatives not only benefit Small and Medium Enterprises (SMEs) but also position Malaysia to navigate contemporary challenges, such as the 2007-2008 global financial downturn and the Covid-19 pandemic, with resilience and adaptability (Ahmad et al., 2022).

As the world gradually comes to terms with a highly sophisticated digital era, the burgeoning e-commerce market in Malaysia played a pivotal role in propelling the adoption of digital payment systems (Shafie et al., 2020; Chong, 2023). Consumers, increasingly inclined towards digital solutions, embraced various methods such as credit cards, online banking, and e-wallets. Remarkably, the e-Conomy SEA 2022 report revealed that 90% of Malaysians adopted digital payments in 2022, with individuals utilizing an average of 3.5 different digital payment channels (Isono & Prilliadi, 2023). Notably, mobile wallets emerged as a favored choice among 83% of Malaysian respondents, with Touch 'n Go eWallet and Boost leading the pack. Cashless methods, particularly bank transfers and credit cards, dominated the e-commerce payment landscape, reflecting the nation's growing reliance on digital transactions (Isono & Prilliadi, 2023).

The Department of Statistics Malaysia reported a substantial 25.2% year-on-year increase in e-commerce revenue, reaching RM672.6 billion (circa $152 billion) in the first half of 2022, underscoring the pivotal role of digital payments in facilitating online commerce. This robust growth in digital payments translated into a significant increase in transaction value, surpassing $20 billion in 2022 and forecasted to approach $200 billion by 2025. Aligned with the government's vision to propel Malaysia into a digital economy by 2030, initiatives such as the MyDigital National Blueprint have catalyzed this transformation (Haron et al., 2023). Among its objectives, the blueprint prioritizes the integration of electronic payment options across government agencies, fostering a cashless culture. The transformation towards a cashless society is bolstered by Malaysia's robust digital infrastructure, boasting widespread access to 4G LTE mobile networks, covering over 95% of the population. This connectivity facilitates seamless utilization of digital payment services, enhancing the integration of cashless transactions into everyday life.

With the convergence of government initiatives, burgeoning e-commerce adoption, and robust digital infrastructure, Malaysia is poised to continue its journey towards a cashless future. This trajectory aligns with its aspirations to ascend to a high-income nation status by 2025, marking a significant milestone in its economic development journey. This provides a good basis to classify Malaysia as a matured economy with a robust payment systems architecture; hence, the choice of the country as a case study among the OIC member countries.

4.1.2 Legal and Regulatory Framework on Payment Systems

The legal and regulatory framework on payment systems in Malaysia is governed by the Central Bank of Malaysia or Bank Negara Malaysia (BNM), which is responsible for overseeing, supervising, and regulating the payment systems and service providers in the country. The main laws and regulations that apply to the payment systems are the Financial Services Act 2013, the Islamic Financial Services Act 2013, and the Interoperable Credit Transfer Framework 2018. These laws and regulations aim to ensure the safety, efficiency, and reliability of the payment systems, as well as to promote innovation, competition, and consumer protection (Lahsasna, 2018; Bacha & Mirakhor, 2016). Specifically, section 5 of the Central Bank of Malaysia Act 2009[14] states that one of the primary functions of the central bank is to exercise oversight over payment systems. It is however important to note that the Securities Commission Malaysia does not directly regulate payment systems, but it exercises certain regulatory influence over aspects of payment systems in the country with reference to the capital market and securities.

Though repealed, it is important to give a brief overview of a dedicated legislation on payment systems in Malaysia. Enacted by the Parliament of Malaysia, the Payment Systems Act 2003[15] served as a pivotal piece of legislation aimed at fostering monetary stability and a robust financial structure. Central to its objectives was the mandate bestowed upon the Central Bank of Malaysia to regulate and supervise payment systems and instruments, thereby safeguarding their reliability and efficiency. Under this Act, the Central Bank Malaysia was empowered to promote the reliable and efficient operation of payment

[14] See section 5(2)(e) of the Central Bank of Malaysia Act 2009 (Act 701 of the Parliament of Malaysia), P.U.(B) 533/2009.

[15] Act 627 of the Parliament of Malaysia, 1 November 2003, P.U. (B) 308/2003].

systems, emphasizing the importance of compliance with regulatory requirements. The Act imposed essential obligations on operators, participants, and issuers, mandating them to furnish requisite documents and information to the Central Bank within stipulated timelines. This transparency requirement bolstered accountability and underscored the importance of regulatory compliance. Moreover, the Act empowered the Central Bank to enact modifications to designated payment systems or instruments to mitigate systemic risks and fortify financial stability. It delineated the qualifications and duties of directors and chief executive officers of payment system operators, accentuating the necessity for adept leadership in overseeing payment systems. Additionally, it addressed the finality of payments and netting arrangements, furnishing legal certainty, and expediting efficient payment processing.

The robust legal and regulatory framework introduced by the Payment Systems Act 2003 significantly bolstered financial stability in Malaysia. By ensuring the secure and efficient operation of payment systems, the Act diminished risks associated with payment processing and settlement. Additionally, the regulatory oversight provided by the Central Bank of Malaysia serves as a bulwark against disruptions in the financial system, fostering stakeholder confidence. The Financial Services Act (FSA) and the Islamic Financial Services Act (IFSA) came into effect on 30 June 2013, repealing the outdated Payment System Act 2003 (PSA) amongst other legislative objectives (Singh, 2018). These legislative changes reflect Malaysia's commitment to bolstering the regulatory framework governing payment systems and instruments. By incorporating enhanced provisions, the FSA and IFSA empower the Central Bank of Malaysia to oversee payment system operators and instrument issuers effectively. This includes the authority to specify standards and issue directives aimed at ensuring the safety, integrity, efficiency, and reliability of payment systems and instruments. Such measures are vital for promoting trust and confidence in Malaysia's financial ecosystem, ultimately benefiting consumers, businesses, and the broader economy. The Financial Services Act 2013 aims to regulate and supervise financial institutions, payment systems, and relevant entities, ensuring the stability of money and foreign exchange markets. It addresses related matters to promote financial stability and addresses consequential or incidental issues (Ghazali & Kandiah, 2014). Part IV of the Act centers on payment systems, delineating the designation of payment systems and payment

instruments, specifying operational requirements, and detailing the finality of payment and netting arrangements.

For the Islamic financial services industry, Malaysia introduced the IFSA which aims to regulate and supervise Islamic financial institutions, payment systems, and relevant entities, ensuring compliance with Shariah and promoting financial stability in the Islamic money and foreign exchange markets. It also addresses related matters and consequential or incidental issues (Lee & Oseni, 2015). Part V of the Act delineates the processes for designating payment systems and Islamic payment instruments, stipulates the operational requirements for payment systems, and outlines the finality of payment and netting arrangements.

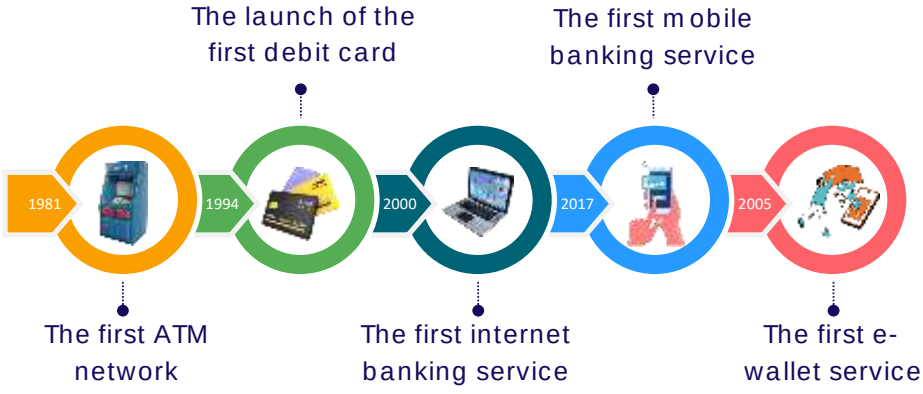
4.1.2.1 Interoperable Credit Transfer Framework 2019

BNM in 2019 also introduced the Interoperable Credit Transfer Framework (ICTF) to enhance Malaysia's payment landscape. Developed based on feedback received during a public consultation period, the ICTF aims to create an efficient, competitive, and innovative payment ecosystem in Malaysia. By enabling interoperability of credit transfer services, the framework facilitates seamless transactions and promotes collaborative competition among financial institutions (Abdullah et al., 2020). It emphasizes fair and open access to shared payment infrastructure to foster a level playing field and encourages collaboration among industry players. Additionally, effective oversight of shared payment infrastructure is crucial for maintaining the safety and integrity of credit transfer systems and ensuring the stability of the financial system (Kadar et al., 2019). The ICTF also encourages innovation through the establishment of innovation sandbox facilities and the publication of APIs by operators of shared payment infrastructure. Moreover, risk management measures tailored to the activities and risk profiles of credit transfer service providers are essential to mitigate potential risks and safeguard stakeholders' interests, while robust consumer protection measures aim to enhance customer protection and instill confidence in the use of credit transfer services (Kamis et al., 2023). Overall, the ICTF represents a significant step towards promoting collaboration, innovation, and efficiency in Malaysia's payment landscape, ultimately benefiting businesses and consumers alike (Kylasapathy et al., 2017).

4.1.3 The Current Level of Development of Digital Payment Systems

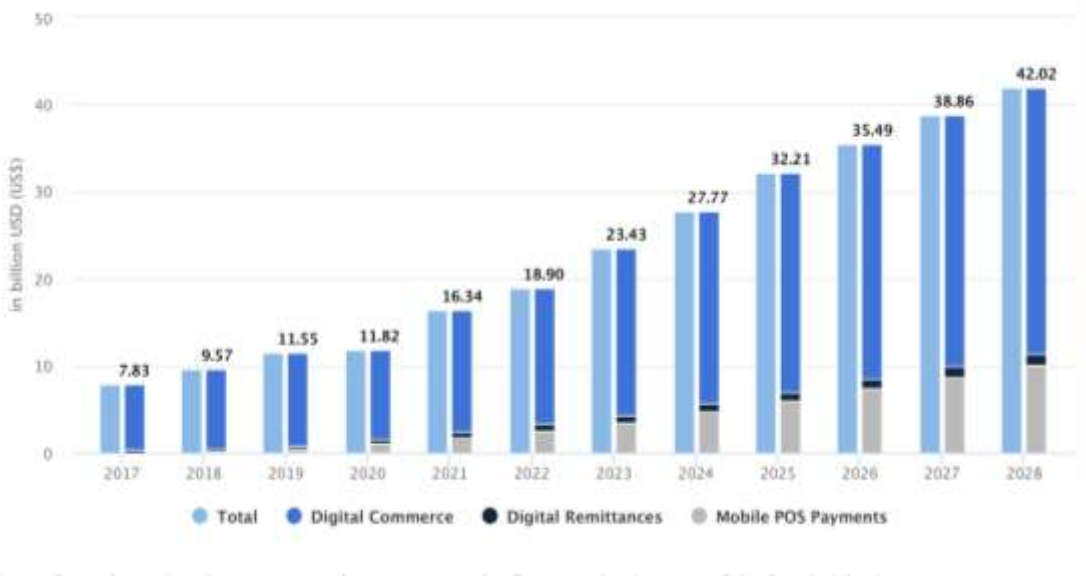
The level of development of digital payment systems in Malaysia is relatively high, as the country has been undergoing a rapid and widespread adoption of cashless payment methods in recent years. The main types of digital payment systems in Malaysia are bank transfers, cards, digital wallets, cash payments, and Apple Pay. The transaction value of digital payments in Malaysia was estimated at $17.6 billion in 2020, and it is expected to reach $42.02 billion by 2028. As shown in Figure 4.1, the history of digital payment systems in Malaysia can be traced back to the introduction of the first ATM network in 1981, followed by the launch of the first debit card in 1994, the first internet banking service in 2000, the first mobile banking service in 2001, and the first e-wallet service in 2005.

Figure 4.1: Malaysia's Milestones in Digital Payment Systems



Figures from Statista show that the Digital Payments market segment, driven by consumer transactions, encompasses online payments for goods and services, mobile payments at POS, and digital remittances. As shown below in Figure 4.2, based on estimates from Statista, the revenue from digital payments industry in Malaysia from 2019 – 2028 is huge and the numbers keep growing in the different segments of digital payments.

Figure 4.2: Amount in Billion USD by Digital Payments Market Segment



Source: Statista (2024)

In Malaysia, the market recorded a USD 18.19 billion transaction value in 2022, leading the Asia-Pacific region. Notably, in 2021, Malaysia demonstrated increased shares of digital payment users among the 18 to 24-year-old and 25 to 34-year-old age groups in the Asia Pacific, reflecting a growing trend towards digital transactions (Statista, 2024c). Analyzing digital payment penetration in e-commerce and POS sectors by the end of 2022, Malaysia showed higher penetration in e-commerce at 24% compared to 20% in POS, with average transaction values of USD0.98 thousand and USD0.37 thousand respectively. The adoption rate of cashless payments surged by 96% in 2021, surpassing the Southeast Asia average of 93%. The digital payments industry in Malaysia has witnessed substantial revenue growth from USD6.8 billion in 2018 to USD22.23 billion in 2023, projected to reach USD41.74 billion by 2027. Similarly, the penetration rate of digital payment systems increased from 31.41% in 2018 to 50.07% in 2023, expected to rise to 57.08% by 2027. Moreover, the number of users nearly doubled to 16.81 million in 2023 from 2018, with an average transaction value per user reaching USD1.25 thousand in the same year.

There are various digital payment systems in Malaysia. These include RENTAS system which is a RTGS with two subsystems i.e. Interbank Funds Transfer System (IFTS), and Scripless Securities Depository System (SSDS); the Interbank GIRO, which provides

facilitates funds transfer services among participating financial institutions in its network; the Financial Process Exchange or FPX which is a multi-bank internet payment platform that allows customers to complete online transactions in real-time while using their credentials; Direct Debit, which provides an interbank collection service to facilitate regular and recurring payments; JomPAY which is an open electronic bill payments platform utilized by the public for greater efficiency in the payment systems; and Real-time Retail Payments Platform (RRP) which comprises various solutions such as DuitNow services such as DuitNow Transfer, DuitNow QR. The RRP initiative is a strategic effort aimed at updating Malaysia's retail payments, fostering and propelling innovation in electronic payments, and enhancing the competitive edge of our participating institutions, enabling them to stay ahead in managing customer relationships.

Table 4.1 provides a snapshot of the transaction volume and value of the digital payment systems from 2019 to February 2024. From the available data from BNM, post-Covid-19, there has been tremendous increased in the volume and value of transactions in the digital payment systems. A closer look at the 2021 volumes and values for each of the payment systems reveal a significant increase from the year before. This is line with the huge acceleration of the Fourth Industrial Revolution exacerbated by the Covid-19 lockdowns across the globe (Raval, 2023; Mohdhar & Shaalan, 2021).

Table 4.1: Transaction Volume and Value (from 2019 to February 2024)

Mil/RM bil	**RENTAS^**		**Interbank GIRO**		**FPX**		**Direct Debit**		**JomPAY**		**RPP***	
	Volume	**Value**	**Volume**	**Value**	**Volume**	**Value**	**Volume**	**Value**	**Volume**	**Value**	**Volume**	**Value**
2019	5.1	56,790.0	202.9	1,126.0	174.2	89.8	4.5	42.5	41.9	25.5	109.3	151.4
2020	4.9	62,101.0	264.5	1,184.1	367.2	138.5	5.0	44.8	52.8	32.4	570.6	679.7
2021	5.0	64,656.4	351.4	1,392.3	638.5	219.8	9.0	52.9	69.2	38.7	1,057.2	1,171.5
2022	5.1	76,752.4	297.0	1,496.4	646.1	251.4	12.0	63.9	77.2	46.2	1,438.2	1,685.6
2023	5.4	77,205.0	294.2	1,485.1	714.2	299.6	13.9	69.6	84.7	53.7	2,090.5	2,173.4
Jan-Feb 2024	0.9	12,110.2	51.0	260.1	127.4	58.6	2.5	12.0	15.1	9.8	459.0	437.1

^ Real time gross settlement system - with two subsystems i.e. Interbank Funds Transfer System (IFTS), and Scripless Securities Depository System (SSDS)

** Real-time Retail Payments Platform refers to DuitNow services such as DuitNow Transfer, DuitNow QR etc.*

Source: Bank Negara Malaysia (2024)

Furthermore, a 2022 survey revealed that in Malaysia, the most popular digital payment method was online payments via credit or debit cards, with 71% of participants favoring this method. Close behind, with 69% of respondents utilizing it, was the contactless card, making it the second most preferred digital payment method in the country (Statista, 2023).

4.1.4 Payment Systems: Current Trends, Issues and Challenges

The payment systems infrastructure in Malaysia has been well positioned to address emerging challenges in the increasingly diversified world with new forms of transactions admits a technological boom in the global financial system.

In recent times, the legal and regulatory framework is focused on a sound balance between fostering innovation and ensuring financial stability. Several efforts have been made in this regard. There has also been a focus on financial consumer protection since payment systems infrastructures are often subject to operational risks, security risks, fraud risk, etc. particularly fraudulent activities. This is even more aggravated in digital payment systems where cyber risks continue to be a major threat to payment systems infrastructures.

Specifically, the current legal and regulatory issues in the digital payment systems relate to several aspects, which generally include consumer protection, risk management and cybersecurity, interoperability and standardization, Anti-Money Laundering (AML) compliance, issues related to privacy and data protection, regulation of cross-border payments, and regulation of collaboration between the public and private sectors and underlying legal issues.

Institutions such as BNM, Securities Commission of Malaysia (SC), and the Malaysia Digital Economy Corporation (MDEC) have adeptly navigated the dual objectives of fostering innovation within the FinTech sector while safeguarding financial stability (Abd Shukor, Mooi & Ibrahim, 2023). Their proactive approaches have been characterized by regulatory initiatives aimed at creating an environment conducive to FinTech advancement. These efforts include reducing barriers to innovation, enhancing supportive infrastructure, fostering greater competition, and allowing for experimentation within the sector. Simultaneously, these regulations prioritize the maintenance of financial stability and the bolstering of confidence in the overall financial system.

The swift digitalization of financial systems heightens cyber threats, posing potential risks to financial stability. Cybersecurity emerges as a paramount concern in the annual reports of major Malaysian banks due to its potential to erode customer trust and confidence. In response, banks are bolstering risk management strategies and increasing investments to mitigate these threats. Regulatory bodies, notably BNM, are actively addressing cyber risks, as highlighted in the Financial Stability Review First Half 2019 (Mohd Haridan et al., 2023). BNM has already issued preliminary guidelines for financial institutions (FIs) on cybersecurity risk management through its Technology Risk Management policy.

To enhance cyber risk identification, BNM established the Financial Sector Cyber Threat Intelligence Platform (FinTIP) which became operational in September 2021. The platform focuses on collating, analyzing, and disseminating real-time information to counter cyber threats effectively. The BNM has also initiated interactions with the Securities Commission Malaysia and the National Cyber Security Agency to broaden the reach of cyber threat intelligence sharing through the FinTIP. Furthermore, industry engagement sessions have served as a platform for participants to exchange insights and best practices on cyber resilience. On an international level, BNM is consistently broadening its bilateral agreements on cybersecurity cooperation with regional peers to encourage information sharing and bolster capacity building (Bank Negara Malaysia, 2024).

4.1.5 Digital Payment Systems and Economic Activities

The potential impact of the digital payment system on the country's economy is positive and significant, as it can enhance the efficiency, convenience, and security of transactions, as well as reduce the cost, risk, and environmental impact of cash handling (Bhuiyan et al., 2024). Moreover, digital payment systems can also foster financial inclusion, innovation, and competitiveness, as well as support the development of the digital economy, e-commerce, and fintech sectors (Patra & Sethi, 2023). According to Minister in the Prime Minister's Department (Economy) Datuk Seri Mustapha Mohamed, Malaysia's digital economy is projected to contribute 22.6% to the nation's GDP and create around 500,000 fresh job opportunities by the year 2025 (MIDA, 2024).

4.1.6 Cross-border Digital Payment Initiatives and Collaborations

In November 2022, Bank Indonesia (BI), BNM, Bangko Sentral ng Pilipinas (BSP), Monetary Authority of Singapore (MAS), and Bank of Thailand (BOT) solidified their commitment to bolstering payment connectivity to facilitate faster, cheaper, and more transparent cross-border transactions. This initiative was formalized through the signing of a Memorandum of Understanding (MOU) on Cooperation in Regional Payment Connectivity (RPC) during the G20 Leaders' Summit held in Bali, Indonesia (Kusuma, Deniswara, & Gui, 2023). The RPC is anticipated to play a pivotal role in expediting regional economic recovery and fostering inclusive growth by facilitating cross-border trade, investment, remittance, tourism, and financial deepening (Chan, 2023).

President Joko Widodo of Indonesia emphasized the significance of collaborative endeavors in tackling global challenges during the signing ceremony, commending the commitment of the central bank governors to drive innovative breakthroughs. The RPC initiative aligns with Indonesia's G20 Presidency priority agenda and underscores the region's concerted efforts towards digital transformation, particularly in payment systems. Moving forward, the collaboration aims to broaden its scope to encompass other countries within and beyond the ASEAN region, thus catalyzing broader economic integration and strengthening regional economic ties. The collaboration also echoes ASEAN's vision for interconnected payment systems, with a focus on achieving faster, seamless, and affordable cross-border transactions by 2025. Through this initiative, ASEAN endeavors to address existing frictions in global cross-border payments, paving the way for new business opportunities and inclusive growth. The participation of central banks, BI, BNM, BSP, MAS, and BOT underscores the collective commitment to fostering regional payment connectivity, which is crucial for advancing ASEAN's digital transformation agenda and promoting financial integration within the region (Chan, 2023).

On the side lines of the 10th ASEAN Finance Ministers' and Central Bank Governors' Meeting (AFMGM) held in Jakarta, Indonesia on August 25, 2023, the State Bank of Vietnam endorsed the Supplemental Pages of the MOU RPC. This was observed by the current participants of the RPC, which include BI, BNM, BSP, Monetary Authority of Singapore, and BOT. The inclusion of other ASEAN members in the RPC, as mandated by the 9th AFMGM, signifies its expansion (Bank Negara Malaysia, 2023).

4.1.7 Analysis of Questionnaire and Survey Results

A total of (145) questionnaires were distributed in Malaysia to request for views of end users on digital payment systems in the country. It comprises the following sections: (i) Background information, (ii) Usage and awareness of digital payments, (iii) Challenges and adoption of digital payments, (iv) Perception and future use.

(i) Background Information

The questions in this section of the survey were used to solicit background information of the respondents' profiles by gender, age, marital status, education level, occupation, income, expenditure, savings, and familiarity with digital payment [level of awareness, common types of payments used, and uses of the payment system]. The responses were presented in Tables 4.2, 4.3, and 4.4 and Figure 4.3 below:

Table 4.2: a) Respondents' Profiles by Gender, Age, & Marital Status

Item	Detail	Frequency	Percentage
Gender	Male	70	48.28
	Female	75	51.72
	Total	**145**	
Age	15-29	96	66.21
	30-44	34	23.45
	45-59	14	9.66
	60 and above	1	0.69
	Total	**145**	
Marital Status	Single	95	65.52
	Married	49	33.79
	Divorced/Widow	1	0.69
	Others	0	0
	Total	**145**	

a) Distribution by Gender, Age and Marital Status

The survey results show that 48% of the respondents are male while 52% are female. This indicates a natural and balanced sampling of the respondents. Meanwhile, over 66% of

respondents fall within the 15 to 29 age range, suggesting that younger people are more inclined to embrace and utilize these digital payment solutions. This trend is further reinforced by the 23% of respondents falling within the 30 to 44 age group. The predominance of younger users can be attributed to their inherent familiarity and comfort with technology, as well as their extensive engagement with digital platforms. This cohort has grown up in an increasingly digitalized world, seamlessly integrating these payment methods into their everyday lives. On the other hand, findings for marital status show that over 65% of the respondents are single, this is evident from younger age group and a significant interest and the convenience use of the digital payment system by this group.

Table 4.3: b) Respondents' Profiles by Education Level & Occupation

Item	Detail	Frequency	Percentage
Educational Level	Primary School	0	0
	High School	2	1.38
	Diploma	7	4.83
	Bachelor's Degree	91	62.76
	Master's Degree	29	20.0
	PhD	16	11.03
	Total	**145**	
Occupation	Businessperson	4	2.78
	Farmer	1	0.69
	Government Civil Servant	16	11.11
	Manager in Private Sector	6	4.17
	Self-Employed	10	6.94
	Teacher	15	10.42
	Others	92	63.89
	Total	**144**	

b) Distribution by Educational Level and Occupation

The respondent distribution in their education level shows that more than 62% holds undergraduate degree while over 31% hold post graduate degree. This suggests that digital

payment system is more widely adopted by individuals with higher education backgrounds. This correlation between educational attainment and digital payment adoption underscores the importance of targeted outreach and training programs. On the other hand, the respondents come from a wide range of occupational backgrounds, indicating that digital payment adoption cuts across various segments of the population. This diversity underscores the widespread appeal and practicality of digital payment solutions across different professional groups.

Table 4.4: c) Respondents' Profiles by Income, Expenditure, and Savings

Item	Detail	Frequency	Percentage
Monthly Income (USD)	Below 1.000	96	66.67
	1.001-4.000	28	19.44
	4.001-7.000	10	6.94
	Above 7.000	10	6.94
	Total	**144**	
Monthly Expenditure (USD)	Below 1.000	99	68.75
	1.001-4.000	32	22.22
	4.001-7.000	10	6.94
	Above 7.000	3	2.08
	Total	**144**	
Monthly Savings (USD)	Below 1.000	131	90.97
	1.001-4.000	9	6.25
	4.001-7.000	2	1.39
	Above 7.000	2	1.39
	Total	**144**	

Source: Authors

c) Distribution by Monthly Income, Expenditure and Savings

Over 88% of participants have a monthly income between $1,000 and $4,000, while 68% earn below $1,000, indicating that digital payment systems are accessible to both middle-income and lower-income groups. This suggests that providers could create features or incentives specifically designed to meet the needs and financial behaviors of these different segments. Meanwhile, over Sixty-eight (68%) of participants spend less than $1,000

monthly, while 22% spend between $1,000 and $4,000, reflecting a balance between income and expenditure. This balance suggests that users may prefer digital payments as a tool for budgeting and effective financial management. With regards to monthly savings, the majority of respondents (91%) have savings below $1,000, highlighting an opportunity for digital payment systems to offer financial planning tools that can assist users in increasing their savings. This analysis emphasizes the importance of targeting specific demographics to expand digital payment adoption and identifies key areas for growth and enhancement within the user base.

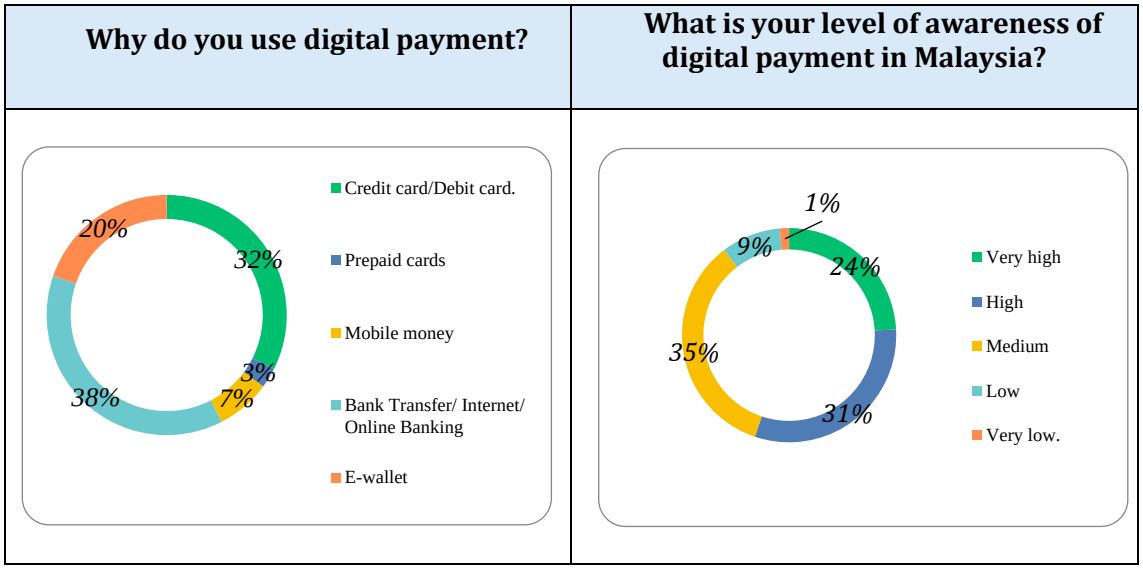
d) Respondent's Familiarity with Digital Payment

This subsection solicited the opinions of the respondents in four aspects, namely 1) the types of digital payment they mostly prefer and use, 2) whether they have made or/and received digital payments, 3) the reasons why they use digital payments, and 4) the level of their awareness regarding digital payments.

Level of Awareness and Preferred Types of Payments

Awareness and trust are also high as indicated in Figure 4.3, with 55.17% of respondents rating their awareness of digital payment systems as high or very high. Familiarity with various digital payment methods is common, and a significant 69.4% of respondents trust the security and reliability of these services. This high level of trust is essential for the continued growth and adoption of digital payment systems. Meanwhile, Figure 4.3 below also shows an even distribution of different usage amongst participants. 37% of the respondent use digital payments for payment of loan, utility bills and merchandise payments, 30% of the respondents identified payment of merchandise as their major reason for using digital channels followed by payment of utility bills, and then loan repayments been the least reason.

Figure 4.3: Respondents' Usage and Awareness of Digital Payment



Source: Authors

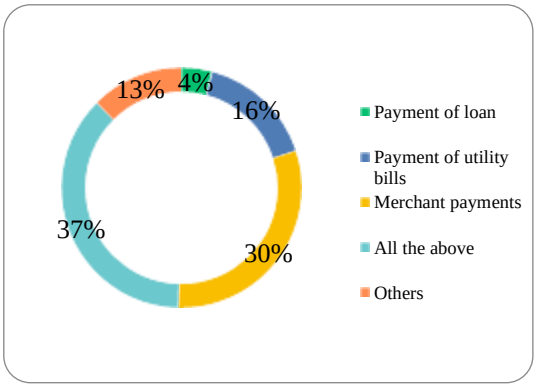
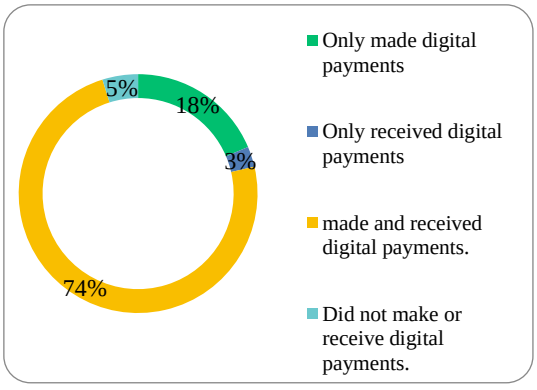
Level of Usage and Reasons for Using Digital Payments

From Figure 4.4 below, almost 74% of the respondents send and receive payments using digital channels, 18% use digital channels only to make payments, 3% only receive digital payments and 5% did not make or receive payments using digital channels. The result shows the high level of usage of digital payment system and the need the need for use is established.

(a) Types of Payments

On the other hand, the widespread adoption of digital payment methods is evident in the Figure 4.4, with bank transfers/online banking (86.21%) and credit/debit cards (73.79%) being the most commonly used. A substantial 73.79% of respondents actively engage in making and receiving digital payments. The primary drivers for this adoption are convenience, security, and efficiency, with a large majority citing these factors as crucial.

Figure 4.4: Respondent's Types of Payments Used and the Use of Digital Payments

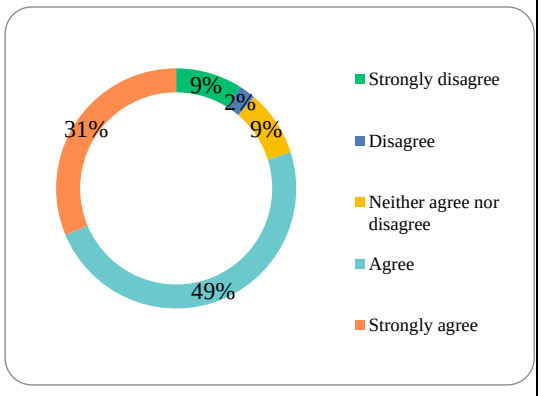
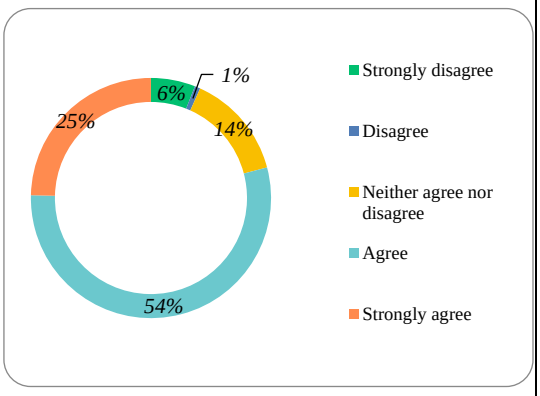
Type of Payment you use	Have you used digital payment?
	

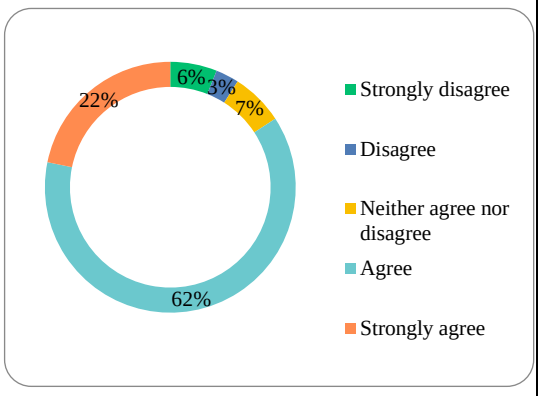
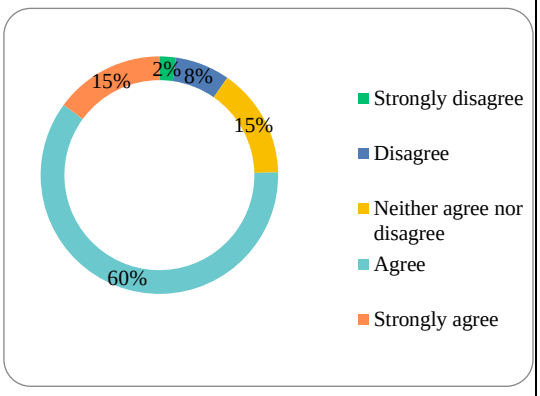
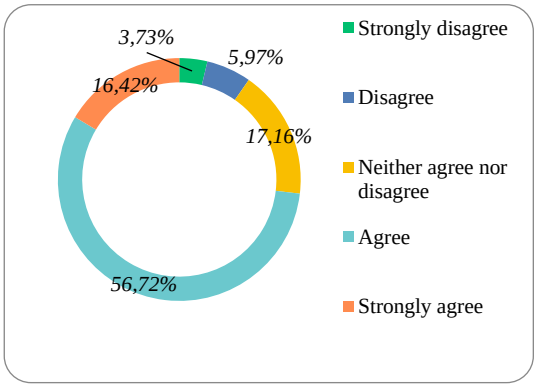
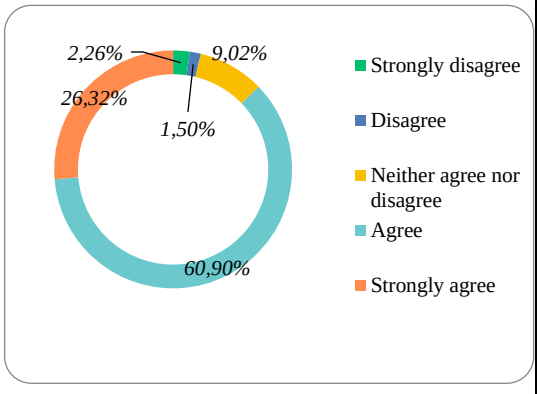
Source: Authors

(ii) **Motivation of Users for the DPS**

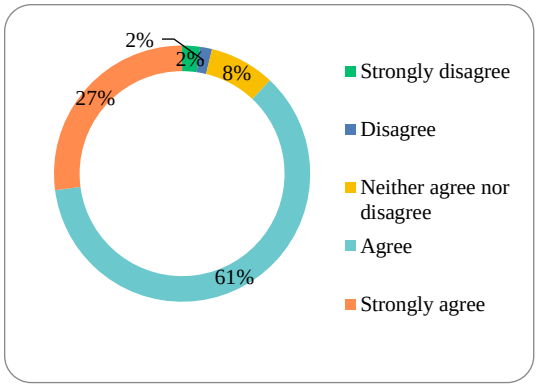
The questions in this section of the survey were used to solicit information related to familiarity, convenience, sources of learning, assessment, influence, understanding, cost, impact, satisfaction, experience, willingness and prospects of the use of digital payment system. The responses were presented in the following Figure 4.5.

Figure 4.5: Factors Motivating Users towards Digital Payment System

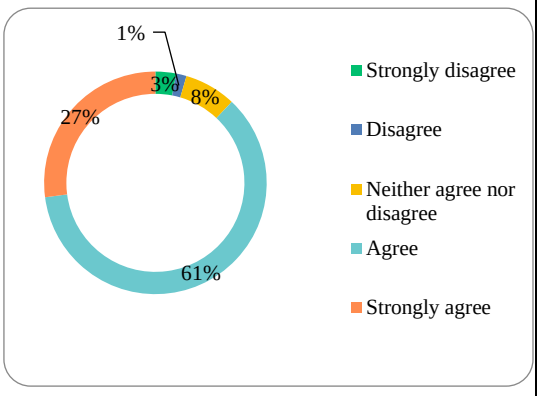
Familiarity with Digital Payments Methods	Convenience and Efficiency of Digital Payments Methods
	

Sources of Learning about Digital Payment Methods	Evaluating Different Digital Payment Methods
	
Influencing Others to Adopt Digital Payment Methods	**Understanding the Significance of Digital Payment Systems**
	

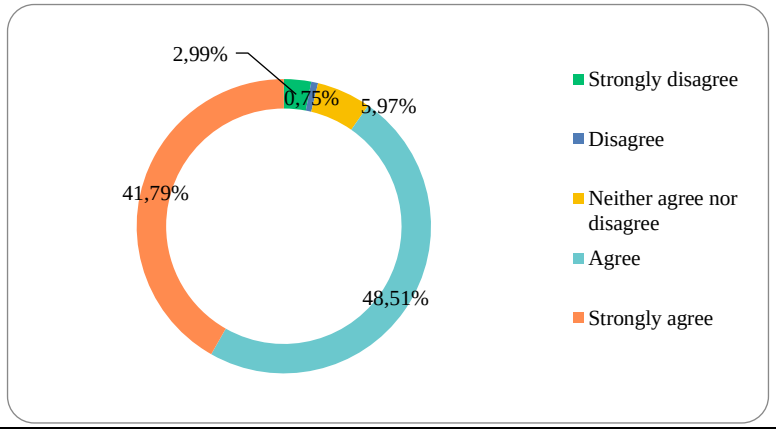
Digital Payment Experience Satisfaction



Willingness to Use Digital Payment System Again



Belief that Digital Payment is the System of the Future



Source: Authors

(a) Familiarity with Digital Payments Methods

Figure 4.5 above shows the result of the respondents on their familiarity with digital payment channels. Up to the half of the total respondents agree to the digital payment channels such as cards, mobile and online. Also, 32% of the respondents strong agree, while 9% of the respondents are neutral others are not familiar with the digital payments system.

(b) Convenience and Efficiency of Digital Payments Methods

From Figure 4.5, 23% and 54% of respondents have strongly agree and agree respectively that the use of digital platforms is convenient and efficient. Meanwhile 14% of the respondents are neutral in their usage of digital payment platforms as compared to the cash system. Others, 6% disagree with the convenience and efficiency of the use of digital payment systems as compared to the traditional channels.

(c) Sources of Learning about Digital Payment Methods

Figure 4.5 shows that 22% of the respondents learnt about the digital payment methods through channels like friends, media and other providers. Again, 62% of these respondents agree to the sources of learning. These sources are neutral to 15% of the respondents and only 10% disagree with the highlighted sources form third party.

(d) Evaluating Different Digital Payment Methods

In total Figure 4.5 shows that the respondents agree to the cost effectiveness of using digital payment system as compared to the traditional payment system. Over 75% of respondents are in agreement that the traditional payments are costlier. While 15% are neutral to this response, a total of 10% disagree with the cost effectiveness of the digital payments.

(e) Influencing Others to Adopt Digital Payment Methods

Additionally, positive experiences play a crucial role in influencing others, with 56.72% of respondents encouraging their peers to adopt digital payment methods. 17.16%% are neutral about influencing or convincing others to use digital system, and less than 10% disagree on influencing others to use digital payment platforms. The results show that there is a high campaign to the masses to disseminate knowledge on digital payment to others.

(f) Understanding the Significance of Digital Payment Systems

Figure 4.5 shows that more than 50% of the respondents understand that proliferation of digital payment platforms contributes positively to the economic development and is more environmentally friendly than the traditional payment system. Meanwhile less than 30% of the respondents were either neutral or disagreed that the digital payment system could contribute to economic development and is environmentally friendly.

(g) Digital Payment Experience Satisfaction with Digital Payment

The figure also suggests from the survey that the experience of respondents on digital payment is satisfactory. Those that strongly agree and agree are 27% and 61% respectively, which explains high satisfaction from users. Only 8% are not able to express that concern hence they are neutral while just 4% had a negative experience with the use of digital payment platforms.

(h) Willingness to Continue Using Use Digital Payment System

Similar statistics was seen on the willingness of the respondents to continue to use digital payments in their financial transactions. Those that strongly agree and agree are 27% and 61% respectively, which confirms their continuous patronage of the use of digital platforms. Only 8% are not able to express that concern hence they are neutral while just 4% disagreed with the continuous usage of the digital payment methods.

(i) Belief that Prospect of the Digital Payment is the System of the Future

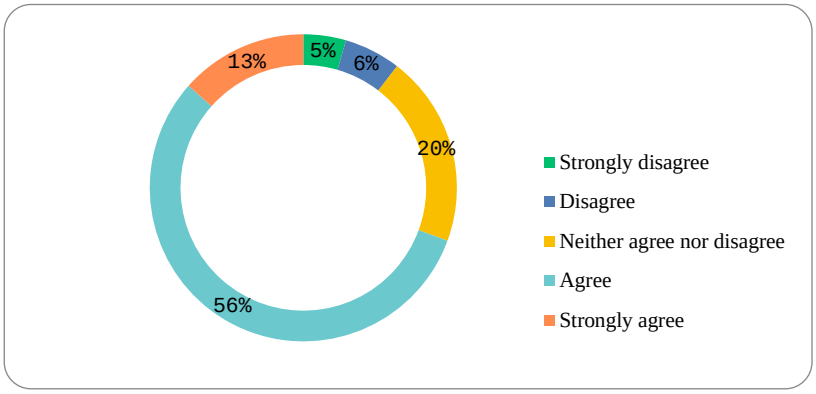
The survey also shows that the growth in use of digital payment system is high. A combine total of over 80% of the respondents confirmed the prospects of using digital payment system. While this is established from the willingness, efficiency, coverage and trust in the patronage of the digital form of payments. Meanwhile less than 5% of the respondents have remained neutral and only 3% disagreed about the promising prospect of digital payment system.

(iii) **Types of Risks Users Face in Using DPS**

The first question in this section of the survey was used to solicit information related to challenges faced by the respondents with regards to risk associated with trusting and verifying the security and stability of the DPS. The responses were presented in Figure 4.6.

Figure 4.6: Risks Users Face in Using DPS

Trusting and Verifying the Security and Stability of Digital Payment Services



Source: Authors

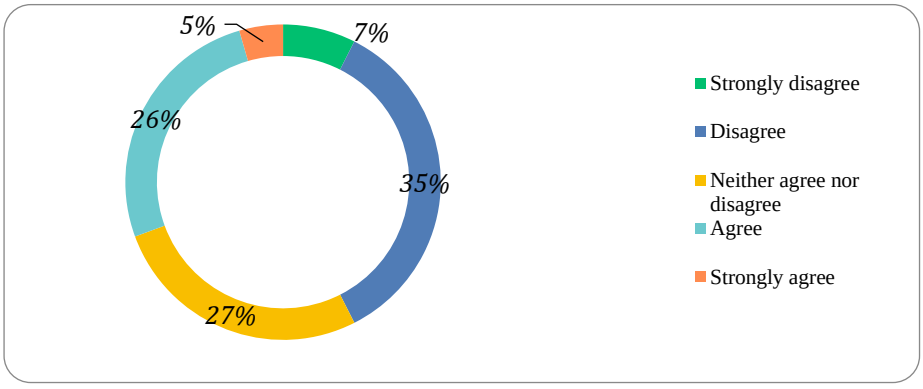
From Figure 4.6 above, give the sophisticated nature of the digital payment system, a combine total of 69% of the respondents verify the certificate of digital company before dealing with it, while 20% of the respondents are neutral about verification and 11% of them disagreed with the concept of verifying certificate of digital company to accept the system or its reputation.

(iv) **Challenges Users Faced in Using DPS**

Figure 4.7 shows that despite the overall positive sentiment, some challenges persist. While 35.07% of respondents reported not facing many issues, 26.12% did experience challenges. Effective customer support is critical, as 55.97% of respondents resolve their issues through customer service or online help.

Figure 4.7: Respondents' Challenges in Using Digital Payments

I face many challenges that have discouraged me to use digital payment system in Malaysia.

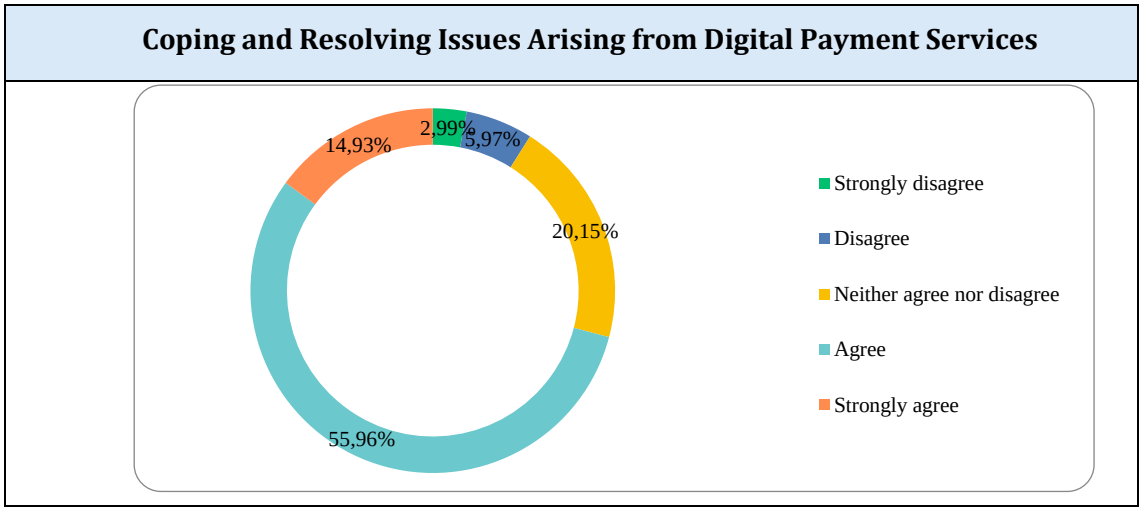


Source: Authors

(v) **Tendency towards Resolving Problems in DPS**

The impact of digital payment systems on society is widely recognized, it has its own challenges highlighted above. The coping mechanism shows level of adaptation from the respondents. With up to 70% of respondents acknowledging their ability to cope and resolve problems arising from digital payment systems. While 20% of the respondents are neutral less than 6% of these respondents disagreed that they were able to solve any issue regarding digital payment platforms.

Figure 4.8: User's Tendency towards Resolving Problems



Source: Authors

In summary, the digital transformation of payment systems in Malaysia, an OIC member country, showcases significant progress and potential. High levels of usage, awareness, trust, and satisfaction underscore the growing importance of digital payment systems. Addressing existing challenges and leveraging positive user experiences can further accelerate adoption, leading to a more efficient, inclusive, and technologically advanced financial landscape. The findings suggest that digital payments are not only beneficial but also poised to become the norm, driving further innovation and integration into everyday financial activities.

4.1.8 Analysis of the Interview Results

This section analyses and discusses the results of the interviews conducted with 4 experts from Malaysia. The 4 experts were carefully selected from different backgrounds and experiences relevant to the discourse and their backgrounds include a financial industry expert, a Sharī'ah expert who has conducted extensive research in digital payments, and a senior banker. The responses from the 16 interview questions were categorized into the following seven themes (i) Significance of the DPS, (ii) Technology used in the DPS, (iii) Level of Satisfaction, (iv) Effectiveness and Impact of the DPS, (v) Challenges facing the DPS, (vi) Prospects of the DPS and (vii) Suggestions to enhance the DPS. The responses obtained complement findings from the questionnaire survey and are very important to the development of the digital payment system in OIC member countries.

(i) **Significance of DPS**

This theme comprises responses to the following two questions: *Q1: How important is the digitalization of payment systems these days? Q2: Why are there needs for digitalization in the payment systems, and what are those needs in your case?* The responses in the theme were further categorized into the following two sub-themes on the extent to which DPS is significant to enhance 1) efficiency and security, 2) financial inclusion.

Efficiency and Security

The experts agree on the significance of digitalizing payment systems in the current business environment. In their respective responses, they argued that the digital payment system supports activities across retail, corporate and capital market sector. The support architecture stems from its efficiency, speed, security and reduced cost. They recognized how digitalization drive business processes through its reach to wider customer location without physical presence and reduces the dependencies on fiat money for transactions. An important point from one of the experts is the alignment to the Fourth Industrial Revolution and how more sectors swiftly embrace the impact of digitalization as well as support for technology. Numerous points from other experts reveal the impact of digital payments on the interconnection of different sectors, online payments and advances and automated payment request, prompt and management for individuals and businesses.

Furthermore, whilst the digital payment support the experience of customers/clients deposits and investments, it has its own security challenges. The financial industry expert mentioned key merits that came with the adoption of digital payment system which include traceability, speed, simplicity, transparency, and security. For all of this to be sustained, the security architecture should continue to be enhanced and protected in order to avoid unauthorized access and data theft attempts. Experts also shared their views on the importance of DPS for economic efficiency. One expert noted that digital systems enhance economic efficiency by boosting net banking income and managing a higher volume of transactions. He emphasized that digitization allows for automation and greater transaction handling, streamlining the process of recording transactions for businesses and governments, and facilitating the tracking of financial activities. Additionally, three experts

highlighted the growing consumer demand for efficient and accessible payment solutions, fueled by technological advancements and the global move towards cashless societies.

Financial Inclusion

Another important point made by the experts is the penetration of the digital payment in addressing financial inclusion. Yes, some experts pointed out the need to have a stable internet connectivity whilst a good solution from an expert referred to the offline mode of payment like USSD and card payment transactions. They mentioned that the unbanked population has reduced drastically in Malaysia with the aid of digital payment systems.

(ii) Technology Used in the DPS and Their Impacts

This theme comprises responses to the following five questions: *Q3: What technologies or methods are mainly used to carry out payments digitally in Malaysia? Q4: What implementation/ processes/ systems have you used that make your digital payment case excel from other countries, and how are they unique? Q5: What are the key components and parties involved in a digital transformation? Q6: To what extent have these technologies affected the adoption of digital payments in Malaysia? Q7: How is the implementation of the digital payment systems in Malaysia different from others?* The responses in the theme were further categorized into the following five sub-themes on: 1) Diversity of Technology Used in DPS, 2) Implementation Processes, 3) Key Components and Parties in Digital Transformation, 4) Impact of Technology on Adoption, 5) Benchmarking with Other Countries.

Diversity of Technology Used in DPS

Experts affirmed that the use of RENTAS for bank-to-bank transactions, RTGS for both corporate and retail transactions have positively transformed payment systems in Malaysia. They also emphasized the increasing use of QR codes for retail transactions. This wave of digital transformation of payment system has been seen in other sectors such as Touch n' Go for toll fees, Swipe for credit cards and E-wallet system. Experts highlighted that for digital payment systems to achieve widespread adoption beyond Malaysia and Asia, the entire ecosystem needs to embrace a diverse range of technologies. This includes not only upgrading digital infrastructure within these regions but also ensuring that different systems and platforms are interoperable on a global scale. The diversity of technology used

and most recently in digital payments, ranging from blockchain to AI-driven security measure plays a crucial role in fostering this interoperability.

Implementation Processes

Analyzing the experts' views on the implementation of digital payments in Malaysia, they highly praised the role of regulators, particularly BNM, for spearheading e-payment initiatives that position Malaysia as a leading investment destination in Asia. They emphasized that digital payments offer greater traceability compared to cash-based transactions, thereby reducing the risk of money laundering. Additionally, experts highlighted the establishment of the MDEC and the country's comprehensive agenda towards nationwide digitalization as crucial factors in the successful implementation of digital payment systems. They also pointed to the increased awareness of digital payment solutions, tax reliefs on major digital payment infrastructure, and subsidies granted for internet bundles as essential measures supporting the DPS rollout. Furthermore, the robust framework governing stakeholders, driven by regulators like BNM, SC, and MDEC, ensures a well-coordinated and effective implementation process. Lastly, they noted the importance of continuous public education and stakeholder engagement to further strengthen the adoption and integration of digital payment systems across the country.

Key Components and Parties in Digital Transformation

The digital transformation of Malaysia's payment systems is propelled by a variety of key components and stakeholders. Experts widely acknowledged the diverse array of participants, including regulators, financial institutions, Fintech companies, academic institutions, and BNM, all of which play pivotal roles in this evolution. Many experts also highlighted the Malaysian government's substantial efforts to promote financial inclusion and enhance digital accessibility. The importance of IT infrastructure, security, and data management in this transformation process is well recognized, with multiple experts emphasizing the critical role of IT departments and technology providers in the successful implementation of digital payment systems.

Impact of Technology on Adoption

Experts unanimously recognized the positive impact of technology on the adoption of digital payments in Malaysia. Several experts highlighted advancements in authentication and AI as key drivers of this adoption. They noted that domestic technology solutions have been instrumental, although regulatory delays have hindered progress in certain areas. The ease and speed of digital transactions are particularly appealing to younger users, further accelerating adoption. Two experts emphasized the importance of security and user experience in promoting widespread usage. They also pointed to the substantial transformation in payment methods in recent years, attributing the rise in adoption to factors such as the proliferation of smartphones, reduced data costs, and robust government support. Additionally, the integration of mobile payment platforms and the expansion of fintech services have further boosted the adoption of digital payment systems in Malaysia.

Benchmarking with Other Countries

When comparing Malaysia's digital payment systems with other countries, several experts highlighted that while the country is still a leading force in South East Asia, many initiatives have been identified by the banks in supporting the government effort to digitalization. Cases mentioned are the launch of fully cloud-native digital banking proposition by Bank Islam last year codenamed Be U with first of its kind technology stack. Similarly Al Rajhi Bank Malaysia released its end-to-end digital banking experience, Rize. They confirm that the sector expects further increases in digitalization in the coming years. Compared to other neighboring countries they serve as a template that others can follow, which will help drive new initiatives in OIC member countries.

(iii) **Level of Satisfaction**

This theme presents responses to the following question: *Q8: How satisfied are you with the availability, security, and convenience of digital payment services in Malaysia?* The experts have focused their responses on the level of satisfaction related to the following three main areas, namely 1) satisfaction level on the availability of DPS, 2) satisfaction level on the security of DPS, 3) satisfaction level on the convenience of DPS. The experts have also shared their views on challenges for meeting those levels of satisfactions and suggested areas for improvement to overcome the challenges.

Satisfaction level on the availability of DPS

As expected, experts find the availability of digital payment services in Malaysia highly satisfactory. However, they also point out that, despite the accessibility of these services, they will need to improve the security architecture to avoid future loss of funds. The expert highlighted that they are very satisfied as the relevant digital transformation initiatives are Government led through its agencies. They further acknowledged that the BNM keeps improving the e-payment system, as it introduces new initiatives every year like JomPay, DuitNow and RPP, which are good digital payment solutions that people are satisfied with in Malaysia.

Satisfaction level on the security of DPS

Two experts affirmed the security of digital payment systems, attributing their confidence to the strong oversight by BNM. However, another expert highlighted that individual perceptions of security can vary widely based on financial literacy and trust in digital platforms. Concerns were also raised about the potential security risks in a market dominated by large, established companies, with one expert suggesting that Fintech companies might have limited influence in bolstering security measures. Despite improvements in regulatory frameworks, experts emphasized the need for continuous investment in cybersecurity, comprehensive consumer education, and proactive risk management to sustain public trust and strengthen the resilience of Malaysia's digital payment ecosystem.

Satisfaction level on the convenience of DPS

Experts praise the convenience level available to users in digital payment solutions. Most of the new digital payment solution platforms are always an improvement on the previous ones, and they are seen as reliable, user friendly and easy to navigate. This brings about a lot of confidence as to the user experience.

(iv) **Effectiveness and Impact of the DPS**

This theme comprises responses to the following question: *Q9: How do you perceive the impact of digital payment systems on the economy, society, and environment of Malaysia? Q10: How do you assess the level of innovation and competition in the digital payment market in*

Malaysia? Q11: How do you rate the quality and effectiveness of the policies and regulations governing digital payment systems in Malaysia? The responses in the theme were further categorized into the following four sub-themes on: 1) Impact on Economy, Society, and Environment, 2) Level of Innovation and Competition in the Digital Payment Market, 3) Effectiveness of Policies and Regulations.

Impact on Economy, Society, and Environment

On the three factors, expert agrees that every phenomenon or solution has both the good and bad sides while measuring the impact. On the good side, the highlighted few points which include real time cash transactions, reduction in the use of paper money, wider acceptance amongst vendors and buyers and time efficiency. The most economic impact is the reduction of government spending in printing more paper money. While most of the experts generally refrained from discussing the negative impacts despite several promptings, one of them alluded to cybersecurity risks.

Innovation and Competition in the Digital Payment Market

The experts highlighted that the level of competition is very high amongst participants stemming from their willingness to provide seamless payment solutions to customers. This has led to increasing product launch and innovations across different sectors. The drive for innovation and competition includes government policies, favorable regulatory environment, government collaboration, hackathon ideas and most especially, borrowing ideas from other jurisdictions. A good example is the Touch 'n Go wallet and Grab, which are initiatives borrowed from Singapore.

A final key aspect mentioned by one of the experts is end-to-end Sharī'ah compliance of e-wallet usage by consumers. While emphasizing the convenience in using e-wallets, he however suggested that since there are institutions offering Islamic financial services are also operating in the digital payment ecosystem, there is a need to consider the Sharī'ah compliance of contracts underpinning funds kept in e-wallets. He therefore suggested the need to consider the application of the Shariah governance framework to digital payment services and solutions.

4.1.9 Specific Needs to Improve the Payment Systems

Improving internet connectivity infrastructure is crucial for advancing e-commerce and optimizing digital payment systems in Malaysia. While significant progress has been made, disparities persist among member states in ASEAN. Singapore leads in internet connectivity, followed by Thailand and Malaysia, albeit at a slower pace. Bridging these gaps is essential to ensure equitable access to reliable connectivity, fostering robust e-commerce growth and seamless cross-border digital payment operations (Ismail & Masud, 2020). Collaborative efforts within ASEAN are vital to address these disparities, driving economic prosperity and digital inclusion across the region.

Efficient e-payment systems are pivotal for seamless e-commerce transactions, offering diverse payment options like credit cards, debit cards, and online banking. Malaysia's advanced banking and financial sectors provide a competitive edge in developing and managing robust e-payment infrastructure. However, ensuring security, consumer protection, and efficiency remains resource-intensive and requires continuous investment in technology and human capital. Collaboration within ASEAN can further enhance Malaysia's e-payment ecosystem, fostering regional economic growth and digital innovation.

Countries are enhancing their payment systems infrastructure and institutions, both in retail and large-value segments, to adapt to technological advancements. This includes upgrading payment system infrastructure and institutions to accommodate new technologies and improve efficiency and reliability (Basir, 2009). Therefore, regulatory authorities always need to consider the balance between efficiency and security. Many investments have been made to implement e-payment schemes and to ensure their safe usage.

Malaysia's strategic position at the forefront of financial integration hinges on concerted efforts from all stakeholders. Through sustained collaboration among banks, regulators, and fintech innovators, Malaysia can establish standardized protocols and interoperable systems, fostering seamless cross-border transactions within ASEAN (DAN & Dewi, 2023). This initiative requires substantial investments in digital infrastructure and regulatory frameworks to ensure security, reliability, and inclusivity. By embracing technological

advancements and harmonizing payment standards, Malaysia can spearhead the transition towards integrated real-time payments, catalyzing economic growth and financial inclusion across the region.

In today's era of Big Data, the proliferation of data collection and analysis poses significant privacy concerns worldwide. The advent of AI enables businesses to delve deeper into complex datasets, raising apprehensions about data security and individual privacy. Online services and smart devices continuously gather vast amounts of user data, including browsing history, purchase behavior, geolocation, and personal information, potentially compromising users' privacy and security. Moreover, the utilization of AI-driven tracking systems within business networks, capable of monitoring employee communications and activities, raises sensitive privacy issues. It is imperative for organizations to provide comprehensive training and transparency regarding data collection practices to ensure employees' awareness and consent (ESCAP, 2018). To assess the national landscape of privacy protection, the development of a cyberprivacy index could serve as a valuable tool in evaluating countries' efforts to safeguard citizens' privacy rights.

4.1.10 Case Studies: Lessons Learnt and Knowledge Transfer among OIC Member Countries

Having a well-developed and robust payment systems infrastructure, Malaysia is in a good position to transfer the lessons learnt, its huge knowledge trove and unique experience in transforming its payment systems. Based on the case studies, some of the key lessons learnt on the current payment systems are summarized as follows:

1. **Propensity for Fast and Seamless Fund Transfer**. Bank customers would ordinarily prefer to transfer and receive funds in real-time. This is the value-add some of the digital banks across the world have introduced with better customer experience. With the introduction of RPP in Malaysia, there is the real-time, data-rich payments between accountholders in various financial institutions. This has significantly modernized the payment landscape in Malaysia.
2. **Enhancing Mobile Banking Capabilities**. With the preference for mobile banking among customers as opposed to desktop online banking, Malaysia has been able to enhance its mobile banking capabilities. The high mobile penetration in the country

has helped many customers to make payments in a seamless manner using their mobiles. Such flexibility has enhanced user experience in both online and in-store purchases.

3. **Further enhancing the payment system through QR Payments**. The convenience of using QR payments with mobile phones is a step further in enhancing the payment systems which deemphasizes the use of cash and bank cards. The rapid rise in the use of QR payments during Covid-19 pandemic has made such payment system a preferred mode by many merchants. The government of Malaysia also used the QR payment platform to disburse government pay-outs.
4. **Continued relevance of Cards**. Despite the increasing rise in digital payments, including the use of QR payments, there is continued trust in bank cards. Both debit and credit cards ae still being used and are trusted for both in-store and e-commerce payments.
5. **Significant reduction in cash usage**. With the increasingly diversified digital payment systems, there is less reliance on cash. It appears that one of the lessons learnt from the pandemic was erosion in cash usage. Payments for most commercial transactions and services have now been digitalized since a huge amount of such transactions and services can now be carried out using online or mobile platforms.
6. **Benefits of Cross-border collaborations**. The collaboration among the ASEA countries to develop a robust cross-border payment systems infrastructure shows that a regional bloc can get things right. This makes a good case for the OIC-wide payment systems infrastructure which will help promote trade and boost the economies of the member countries.

In terms of transfer of knowledge among the OIC Member countries, Malaysia seems to be one of the countries with a matured payment systems infrastructure. This means other OIC member countries could benefit from the Malaysia's experience. Accordingly, Malaysia's experience and lessons learned in payment systems can be transferred to other OIC member countries through several methods.

1. **Targeted Exchange Programs**: The Malaysia's central bank could organize exchange programs for key staff from central banks of other OIC member countries. Such professionals could spend some time at the relevant department of BNM to

gain first-hand experience of the payments systems operation before returning to their respective countries to implement such reforms.

2. **Smart Joint Projects**. Beyond exchange programs, to facilitate direct knowledge transfer and collaboration, Malaysia's central bank and central banks in OIC member countries or even financial institutions could introduce joint projects to further deepen their payment systems. This is more relevant to digital payment systems with the tremendous growth in e-commerce and the needs for cross-border payment systems infrastructure.
3. **Regulatory Policy Sharing**. Regulatory policies relating to payment systems which have been implemented and finetuned in Malaysia can be shared with other OIC member countries with a view to engendering further reforms in such jurisdictions.
4. **Well-coordinated Technology Transfer**. Rather than reinventing the wheel in other OIC member countries, Malaysia' s central bank can facilitate the transfer of some specific technologies or systems relating to digital payments to other countries. This will help introduce rapid reforms in the payment systems of the OIC member countries.
5. **Practical Case Studies on Payment Systems**. Malaysia could develop practical case studies on the evolution of its payment systems, strategies, challenges, impact and lessons learnt. These case studies will be valuable resource material for policy makers in other OIC member countries.
6. **Education and Training Events**. Workshops, trainings, forums, and conferences could be valuable resources for transfer of knowledge and expertise. In such events, experts in payments systems from Malaysia could be invited to share their experiences in developing robust payment systems. Such forums could also provide a good platform for cross-fertilization of ideas among experts in payment systems among the OIC member countries.

4.1.11 Country-Specific Policy Recommendations

Based on the case studies and experiences of Malaysia's payment systems, here are some policy recommendations that could enhance Malaysia's payment systems, including digital payment systems.

1. **Sustained promotion of digital payments**. Malaysia should continue to promote the use of digital payments through various strategies, particularly in the rural communities. Customers should be encouraged to discontinue the use of traditional methods such as cheques and cash. This requires some incentives and public awareness campaigns. Of course, to achieve this, digital payments platforms need to be user-friendly and accessible to all, including people who reside in the rural areas and the underserved communities.
2. **Strengthen Cybersecurity**. Though Malaysia through BNM and other industry partners such as the SC has taken giant steps in enhancing cybersecurity to minimize the risks associated with digital payments, there is a need for continuous improvement, enhancement and finetuning to ensure a robust, resilient and ironclad cybersecurity protocols are deployed in the payment systems infrastructures in the country. Bilateral and multilateral arrangements on cybersecurity cooperation not only with regional partners but also with all OIC member countries could help promote information exchange and further support ongoing capacity building initiatives.
3. **Proactive Regulatory Reforms**. Since the payment landscape keeps evolving, particularly the digital payment systems with the proliferation of Fintech, there is a need for BNM to continue to track developments globally and monitor emerging risks which would help in updating and reforming existing regulatory policies.
4. **Foster an environment that encourages innovation**. Malaysia needs to continue to foster an environment that promotes innovation and adoption of new technologies in the payment systems. This would help control the activities of non-state or faceless players who have utilized blockchain technology in introducing cryptocurrencies. Hence, BNM should actively consider enhancing its payment systems through the introduction of CBDC.[16] Utilizing blockchain for its regulatory and supervisory roles will also enhance service delivery and promote transparency.

[16] See the full report, COMCEC, "Improving Cooperation among Central Banks in terms of Digital Currencies: Challenges and Prospects for OIC Member Countries", COMCEC Coordination Officer, October 2023.

5. **Promote Financial Literacy**. Consumers, particularly the underserved and vulnerable, need to be well informed about digital payments, including how to benefit from its potentials and protect themselves against the risks. Understanding the benefits, risks and security aspects of digital payments would help such consumers utilize such payment systems with enhanced user experience.

4.1.12 Implications of Policy Recommendations for OIC Member Countries

The implications of Malaysia's policy recommendations on payment systems for other OIC Member Countries could be significant and transformative. Here are some potential implications.

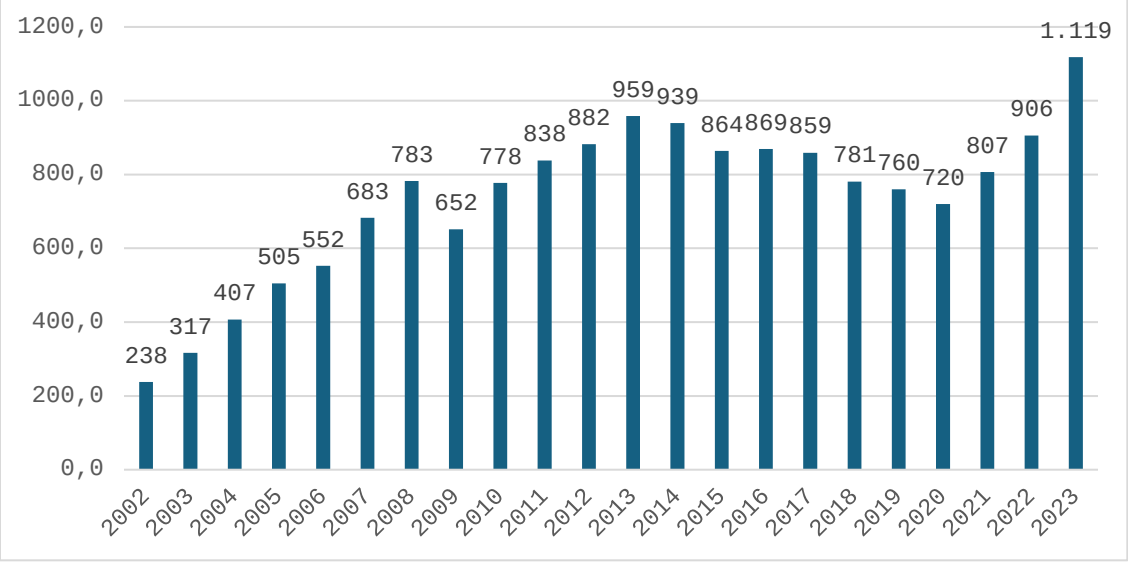
1. **Enhanced Interoperability among OIC Countries**. There is a need for participants in different payment systems among the OIC member countries to clear and settle financial transactions and payments in real-time. This would help foster economic cooperation, facilitate smoother cross-border transactions and promote international trade.
2. **OIC Payment Systems Platform**. Taking a cue from the success recorded in Malaysia, particularly in its cross-border collaborations relating to the payment systems, the OIC could consider introducing its unique cross-border payment systems platform where all payments are settled in local currencies.
3. **Promotion of Financial Inclusion**. Deepening the promotion of digital payments and expansion of relevant technological infrastructure in rural areas and among the underserved, to help improve financial inclusion among consumers in OIC member countries, where many in the regional bloc are still considered underbanked.
4. **Strengthened Cybersecurity**. As discussed above, expanding cross-border collaboration and scaling up bilateral collaborations on cybersecurity related to digital payment systems to multilateral agreements could help protect financial systems of OIC member countries against increasing cyber threats.
5. **Harmonization of Policy and Regulatory Frameworks**. Once transfer of knowledge and technology is achieved among member countries, there would be greater regulatory harmonization among OIC countries. Such cross-border cooperation would enhance the resilience of digital payments systems, technological advancement, and competitiveness among the OIC member countries.

4.2 TÜRKİYE

4.2.1 Introduction

Türkiye is a country strategically located between Europe and Asia giving it a significant comparative advantage in trade routes. Such geographical proximity demands high adaptability and openness to changes, and constant intellectual and physical transformations. In recent years, it has shown significant economic and technological developments, and it steadily continues to grow. The country boasts among the world's most important economies especially in agriculture and tourism, and the regional largest exporter. Its gross domestic product (GDP) surpassed $1 trillion in 2023 from $200 billion in 2002 as shown in Figure 4.9 below. Türkiye's impressive economic growth over the years has solidified its position among the G20 economies.

Figure 4.9: GDP in Current Prices between 2002-2023



Source: TurkStat, Veri Portalı

It is undeniable that technology adoption and digitization have played a significant role in Türkiye's economic development. Despite being vulnerable to external shocks and exposed to a dollarized monetary system, Türkiye continues to maintain market fairness with effective payment methods and systems (MUSIAD, 2022). Such effective payment

methods and systems have allowed Türkiye achieve advanced level of financial inclusion, enhanced by a significant portion of cashless money transfers (Dinc, 2017).

A significant portion of the Türkiye's population of 85.4 million consists of young people. Yet, Türkiye's digitization has transcended the youthful population. The first card experience in Türkiye can be traced back to 1968 (Kaya, 2009). After the acceptance of Turkish Lira convertibility in 1989, card usage grew dramatically in the retail sector. Card usage is widespread among the adult population due to their high level of income. The primary payment system has matured in the commercial sector more than the retail sector. Before the use of cards became prevalent, bank checks were extensively used in Türkiye. Today, these checks have some degree of digitalization through QR features which enables making a query on the historical performance of the account holder.

Thus, Türkiye has begun to use alternatives to cash in terms of payment methods and systems and has even started to generate volume in the economy without increasing the supply of money and credit. With the beginning of new millennium, both check and card usage accelerated, and new technologies and institutions were integrated into the system. Efforts and developments in the digitization of the payment system in Türkiye have enhanced investments towards electronic money companies, digital banks, and other financial alternative distribution channels. The recent central bank's digital currency has been projected to contribute to the government's implementation plans of the digital payment system. Subsequent sections will cover developments in these areas and market data.

4.2.2 Legal and Regulatory Framework on Payment Systems

In Türkiye, there are two regulatory authorities responsible for regulating payment systems. These are the Central Bank of the Republic of Türkiye (CBRT) and the Banking Regulation and Supervision Agency (BRSA). Each of these authorities regulates and supervises institutions and practices within its jurisdiction. Payment systems are directly regulated by CBRT, which issued Law on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions, published in the Official Gazette dated June 27, 2013, No. 28690. This law, commonly known as "Law No. 6493," was enacted to regulate the establishment, operation, and oversight of payment and securities settlement

systems, as well as payment services and electronic money issuance in Türkiye. The primary goals of the law are to ensure the safety, efficiency, and reliability of payment systems and to protect users of payment services and electronic money. This law is supported by the Regulation on Payment Services, Electronic Money Issuance, and Payment Service Providers, published in the Official Gazette dated December 1, 2021, No. 31676. This regulation provides detailed guidelines and rules to implement the provisions of Law No. 6493. In Türkiye, other secondary legislation for payment services include but not limited to Communique on Information Systems of Payment and Electronic Money Institutions and Data Sharing Services in the Field of Payment Services of Payment Service Providers, Regulation on the Generation and the Use of TR QR Code in Payment Services and Regulation on the Disuse of Crypto Assets in Payments. Al of these aimed to enhance the security, transparency, and efficiency of payment services and electronic money issuance.

Specifically, card and digital banking operations fall under the regulation of the BRSA. The Law on Bank Cards and Credit Cards, published in the Official Gazette dated March 1, 2006, No. 26095, and the Regulation on Bank Cards and Credit Cards, published in the Official Gazette dated March 10, 2007, No. 26458, issued under this law, regulate the card sector, which constitutes a significant portion of digital payment systems, under the oversight of the BRSA. This law, also known as "Law No. 5464," was enacted to regulate the issuance, use, and management of bank cards and credit cards in Türkiye. It aims to protect consumers, ensure fair practices among financial institutions, and promote the security and efficiency of card-based payment systems. The regulation provides detailed guidelines for the implementation of the Law on Bank Cards and Credit Cards. It sets out the operational, technical, and procedural standards that financial institutions must follow when managing card services.

On the other hand, Regulation on the Principles for Digital Banking and Service Models (Published December 29, 2021, No. 31699) often referred to as the "Digital Banking Regulation," sets out the principles and standards for the establishment and operation of digital banks in Türkiye. It defines digital banks as institutions that primarily operate online without traditional branch networks.

There are other related regulations in Türkiye for digital payment services. Regulation on Remote Identification Methods for Digital Banking Services (Published March 1, 2021) is one of the pillars of regulatory environment on the issues and allows banks using remote identification methods to facilitate the growth of digital banking by enabling customers to open accounts and access services without visiting a physical branch or office. Law No. 6493 and secondary regulations enable payment and electronic money institutions to digitally onboard their customers similar to banks. Regulation on Information Systems and Electronic Banking Services of Banks (Published 2020) sets out the standards for the management of information systems and the provision of electronic banking services in the jurisdiction.

The regulatory environment for digital financial services in Türkiye was designed to balance innovation with security and consumer protection. By providing clear guidelines and robust oversight, the BRSA and the CBRT have created a conducive environment for the growth of digital banking services, contributing to the modernization and digitalization of the Turkish financial sector. The clearing of card transactions was carried out by the Interbank Card Center (ICC) and other specialized payment system operators such as Paycore, Garanti Payment Systems, and Bileşim with focus on certain transactions. All transactions are settled within seconds. .

It supports the Visa and Mastercard infrastructure and has also developed and introduced a payment system called TROY, which has represented a national card payment system for economies worldwide with its millions of users. It has expanded beyond local usage, successfully offering its users opportunities for international use through international agreements. According to the Law 6493, the CBRT is the main regulatory and supervisory authority for payments. This include but not limited to the transfer of electronic money, checks, and electronic fund transfers. While the CBRT operates payment and securities settlement systems for electronic fund and security transfers, the clearing and settlement operations for checks are conducted through Check Clearing System operated by Takasbank. In addition to being a regulatory authority, the CBRT stands out as a technological institution due to this aspect. This observation is significant as it may be the first time such a record has been made about the CBRT. Similar to the infrastructure

provided by the ICC, the CBRT's infrastructure processes millions of transactions daily, each completed within a few seconds.

Naturally, the CBRT is also the issuer in the development of digital currency. Regulations are expected to be made regarding the project for which pilot studies have been conducted. On the other hand, it is known that Türkiye is one of the first countries regulated cryptocurrency exchanges. These are the main regulatory aspects and bodies in Türkiye. However, it is also worth noting that the financial sector plays an active role in transferring the payments into digital systems via innovative technologies and combating informality in the economy.

In recent years, Türkiye has taken coordinated steps to increase financial inclusion and reduce informality through its regulatory reforms on digital payment systems. All central government transfer payments in the country are now made exclusively through banking channels. This has facilitated financial inclusion for lower-income groups. Items such as student scholarships, pension payments, and government subsidies are only processed through bank accounts. In turn, banks offer services like cards and online banking to customers included in this manner. It has also become mandatory for rental payments in the country to be made through banking channels. This has enabled both tenants and landlords to be integrated into the financial system. Through cross-selling, these groups have become users of payment systems. Another important area where the financial sector plays an active role is the regulation that requires all wage payments in the country to be made only through banks. As a result, all wage earners in the country are incorporated into the financial sector.

Various studies have shown that e-commerce is a significant factor in driving the need for payment system usage in Türkiye. The rapid growth of the e-commerce marketplaces in the country, has attracted price-sensitive consumers to use payment systems (Gokmen, 2012). The courier and cargo services in the country coupled with product return regulation have also established a strong ecosystem that strengthens marketplaces. Therefore, the ability for users to utilize these cost-effective infrastructures depends on their ability to use payment systems. This aspect is not only important as a financial inclusion experience but

also because it encourages marketplaces to develop alternative payment systems and foster a competitive environment that supports the development of traditional payment systems.

4.2.3 The Current Level of Development of Digital Payment Systems

According to the ICC, as of February 2024, the number of credit cards in Türkiye have reached 120.4 million, while the number of debit cards reached 191.2 million. Considering the number of debit cards relative to the total population, it can be inferred that households in Türkiye typically engage with an average of 2 banks, as indicated in Table 4.3 below.

Table 4.5: Composition of Classical Payment Systems

Number of Cards		Number of POS* Machines		Number of ATM*	
Total Credit Cards	120.377.683	POS	2.006.434	ATM	53.073
Total Debit Cards	191.239.805	*Point of Sale		*Automated Teller Machines	

Source: ICC, Kart Sayıları.

Although there is an increasing trend in the number of cards, it should be noted that the number of POS terminals has not increased; rather, it has decreased. New technologies enable the consolidation of POS machines obtained from different banks. Previously, it was necessary to obtain a separate POS device from each bank, but this issue has been mitigated. In addition, the use of digital POS devices supported by smartphones has become widespread among businesses. Meanwhile ATMs in Türkiye have become payment centers, enabling payment transactions to be easily conducted within an ATM rather than at a bank branch. Several banks have opened their ATM infrastructure to customers of other banks, and this has decreased the need for additional numbers of ATMs. Moreover, the decline in cash usage is another decisive factor that has inversely changed usage patterns of ATMs and decline in their numbers.

The volume of card transactions in Türkiye is as shown in Table 4.4 below. In February 2024 alone, approximately 745 million transactions were conducted with credit cards and around 578 million transactions with debit cards. When adding the approximately 140 million credit card and debit card cash withdrawal transactions to this figure, the total number of transactions reaches around 1.5 billion. It can be observed from the data that credit cards are more actively used for purchases, while debit cards are more commonly used for cash withdrawals. This indicates a usage pattern that aligns with the purpose of each type of card.

Although the total transaction volume from credit cards (including purchases and cash withdrawals) and debit cards (including purchases and cash withdrawals) is similar, there is a significant difference in volume. Specifically, the transaction volume from credit cards amounted to approximately 967 billion Turkish Lira (TL), whereas transactions from debit cards totaled around 440 billion TL as indicated in Table 4.6 below.

Table 4.6: Number of Transactions and Volumes of Card Use

		Number of transactions and Volumes (as of February 2024)					
		Number of Transactions			Volume (Million TL)		
		Shopping	Cash Withdrawals	Total	Shopping	Cash Withdrawals	Total
Credit Card	Local cards local transactions	736.373.818	22.778.288	759.152.106	817.657,66	121.255,75	938.913,41
	Local cards abroad transactions	26.912.602	70.481	26.983.083	25.406,17	405,01	25.811,19
	Foreign Cards local transactions	9.061.207	427.122	9.488.329	26.828,16	1.681,38	28.509,54
	Total local transactions	745.435.025	23.205.410	768.640.435	844.485,82	122.937,13	967.422,94
Debit Card	Local cards local transactions	571.830.311	114.316.812	686.147.123	163.302,27	261.063,10	424.365,37
	Local cards abroad transactions	25.835.712	307.221	26.142.933	6.082,76	1.358,40	7.441,16
	Foreign Cards local transactions	5.806.012	421.067	6.227.079	14.224,07	1.830,93	16.055,01
	Total local transactions	577.636.323	114.737.879	692.374.202	177.526,35	262.894,03	440.420,38

		No. of Transactions & Volume	
		Number of Transactions	Volume (Million TL)
Digital POS	Online	202.986.428	293.680,57
	Mail-Order	15.732.407	76.848,01

Source: ICC

On the one hand, it was observed that the transaction volume of virtual POS systems has reached significant levels. As of February 2024, transactions exceeding 200 million have amounted to up to 300 billion TL. While on the other hand, TROY data, although it's from September 2023, it shows that there were 19 million cards and a transaction volume of 47.9 billion TL.

4.2.4 Payment Systems: Current Trends, Issues and Challenges

The Electronic Funds Transfer System (EFT), which started operating since 1992 and redeveloped under the CBRT in 2013, serves as a fundamental instrument in Türkiye's payment ecosystem, and has been operating efficiently and effectively. In 2023, the system reconciled approximately 780 million transactions, with a daily average transaction count of 3.1 million.

In addition to EFT, the new generation instant payment system called FAST (Instant and Continuous Transfer of Funds), developed by the CBRT and launched in January 2021, has introduced innovative approaches and layered services in the payment sector. FAST enables secure, fast, and easy payments around the clock, rapidly gaining popularity as an alternative method to cash and card payments in shopping transactions.

Considering the dynamic requirements of the payments ecosystem and the effective operation of the FAST system, transaction amount limits increased from 50,000 TL to 100,000 TL for fund transfers, and from 100,000 TL to 250,000 TL for merchant payments with dynamic verification using FAST-TR QR codes in April 2024. Since its introduction as an alternative payment method to cash and cards, the FAST System has seen an increasing

transaction volume from its first day of operation. As of August 2024, an average of 12,3 million transactions occur daily.

In addition to these instruments, digitalization has also become prominent in corporate structures. In Türkiye, for the first time in 2023, two digital Islamic banks commenced operations. With this development, the implementation of open banking services and banking as a service application is expected to take root in Türkiye. Internet marketplaces offering insurance agency services have emerged as another significant players. Recently, the number of electronic money institutions established through recent regulations in Türkiye has reached 63[17], indicating their increasing effectiveness in the country. Similarly, 26 companies are operating to meet individual users' needs such as bills and international transfers. Türkiye's Post and Telegraph Organization, despite its monopoly on postal services, also plays an active role in payment systems, benefiting from its extensive branch network.

Another important development was the Central Bank's initiative to issue digital currency. The issuance of digital Turkish Lira is now included in the government's core economic policy text, the Medium-Term Program. In this context, the Central Bank initiated proof-of-concept studies in 2020 to kickstart the process. Following proof-of-concept studies that included testing the applicability of various distributed ledger technologies to the CBDC, the Central Bank launched the Digital Turkish Lira (DTL) Research and Development Project and DTL System. A Digital Currency R&D team was formed within the Central Bank to conduct research, development, and testing activities for the project. Based on the findings of these studies, collaborations were established in 2021 with technology institutions such as ASELSAN, HAVELSAN, and TÜBİTAK in the fields of cryptography, specialized hardware, and various advanced technology areas. Finally, the "Digital Turkish Lira Collaboration Platform" was established to conduct technological research, development, and testing processes as the first phase of the project. The second phase of the project is expected to be carried out in 2024 (CBRT, 2023).

[17] As of November 26, 2024:
https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Core+Functions/Payment+Services/Electronic+Money+Institutions

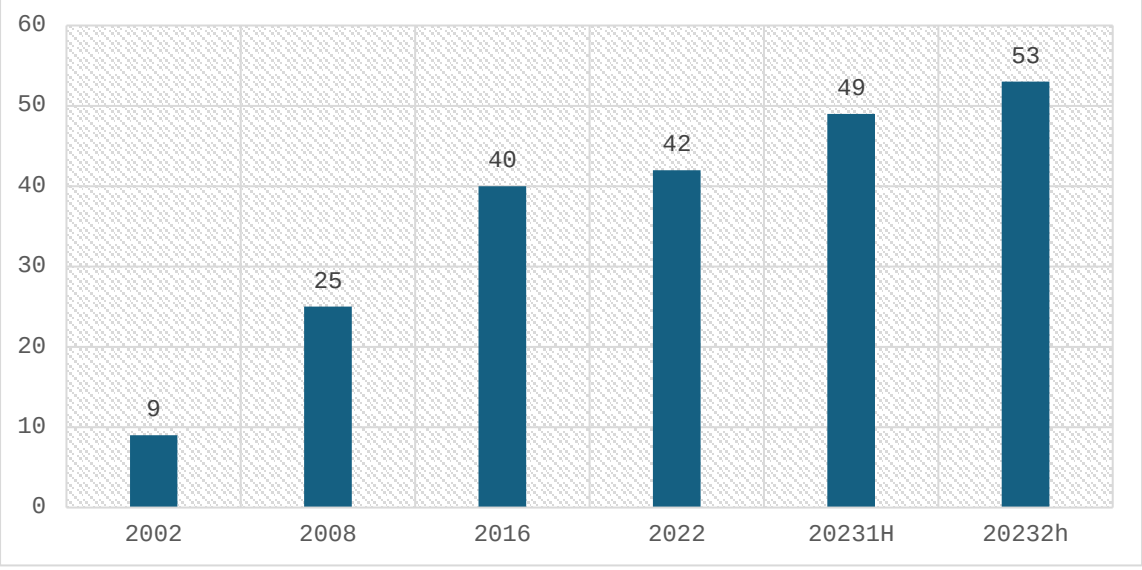
In summary, the fundamental instruments in Türkiye's payment systems currently are card-based systems and electronic transfer systems. Nevertheless, there is a positive trend towards the diversification of the digital payment system in the near future.

4.2.5 Digital Payment Systems and Economic Activities

The impact of payment systems on the economy should be evaluated from two perspectives: combating informality and contributing to stability of the sector. Türkiye has increasingly benefited from payment systems in both areas over the past 20 years.

Türkiye has developed an Anti-Informality Action Plan for 2023-2025, which has put a strong emphasis on digitization in relevant areas. This emphasis is not made unnecessarily. Digitization, especially through payment systems, enables economic data to reflect reality. In this context, special importance is also given to card-based systems. A strong relationship can be observed between the development of card-based systems and increased utilization of cards in consumption expenditures. Graph 2 below shows that the share of card expenditures in total expenditures has increased from only 9% in 2002 to around 53% by the second half of 2023. This signified the transformation from traditional to digital payment systems as highlighted in the Figure 4.10 below.

Figure 4.10: Share of Card Expenditure to Total Expenditure



Source: ICC, Dönemsel Raporlar

Thus, cash usage is being reduced, and potential economic disruptions stemming from emissions can be prevented. As evident from the GDP data provided above, Türkiye has achieved significant development, growing fivefold from 2002 to 2023 with above-average performance. It is important to note that this period also marks the proliferation of payment systems in Türkiye.

The number of credit cards increased from 14 million at the end of 2001 to 120 million by the February of 2024, while the number of debit cards rose from 31.6 million to 191 million. The increase in card quantities and usage prevalence can be considered a key factor contributing to the stable growth in the economy.

4.2.6 Analysis of Questionnaire and Survey Results

A total of (523) questionnaires were distributed in Türkiye to solicit views of end users on digital payment systems in the country. It comprises the following sections: (i) Background information, (ii) Motivation of users for the DPS, (iii) Types of risks users faced in using the DPS, (iv) Challenges users faced in using the DPS, and (v) Resolving problems of the DPS.

(i) Background Information

The questions in this section of the survey were used to solicit background information of the respondents' profiles by gender, age, marital status, education level, occupation, income, expenditure, savings, and familiarity with digital payment [level of awareness, common types of payments used, and uses of the payment system]. The responses were presented in Table 4.7, 4.8, and 4.9 and Figure 4.11 below:

Table 4.7: a) Respondents' Profiles by Gender, Age, & Marital Status

Item	Detail	Frequency	Percentage
Gender	Male	248	47.42
	Female	275	52.58
	Total	**523**	
Age	15-29	428	81.84
	30-44	52	9.94
	45-59	39	7.46
	60 and above	4	0.76
	Total	**523**	
Marital Status	Single	400	76.48
	Married	103	19.69
	Divorced/Widow	14	2.68
	Others	6	1.15
	Total	**523**	

a) Distribution by Gender, Age and Marital Status

Based on Table 4.7 above, 53% of the respondents were females and 47% were male. This is to guide the administrators to pursue female gender segment participation for the winning most of the participants. The distribution by age of the respondents signifies that 82% were between 15 and 29 years of age and 28% were 30 years and above. As the majority of respondents were youths, this means the future of digital payment is expected to be brighter and the adoption will gradually be faster and successful. Meanwhile 76% of the respondents were single, 20% were married, and less than 15% were either divorced or not specified.

Table 4.8: b) Respondents' Profiles by Education Level & Occupation

Item	Detail	Frequency	Percentage
Educational Level	Primary School	8	1.53
	High School	57	10.90
	Diploma	46	8.80
	Bachelor's Degree	345	65.97
	Master's Degree	46	8.80
	PhD	21	4.02
	Total	**523**	
Occupation	Businessperson	41	7.84
	Farmer	7	1.34
	Government Civil Servant	22	4.21
	Manager in Private Sector	34	6.50
	Self-Employed	63	12.05
	Teacher	38	7.27
	Others	318	60.80
	Total	**523**	

b) Distribution by Educational Level and Occupation

The educational background of the respondents in Table 4.8 shows that 66% of them have a bachelor's degree, 9% for diploma and master's each, 4% were PhD holders, and 11% have high school certificates while only 1% have a primary school certificate. This means that the respondents were educated, which indicates the reliability of their informed decisions and responses. Meanwhile, the occupation status of the respondents signifies that 61% of them were unspecified, 12% were self-employed, 8% were businesspeople while 19% were on the various types of employment.

Table 4.9: c) Respondents' Profiles by Income, Expenditure, & Savings

Item	Detail	Frequency	Percentage
Monthly Income (USD)	Below 1.000	282	53.92
	1.001-4.000	149	28.49
	4.001-7.000	35	6.69
	Above 7.000	57	10.90
	Total	**523**	
Monthly Expenditure (USD)	Below 1.000	320	61.19
	1.001-4.000	131	25.05
	4.001-7.000	40	7.65
	Above 7.000	32	6.12
	Total	**523**	
Monthly Savings (USD)	Below 1.000	407	77.82
	1.001-4.000	73	13.96
	4.001-7.000	25	4.78
	Above 7.000	18	3.44
	Total	**523**	

Source: Authors

c) Distribution by Monthly Income, Expenditure and Savings

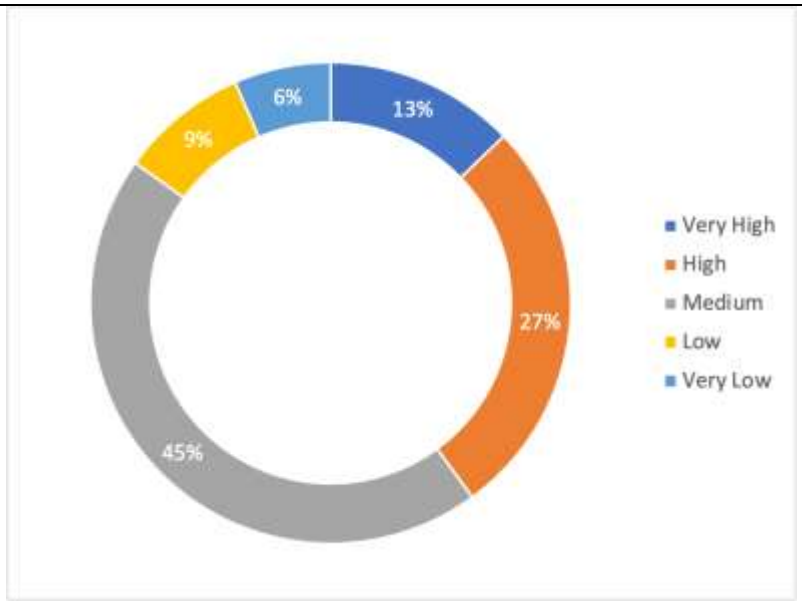
Also, from Table 4.9 we have seen that 54%, 61% and 78% of respondents have monthly income, monthly expenditure and monthly savings of below $1,000 respectively. Also 28%, 25% and 14% have monthly income, monthly expenditure and monthly savings of between 1,001 and $4,000 respectively. The remaining percentages from all the categories were above 4,000 USD. This means that the administrators should pay more attention to micro digital platforms that could enhance small financial transactions.

d) Respondent's Familiarity with Digital Payment

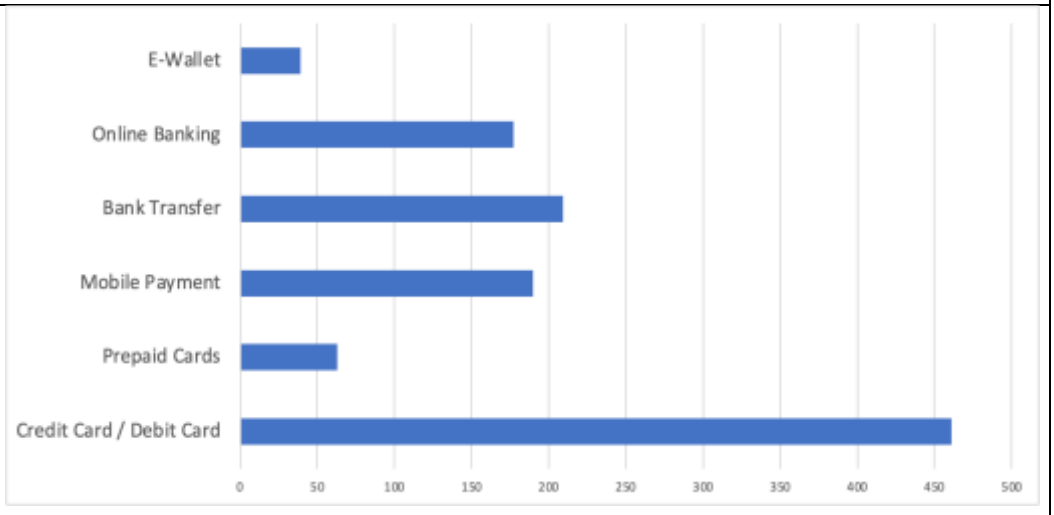
This subsection solicited the opinions of the respondents in four aspects, namely 1) the types of digital payment they mostly prefer and use, 2) whether they have made or/and received digital payments, 3) the reasons why they use digital payments, and 4) the level of their awareness regarding digital payments.

Figure 4.11: Respondent's Familiarity with Digital Payment

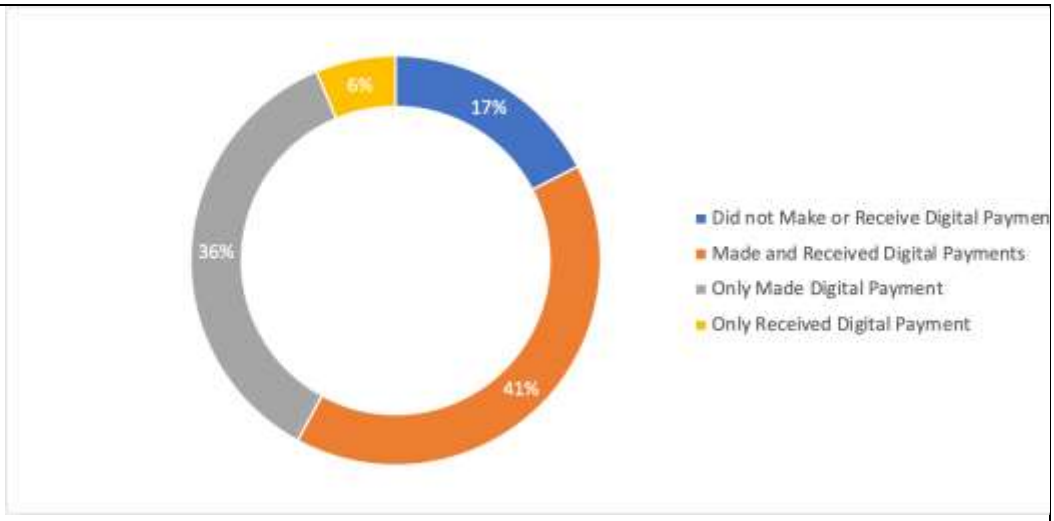
(a) Level of Awareness



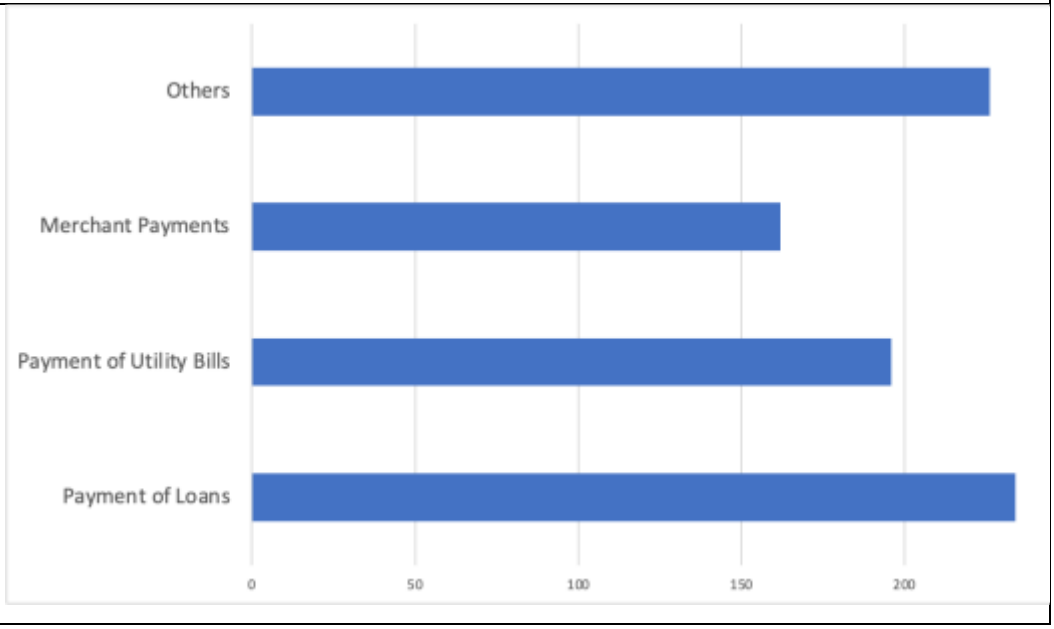
(b) Types of Payments



(c) Level of Usage of Digital Payments



(d) Uses of Digital Payments



Source: Authors

Level of Awareness and Preferred Types of Payments

Based on Figure 4.11, 13% of the respondents have very high level of awareness of the digital channels, while 27% consider their level of awareness as high, which means a combined 40% of the respondents understand the digital payment channels very well. Thus, considering the first and second categories, it can be inferred that respondents have sufficient knowledge of the digital finance platforms. On the other hand, 45% of the respondents have medium understanding of the digital channels. Only 15% of the

respondents have a poor understanding of digital finance. Meanwhile with regards to type of payments, more than 80% of the respondents have indicated their preference for the use of card (debit/credit) to be the most prominent payment channel, followed by Bank transfer channel, then the mobile and online banking channels came in the third and fourth positions respectively, and prepaid came fifth and lastly E-wallet in the sixth position.

Level of Usage and Reasons for Using Digital Payments

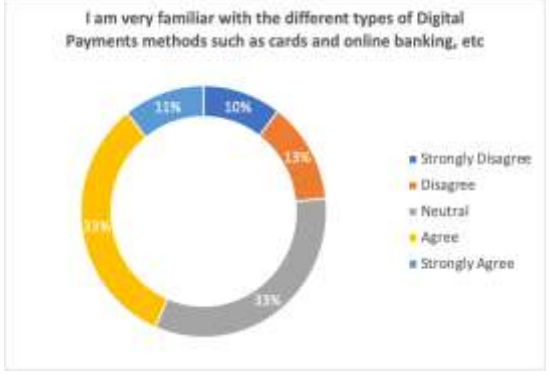
Figure 4.11 above shows that 41% of the respondents send and receive payments using digital channels, 36% use digital channels only to make payments, 17% did not make or receive payments using digital channels, and 6% receive digital payments but did not make any payments using the channel. Meanwhile, more than 80% of the respondents identified payment of debt as their major reason for using digital channels followed by other payments, then utility payment and finally, payment for merchandise.

(ii) Motivation of Users for the DPS

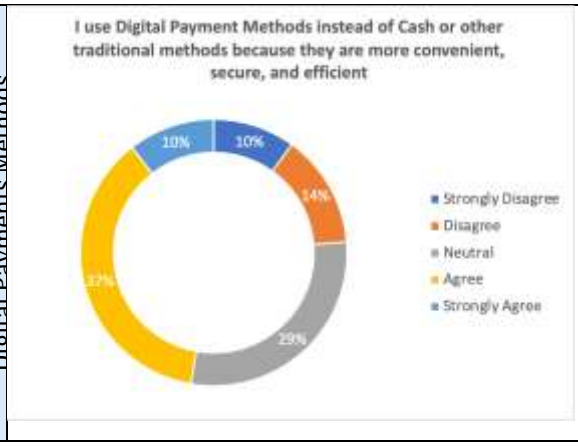
The questions in this section of the survey were used to solicit information related to familiarity, cost, impact, satisfaction, prospects, convenience of the respondents on the DPS. The responses were presented in the following Figure 4.12.

Figure 4.12: Factors Motivating Users towards DPS

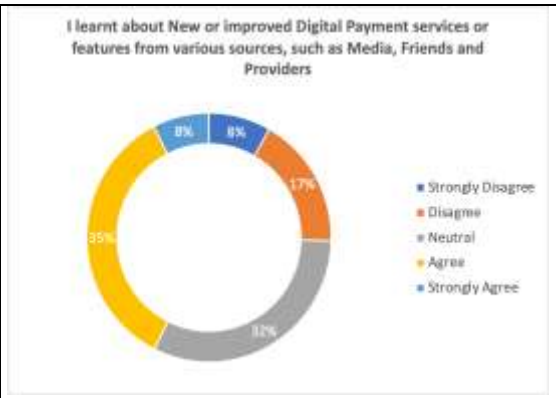
(a) Familiarity with Digital Payments Methods



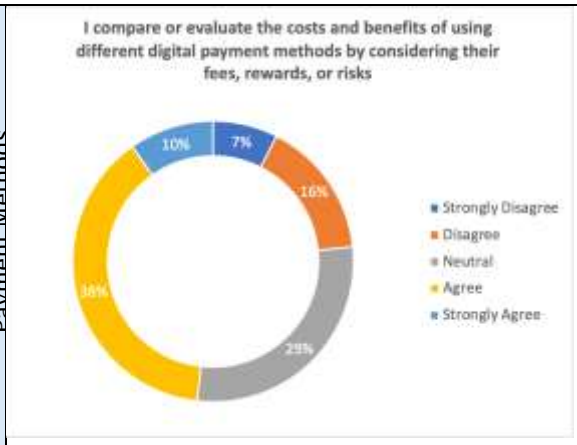
(b) Convenience and Efficiency of Digital Payments Methods



(c) Sources of Learning about Digital Payment Methods

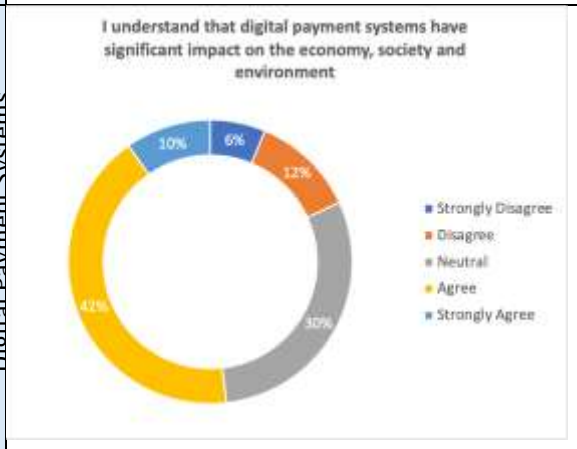


(d) Evaluating Different Digital Payment Methods

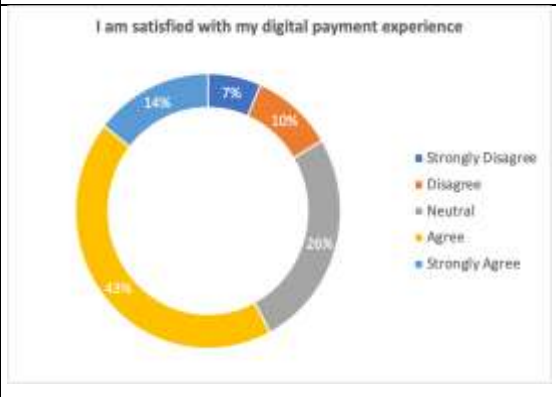


(e) Influencing Others to Adopt Digital Payment Methods

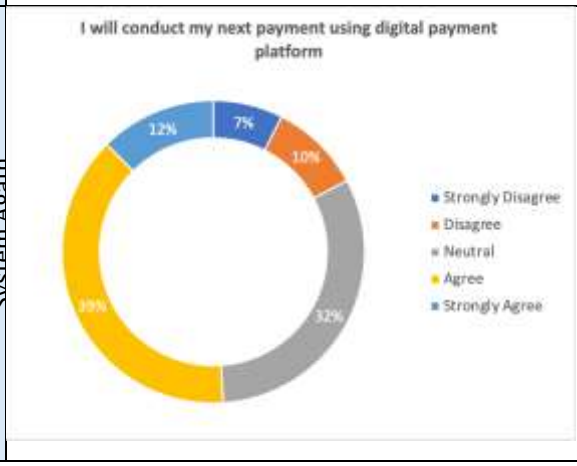
(f) Understanding the Significance of Digital Payment Systems

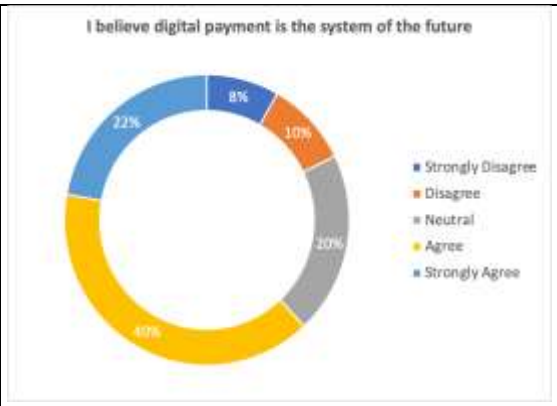


(g) Digital Payment Experience Satisfaction



(h) Willingness to Use Digital Payment System Again



(i) Belief that Digital Payment is the System of the Future			

Source: Authors

(a) Familiarity with Digital Payments Methods

Figure 4.12 presents familiarity of the respondents with the digital payment channels. It shows that 44% of the respondents [33% and 11%] identified familiarity with the digital payment channels such as Cards, mobile and online. Meanwhile 33% of the respondents are neutral regarding their familiarity with the digital payment channels. The remaining 23% of the respondents are not familiar with the channels.

(b) Convenience and Efficiency of Digital Payments Methods

From Figure 4.12, 47% of the respondents believe that they use digital platforms because they are convenient and efficient. Meanwhile 29% of the respondents are neutral about the convenience and efficiency of the digital payment relative to cash payment. They believe that the risk and security in both channels are the same. On the other hand, 24% of the respondents disagree that digital payment is more efficient and secured than the traditional channels.

(c) Sources of Learning about Digital Payment Methods

Figure 4.12 shows that 43% of the respondents learnt about digital payment channels through a third party and they trust and believe in the reliability of digital payment. While 32% of the respondents were neutral, and 25% of them are of the opinion that they did not get their information about digital channels from third party, and they do not trust the reliability of the system.

(d) Evaluating Different Digital Payment Methods

From Figure 4.12 approximately 48% of the respondents compared the cost effectiveness of using digital payment system with traditional payment system and found out that the digital payment channels are more cost effective than the traditional payment system. While 29% of the respondents are neutral and 23% of them disagreed with the cost effectiveness of the digital payment channels.

(e) Influencing Others to Adopt Digital Payment Methods

Figure 4.12 shows that less than 40% of the respondents disseminate information regarding digital payments to others, 33% are neutral about influencing or convincing others to use digital system, and 16% disagree on influencing others to use digital payment platforms. The results show that there is a need for campaigns to the masses to disseminate knowledge on digital payment to others.

(f) Understanding the Significance of Digital Payment Systems

Figure 4.12 shows that more than 50% of the respondents understand that proliferation of digital payment platforms contributes positively to the economic development and is more environmentally friendly than the traditional payment system. Meanwhile less than 30% of the respondents were either neutral or disagreed that the digital payment system could contribute to economic development and is environmentally friendly.

(g) Digital Payment Experience Satisfaction with Digital Payment

According to Figure 4.12, 57% of the respondents expressed their satisfaction regarding their digital payment experience. This means that they were happy with the way digital payments platforms accelerate payment processes. On the other hand, 26% of the respondents were neutral and less than 20% of them were not happy with their experience of digital payments platforms.

(h) Willingness to Continue Using Use Digital Payment System Again

From Figure 4.12 above, 39% of the respondents agreed that they were willing to continue using digital channels in their financial transaction, and 32% of them strongly agreed to continue using digital channels in their financial transaction. This shows a combine figure of 71% of the respondents who are confident frequent users of digital

payment systems in their transactions. Meanwhile less than 30% of the respondents do not believe in using digital channels for their financial transactions. On the other hand, 12% of the respondents were neutral, and less than 20% disagreed with using digital platforms for their financial transactions.

(i) Belief that Prospect of the Digital Payment is the System of the Future

Figure 4.12 shows that 40% of the respondents agree that the prospect of DPS is promising, indicating that it would will receive greater acceptance owing to its efficiency and coverage. Similarly, 22% of the respondents strongly agree about the promising prospect of DPS. Hence, a combined figure of 62% of the respondents believe that the prospect of DPS is promising. Meanwhile less than 38% of the respondents have remained neutral or disagreed about the promising prospect of DPS.

(iii) **Types of Risks Users Face in Using DPS**

The first question in this section of the survey was used to solicit information related to challenges faced by the respondents with regards to risk associated with trusting and verifying the security and stability of the DPS. The responses were presented in Figure 4.13.

Figure 4.13: Risks Users Face in Using DPS

Trusting and Verifying the Security and Stability of Digital Payment Services

Source: Authors

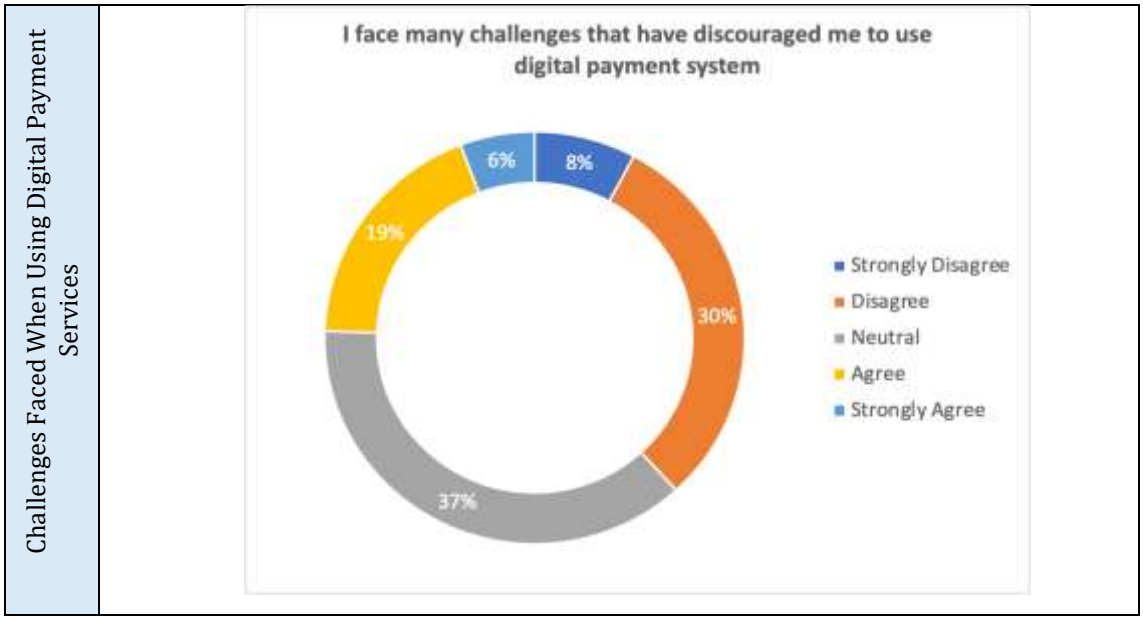
From Figure 4.13 above, 43% of the respondents verify the certificate of digital company before dealing with it, while 32% of the respondents are neutral about verification and 25%

of them disagreed with the concept of verifying certificate of digital company in order to accept the system or its reputation.

(iv) Challenges Users Faced in Using DPS

The second question in this section of the survey was used to solicit information related to challenges faced by the respondents with regards to the use of the DPS. The responses are presented in Figure 4.14.

Figure 4.14: Challenges in Using DPS



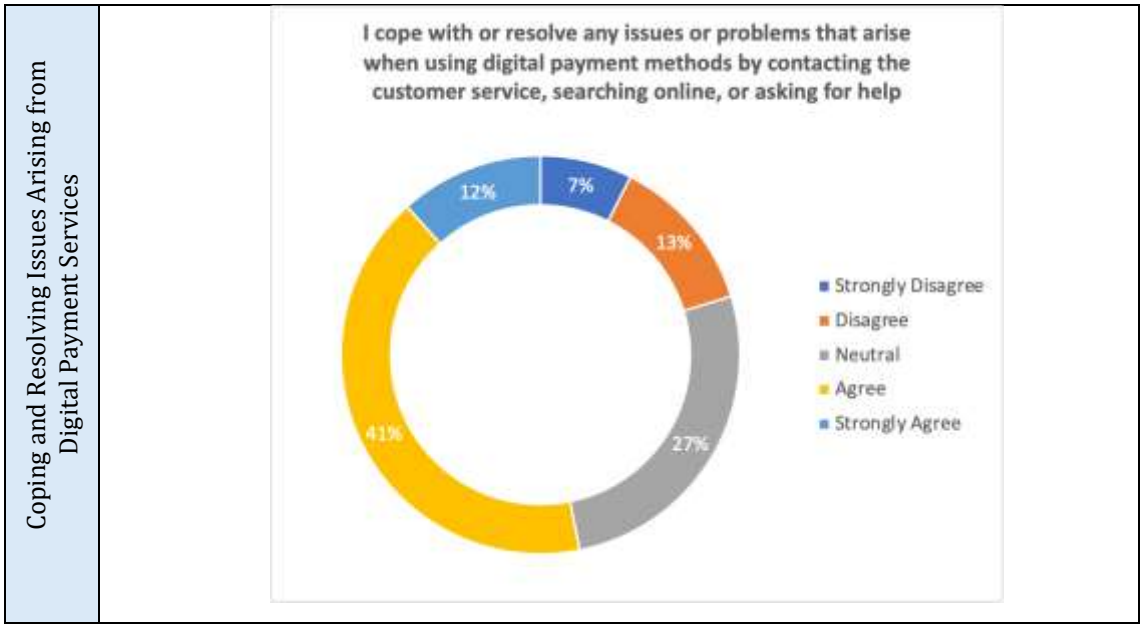
Source: Authors

Figure 4.14 above shows that 25% of the respondents were discouraged from using digital payment channels because of the challenges. This result is in favor of the prospect and efficiency of digital payment channels compared to traditional systems which many people avoided because of their challenges. In contrast, more than 70% of the respondents were not discouraged by the challenges of using DPS or they were able to resolve any challenge that they encountered with ease.

(v) **Tendency towards Resolving Problems in DPS**

The third question in this section of the survey was used to solicit information related to how the respondents were able to cope or solve their problem while using the DPS. The responses are presented in Figure 4.15.

Figure 4.15: User's Tendency towards Resolving Problems



Source: Authors

From Figure 4.15 above, more than 50% of the respondents agreed that they resolved their issues and problems concerning digital payment via customer care, online search or asking someone nearby. Meanwhile 27% of the respondents are neutral and 20% disagreed that they were able to solve any issue regarding digital payment platforms.

4.2.7 Analysis of the Interview Results

There were seventeen (17) structured questions distributed to seven (7) specialists in finance, banking, industries, and financial industry regulators in Türkiye. The responses were analyzed and presented in the following discussions that support the questionnaire survey's conclusions on the advancement of the digital payment system in the chosen OIC member nations particularly Türkiye. The interview questions focused on the following main themes: (i) the significance of the DPS, (ii) the technology used in the DPS, (iii) the

level of satisfaction, (iv) the effectiveness and impact of the DPS, (v) the challenges facing the DPS, (vi) the prospects of the DPS, and (vii) suggestions to enhance the DPS.

(i) **Significance of the DPS**

This theme comprises responses to the following two questions: Q1: How important is the digitalization of payment systems in Türkiye? Q2: Why are there needs for digitalization in the payment systems, and what are those needs in your case? The following six sub-theme were identified from the responses provided by the experts on the extent of the significance of DPS, namely 1) instant financial transactions, 2) speed and efficiency, 3) financial inclusion, 4) cost-effectiveness, 5) trade promotion, and 6) enhance security enhancement.

The majority of experts acknowledge that digitalization of payment systems holds great importance today. It enables instant financial transactions, offering speed, efficiency and enhances security through encryption and authentication methods, reducing the risk of fraud. They also opine that some of the digital payment platforms such as mobile payment applications and online banking provide easy access to financial dealings from anywhere in the world. The digital payment systems offer significant advancements over traditional payment methods and have advantages of cost-effectiveness, easy tracking system, e-commerce, and global access. Three of the experts are of the view that DPS improve financial inclusion by providing access to financial services for those without formal banking affiliations; and as a result, they argue that digitalization of payment systems offers significant advantages for individuals and the economy, making it highly important in today's world businesses. Moreover, they opined that beside , financial inclusion and economic growth, DPS increases security and prevents fraud using as a user-friendly system that was significantly helps to save time in financial transaction.

Two experts see the digitization of payments as a mechanism to promote trade and accelerate globalization, which further enables healthier payments between the parties. They added that, as mentioned above, the system helps to modernize the financial system and business models and became more important during and after the COVID-19 pandemic. Four of the experts also expressed their opinion on security. The enhanced security measures, such as encryption and two-factor authentication. They said added that digital payments provide more convenience, allowing transactions to be made anytime and

anywhere through mobile applications and online banking. Additionally, they said enhanced security measures lower costs associated with handling and processing physical money. Meanwhile three experts opined that developments in financial technologies make it necessary to digitalize payment systems that support financial innovations and inclusion, increasing reliability and efficiency because digitalization brings creates new places and platforms where the trade occurs. They added that new digital payment methods and technologies are needed for people to pay digitally, manage their several accounts on one platform, and withdraw cash easily.

(ii) **Technology Used in the DPS**

The experts Respondents stated that in Türkiye, digital payments are primarily facilitated through several modern technologies. Bank cards, including credit and debit cards, are widely used for both online and off-line transactions. Additionally, mobile and internet banking services provided by Turkish banks enable consumers to make transfers and pay bills conveniently from their devices. Consequently, contactless payments, leveraging NFC technology, have gained popularity for their ease of use, allowing a quick tap of a card or smartphone over a payment terminal to make transaction. In addition, they said, e-wallets and specialized payment applications such as ICC, QR code payments, e-wallets and other electronic payment channels offer flexible and user-friendly options for managing and spending funds digitally.

These technologies collectively enhance the convenience and accessibility of digital payments across the country carrying out through internet-based mobile and API applications through banking and other financial institutions. It was worth noting that, previously the most used payment systems were banks, ATMs, and Unstructured Supplementary Service Data (USSD) using mobile phones without internet access. However, with the increase in digitalization and internet usage, various methods as mentioned above evolved. When asked also, to what extent have these technologies affected the adoption of digital payments in Türkiye? The experts stated that, in Türkiye, the adoption of digital payment technologies has been significantly influenced by the integration of various banking channels such as mobile and internet banking, contactless payments, and e-wallets. These technologies have made financial transactions quicker, safer, and more convenient,

encouraging a shift from traditional cash-based systems to digital platforms. As a result, a growing number of individuals and businesses now prefer digital payments for their efficiency and ease of use. This transition is further supported by the widespread availability of smartphones and internet access, enhancing the penetration and acceptance of digital payment methods across the country. In essence this aided the government in promoting financial inclusion, with many unbanked population seamlessly joining digital transaction services.

Notwithstanding, what further financial inclusion and broader use of DPS was not only banking industry, other efficient applications and FinTech firms also brough new payment platforms. Overall, these innovations have affected the entire financial system and business sector, including, as mentioned above, trade and logistic facilities. For example, in the participation banking sector, new digital participation banking have been established. The young and dynamic population causes these systems to be constantly updated and widespread.

Some of the experts opined that the main reason for the widespread adoption of these systems is because it allowed the financial transactions to be carried out quickly, easily, and securely. Regulations by supervisory authorities like BRSA and the CBRT have led to an increase in FinTech companies. According to some of the respondents, the implementation of digital payment systems in Türkiye differs from other countries in several keyways. First, Türkiye's financial regulations are designed to encourage digital innovation. Government and other regulatory bodies have established frameworks to facilitate the growth of digital payments, including efforts to develop a CBDC, DTL. Türkiye as mentioned above, boasts a high penetration rate of smartphones and internet usage, which has accelerated the adoption of mobile payments and banking applications as primary methods for financial transactions. Other experts attributed the background sources that enhanced participation to the Electronic Government (e-Government) application and the implementation of digital identity verification systems have led to the rapid growth of e-commerce and inclusion as well.

Additionally, as stated above, QR code payments and NFC-based contactless payments have been adopted more rapidly in Türkiye than in many other countries, a trend that was

accelerated by the pandemic as businesses and consumers sought safer, contactless transaction methods. Turkish digital payment systems are highly integrated with the e-commerce sector and other private DPS that were offering seamless payment options—a more extensive integration than in some regions where e-commerce and digital payments may still be evolving separately. These platforms, not only enhance inclusion for non-banked citizens, they provide a range of services, from mobile wallet functions to seamless checkout systems for online merchants, reflecting a robust local FinTech ecosystem that supports and drives the adoption of digital payments. Supported by a young and tech-savvy population, there has been an indication of strong cultural shift towards digital payment methods in Türkiye. This demographic is more open to adopting new technologies, which has facilitated widespread acceptance and use of the methods. These features make Türkiye's digital payment landscape unique and indicate a broader trend of digital transformation in the country's financial sector, hence economic growth.

(iii) **Level of Satisfaction**

On customer satisfaction with the digital payment services in Türkiye, the experts showed a high level of satisfaction with the availability, security, safety, and convenience of digital payment services. Digital payments have become widespread, catering to a broad user based, and transactions are conducted quickly and smoothly though user-friendly interfaces. They signify consumer trust in digital payment services in Türkiye. When using them, there were advanced security measures in place. In terms of convenience, ease of use, and quicker transactions.

However, some experts highlighted concerns about the rising cases of password theft and system breaches. Although the security of digital payment services in Türkiye is high, there are still users who do not trust digital payment systems. Regulatory institutions were implementing strict audits and standards to ensure the security of payment systems. Banks and digital payment platforms have advanced security measures like identity verification and biometric verification. However, there should be expansions in improving internet infrastructure and increasing digital payment access in rural areas to cater for the most informal economy, unbanked people and businesses who were live in these areas.

(iv) Effectiveness and Impact of the DPS

The areas where Türkiye's digital payment systems excel compared to other countries include in the area of private sector participation in in development of mobile payment applications, contactless payment technology, QR code payment applications, and security standards enhancements software that allows 24/7 instant money transfers. Additionally, Türkiye uses advanced encryption and security measures to protect users' data in digital payment systems.

Some of the experts highlighted key implementations that differentiate digital payments in Türkiye from other countries, including ICC and the FAST system. These systems enable instant money transfers and provide users with high security standards, delivering a unique experience. Other areas where digital payment systems in Türkiye excel compared to other countries include mobile payment applications, contactless payment technology, QR code payment, and security standards. The FAST system, launched by the Central Bank of Türkiye in 2021, allows for instant money transfers 24/7. Mobile payment applications offered by various banks and FinTech companies in Türkiye are widely used. Also, contactless payment applications with credit and bank cards are widely and quickly adopted. Depositing, withdrawing, and transferring money out of the banking premises provide great convenience for customers. Thus, we can say that banks and FinTech companies in Türkiye use advanced encryption and security measures to protect user data in digital payment systems.

Furthermore, the experts were asked to identify their understanding of the key parties involved in a digital payment transformation. Sone of them opined that, digital transformation refers to the facilitation of how institutions, businesses, and individuals work and provide services using digital technologies. Its key components and parties involved infrastructure, regulatory bodies, financial service providers, businesses, and end users. They believe that coordination among these components and parties ensures the successful implementation of digital transformation process. Others viewed security, speed, and efficiency as essential components, while the parties involved were financial institutions and customers. Others also added innovation and adoption; public entities responsible for payments; banks; FinTech firms; intelligence; machine learning; the

Internet of Things (IoT); and cybersecurity as the components, while parties involved are payment system providers.

Other experts perceived the impact of digital payment systems on the economy, society, and environment of Türkiye positively. They argued that the system reduces informality in the economy, and as mentioned above, it increases financial inclusion in and also enhances the green economy by decreasing paper consumption, contributing positively to environmental sustainability. It further provides an opportunity for the integration of the Turkish economy domestically and into the global markets. The system spreads technological transformation to the social base and supports people's financial literacy. Others opined that as long as the digital economy increases efficiency in resource allocation, it enhances the economy and society. The economy becomes easier to operate and more secure; the problem of unregistered transactions is eliminated; trust in the financial system increases; ease of payment stimulates spending; savings may decrease depending on the situation; and paperless transaction promoted.

Thus, assessment on the level of innovation and competition in the digital payment market in Türkiye was viewed to be very high and believe that new payment solutions and technologies are continuously being developed, contributing to increased competition and improved service quality, while other section of respondents sees its progress as moderate and expected it to be high in the medium term. The adoption of new technologies, QR code payments, contactless payment technology, and the spread of blockchain technology help increase security. Local and foreign banks in Türkiye are in intense competition to offer digital payment solutions. While foreign banks transfer technology from abroad, local banks continuously invest in new technologies to provide better services to their customers. International digital payment platforms help increase competition in the Turkish market.

When questionnaire asked experts to rate the quality and effectiveness of the policies and regulations governing digital payments in Türkiye, they differed, some of them rated the quality and effectiveness of the policies and regulations governing digital payment systems in Türkiye as high because according to them the regulations are well-structured to ensure security and protect user rights and are continuously updated. This is to say that a score between 60-70% was given.

These policies and regulations related to digital payments in Türkiye were continuously developed and updated to ensure safe and efficient operation of the digital economy. While BRSA ensures the security and efficiency of the financial system, the Central Bank plays a critical role in the regulation and supervision. The Consumer Protection Law also serves an important function in protecting individuals' rights. The regulations consider innovative solutions, technology adaptation, creating financial awareness, and compliance with international standards.

(v) **Challenges Facing the DPS**

The experts had diverse views about the challenges of DPS. Four of the experts have highlighted that among the challenges of transforming digital payments in Türkiye are the aging Turkish population and low levels of financial literacy. They have also noted the lack of adequate infrastructure investments to mitigate cybersecurity risks. Moreover, they said the timeframe for the development of legal regulations, the different levels of technological capacity and financial knowledge of user parties, and some users' distrust of the system were all part of the challenges. Thus, they have suggested having more players to prevent concentration in the market, although this requires huge financial investment.

Two experts opine that the challenges encountered during the transition to digital payments in Türkiye can be categorized into technological, cultural, economic, and regulatory. They said the inadequate internet and mobile network infrastructure in rural areas restricts access to digital payment systems. In addition, they say the establishment, operation, and maintenance of digital payment infrastructure pose high costs, especially for small businesses, which presents a significant economic challenge. They have also expressed concern about tax regulations related to digital payments which complicate businesses' use of these systems. Hence, they added, lack of clarity, transparency, and constant changes in legal and tax regulations related to digital payment systems can be confusing for investors and users.

Three of the experts opined that challenges resulting from the transformation to digital payments in Türkiye include digital inequality, data privacy concerns, cybersecurity risks, technological adaptation, and the continued reliance on traditional payment methods. Furthermore, one of them stated, “Payment systems increase legal liabilities and financial

burdens for the informal sector. It discourages these groups from using the system. It involves some risks regarding the protection of personal data. Digital transformation may also push individuals with low financial literacy out of the economy. The vulnerable ones, like the elderly or young people, may struggle to make payments in the long run".

Accordingly, most of the experts stresses the are of the view that overcoming of the above challenges to would require digital literacy education, infrastructure investments, and enhanced regulations of data security. Additionally, they said solutions tailored to the needs of different user groups should be developed. That the informal economy can be reduced with a fair tax system and mandating legal regulations on the use of DPS. Furthermore, one of them opined that "Legal legislation can be developed for the protection of personal data. Service providers need to develop technological innovations and security systems. Users' financial literacy should be increased, and it should include the risks in the digital system. He further argued that cash and digital payments should exist together for people who cannot use or do not prefer to use digital payments Building consumer trust and strengthening convenient regulatory frameworks are also some of the suggestions they provided.

(vi) **Prospects of the DPS**

Beside the challenges highlighted, the prospects of the digital payments in Türkiye look promising. With a large user based, technological innovations, and supportive government policies, the adoption rate of digital payments is expected to increase. There has been significant progress in transitioning to digital payments. The process was has been progressing rapidly when we considering the strong banking sectors and the development of the market in recent years. FinTech innovation is increasing, and regulatory bodies have been taking were enhancing the proactive measures.

The experts were asked about their future anticipation of digital payment systems in Türkiye and globally. Most of them believe that the future would become even more widespread and supportive of innovative FinTech solutions. Technologies like blockchain and artificial intelligence will lead to significant advancements in this field. Thus, digital payment systems were expected to have an increasing user base both in Türkiye and around the world. They also expect that the use and adoption of digital payments would increase

strongly in the future. They said with the help of digital transformation and increasing investment in the field, innovative solutions will enforce digital payment systems to prosper.

Furthermore, from the global perspective, the experts expected that blockchain technology would be developed further, and AI and machine learning would play a key role. Hence, they opine that introduction and the adoption of digital currencies will increase, transactions will be conducted using smart contracts, and artificial intelligence will be all inclusive.

(vii) **Suggestions to Enhance the DPS**

In summary and based on the general views of the experts, the relevant stakeholders that include policy makers, regulators, financiers, and end users in Türkiye are expected to increase digital literacy, continuously improve security standards, and continue to develop innovative solutions tailored to user needs. The experts have also highlighted that the legislation must support the system, service providers must provide qualified and efficient service to users, reduces financial burdens for users, develop more applications to support trade and financial structure at both domestic and international levels, and train young people who are savvy with artificial intelligence and the digital system.

4.2.8 Specific Needs to Improve the Payment Systems in the Country

The initial steps of digital payment systems in Türkiye were taken in the late 1990s and early 2000s. During this period, banks expanded their ATM and POS networks to outside banking premises, and simultaneously, the use of bank and credit cards became widespread. Furthermore, during this period, EFT and internet banking services significantly evolved and contributed to the spread of digital payments. In the past decade, the rapid proliferation of mobile banking applications and contactless payment technologies has made digital payments a part of everyday life.

Bitcoin was introduced in 2008 as an alternative to both traditional currency and payment systems, as well as for other emerging payment system technologies (Nakamoto, 2008). In Türkiye, according to the Regulation on the Disuse of Crypto Assets in Payments,

crypto assets[18] cannot be used in payments, in the provision of payment services and electronic money issuance. The main motivation behind this regulation is to protect Turkish payment ecosystem from potential adverse impacts of crypto assets while enabling the potential benefits of the technology used in crypto assets to be had in the payments ecosystem of Türkiye.

In 2019, the CBRT began to examine digital currencies and blockchain technologies with the aim of assessing the feasibility of a CBDC. In 2020, the CBRT officially announced the Digital Turkish Lira project. The first phase of the project focused on establishing the technical and legal infrastructure of the digital Turkish lira. Following this work, as of 2021, the CBRT signed bilateral memoranda of understanding with Aselsan, Havelsan (defense industry companies), and the Scientific and Technological Research Council of Türkiye (TUBITAK) for the research and development project. The inclusion of the defense industry in the project, given its advanced software capabilities, is an added advantage. The CBRT in conjunction with private sector and academic institutions established Digital Turkish Lira Collaboration Platform, initiating cooperation between the sectors. This platform aims to collaborate with various stakeholders for the development and implementation of the DTL. In 2022, the CBRT launched the first phase of pilot applications for the DTL Project. During this phase, the technical infrastructure and user experience of the digital currency were tested.

In the following year, the "Digital Turkish Lira Phase One Evaluation Report" was published. This report provided significant insights for the development of the DTL based on the data and feedback obtained from the pilot applications. In 2024, the CBRT moved into the second phase of the DTL project, initiating larger-scale pilot tests and integration efforts. These efforts were accelerated to establish the legal and regulatory framework, with the aim of integrating the digital Turkish lira into the national payment systems. Additionally, the use of the DTL in cross-border payments is one of the key goals.

The annual programmes include initiation of user education and awareness programs, along with the development of comprehensive educational materials and campaigns to

[18] Defined as "intangible assets that are created virtually using distributed ledger technology or a similar technology and distributed via digital networks, but are not classed as fiat money, deposit money, electronic money, payment instrument, securities and other capital market instruments".

enhance digital financial literacy. During this period, the amended Capital Markets Law, which includes regulations on crypto assets, was published in the official gazette and came into effect. Thus, one of the first legal frameworks for crypto assets in Türkiye was established. This law introduced significant regulations for the crypto asset ecosystem. It standardized processes such as the transfer, storage, and management of crypto assets. Platforms defined as "crypto asset service providers," institutions offering crypto asset custody services, and other relevant service providers are required to obtain permission from the Capital Markets Board (CMB) to operate.

It is apparent from the discussion above that the Türkiye's efforts to develop DPS, among others, is mainly to curb and reduce activities of informal financial and non-financial sectors, such as local businesses and money lenders.

4.2.9 Case Studies: Lessons Learnt and Knowledge Transfer among OIC Member Countries

Türkiye is a G20 member country with a population exceeding 80 million, a GDP surpassing 1 trillion dollars, and has advanced financial and non-financial digital integration. It has made significant strides in digital payment systems, with a wide range of options available including credit cards, debit cards, smartphone payments, QR payments, and even biometric-based payments channels. The number of credit and debit cards in circulation, as indicated in a table in the previous sub-section was more than 300 million, surpassing three times of Türkiye's total population, underlining the widespread adoption of cashless transactions. Nearly every business is equipped with POS machines, which is also over two million in operation, demonstrating the ubiquity of electronic payment system and its acceptance across the country.

One of the main motivations of the country in developing DPS is to combat the informal economy. It is estimated in several studies that the informal Turkish economic sector is more than 10% of the total economy, which is approximately one hundred billion United state dollars ($100.0 b), larger than the total economy of several countries in the world. Integrating the informal sector into the formal sector could enhance tax base and tax performance which will translate into efficient performance of Turkish economy and in a broader sense into real value of economic performance in the country. The informal

economy vacegerate not only Türkiye, but all the OIC countries. Thus, there was need for the extensive colloborateion within the member countries.

The development of digital currency by the central bank demonstrate a strong commitment to modernizing the financial infrastructure. The implementation of the CBDC is slated for the coming years in alignment with the nation's five-year development plan (Presidency of Turkish Republic, 2019). With the introduction of digital banks, digital Islamic banks, and digital insurance companies, Türkiye appears to be embracing the digital transformation of its financial sector. In the last decade, more than 50 electronic financial companies were established within the Turkish economy after the Law on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions were introduced in 2013. Moreover, national card payment system TROY has emerged as a formidable competitor to Visa and Mastercard, boosting millions of cardholders and customers both domestically and internationally since 2015. Türkiye remained is an exemplary case study, showcasing successful investments in digital systems. Overall, Türkiye's emphasis on digitalization has contributed to the stability and resilience of its financial system which has withstand the tests of many shocks.

- The enactment and legalization of crypto asset service providers will contribute to safer, more transparent, and orderly functioning of Türkiye's crypto asset market. Additionally, it will enhance the market's growth and maturity by increasing competitiveness in the field of digital economy and financial technologies. Furthermore, this regulations process is seen as a valuable know-how gain for the DTL project. Considering all these recent strategies and perspectives, Türkiye is on the path to fully digitalize its payment systems. Yet, like any country even with an advanced digital payment infrastructure, Turkey faces challenges in further enhancing its experience: Foremost, as the development process of the CBDC is still in its early stages, significant unresolved issues are likely to arise concerning the methods of issuance, usage patterns, data flow, and privacy of this currency.
- The lack of international or OIC regulatory frameworks in this area and the inadequacy of institutional structures that ensure control and coordination make this issue dependent on and fragmented by individual efforts of countries. Therefore, there is a growing need for global coordination.

- Lack of adequate infrastructure investments to mitigate cybersecurity risk, including the timeframe needed for development of legal regulations, the different levels of technological capacity and financial knowledge of user parties.
- Age Demographics: Transforming from traditional to DPS in Türkiye given the aging Turkish population and low levels of digital literacy hinder expected progress in DPS utilization.
- Customers have highlighted significant security concerns while using DPS. These include but is not limited to identity and data theft or loss .
- Inadequate internet and mobile network infrastructure: In rural areas, infrastructure restricts access to digital payment systems.
- High Costs: Establishment, operation, and maintenance of digital payment infrastructure pose high costs especially for small businesses.
- Acceptability: The unacceptability of the DPS in Türkiye is quite significant as more than 20% of the people surveyed did not trust the use of DPS. This indicates a challenge that may hinder the reach of the system. Although the informal economy has high reach in the rural area, the acceptability of DPS in the rural area is still very poor.
- Challenge of Customer Use: As in figure 4.8, some people were not able to resolve the challenges they face while using DPS to the extent that they are discouraged from using the system.
- Digital inequality: Vulnerable users, like the elderly or young people, may struggle to make payments in the long run. Some of them reject technological adaptation, and continue relying on traditional payment methods.
- Financial literacy: Digital transformation may also push individuals with low financial literacy out of the economy. This was viewed by some section of the experts during the interview.
- Complexity of Taxation: Tax regulations related to digital payments complicate businesses' using these systems; The lack of clarity, transparency, and constant changes in legal and tax regulations related to digital payment systems can be confusing for investors and users.

- Data privacy: As identified by the expert in response to the interviews, Some loopholes and deficiencies that may be encountered regarding data privacy may be exploited by malicious actors in an undesirable manner.

4.2.10 Country-Specific Policy Recommendations

Despite the challenges discussed above, Türkiye continues to modernize its financial system by taking significant steps in digital currency technologies. The DTL project is an important initiative that will enable Türkiye to assume a leading role in the digital currency ecosystem. These efforts aim to extend financial services to a broader audience, increase the speed and efficiency of payment systems, and facilitate international trade transactions. Given the challenges and problems itemized above, the following set of country specific policy recommendations are provided:

- **Digital literacy education**: Financial literacy education should be emphasize not only by the government but by financial institutions and any other concerned non-governmental organization, and it should go hand in hand with the promotion of DPS.
- **Infrastructure investments**: Government (regulatory authority) and Service providers needed to enhance innovations in the security of the DFS and financial sector in general.. The subsidy for infrastructural development should be introduced and implemented with the provision of mobile network and internet service. The subsidy legislation should mandates minimum coverage in the rural area.
- **Regulatory enhancement**: Informal economy can be reduced with a more effective tax system and mandatory legal regulations and building consumer trust and strengthening convenientthrough strengthening consumer protection institutions. Legal legislation could be developed for the protection of personal data.
- **Constant Data security upgrade**: The relevant authority should invest in constant research and development so as to make sure that information with regard to the people subscribing to the digital system is highly protected.

4.3 MOROCCO

4.3.1 Introduction

Morocco, located in North Africa, is an Arab country with a population exceeding 37 million inhabitants and a GDP of USD 149 billion. It is classified as a lower-middle-income country. Morocco boasts as one of the youngest populations globally, with 88.9% residing in urban areas (Haut Commissariat au Plan, 2023, 2024).

According to the Moroccan High Commission for Planning, the poverty rate in Morocco, based on the national poverty line, reached 3.9% in 2022, with multidimensional poverty at 5.7%, marking a decline from 9.1% in 2014 (Haut Commissariat au Plan, 2024).

The increased receptiveness to foreign direct investments and trade facilitated the acceleration of Morocco's export base diversification as the nation integrated into complex global value chains such as electronics, automotive, aerospace, etc… (Cardarelli & Koranchelian, 2023a).

The country also demonstrates a significant digital orientation, as evidenced by the data from early 2023. The country had 33.18 million internet users, leading to an internet penetration rate of 88.1 percent (DataReportal, 2023). Additionally, 21.30 million people, or 56.6 percent of the population, were active on social media (DataReportal, 2023). Moreover, there were 50.19 million active cellular mobile connections, which is equivalent to 133.3 percent of the total population (DataReportal, 2023).

According to the Global Findex 2021 report, 20.34% of individuals aged 15 and above made a digital payment, 30.3% either made or received a digital payment, 21.43% received digital payments, and 31.79% own a debit or credit card (World Bank, 2021).

The e-commerce market in Morocco is expected to witness a steady growth in the number of users from 2024 to 2029, with a total increase of 2.5 million users (+36.28 percent). Following nine consecutive years of growth, it is projected that the indicator will reach a new peak of 9.35 million users in 2029. It is worth noting that the number of users in the e-commerce market has been consistently increasing in recent years. The e-commerce market in Morocco is expected to witness a continuous rise in revenue within the same analysed period (2024-2029), with a cumulative increase of 1.1 billion U.S. dollars

(+63.05 percent) (Statista, 2022b). After seven years of consecutive growth, it is estimated that the market will reach a new milestone of 2.8 billion U.S. dollars in 2029 (Statista, 2022b).

In Morocco, cash was the primary method for utility payments in 2021, with 84% of individuals aged 15 and above paying their utility bills exclusively in cash, and 38% making all utility payments in cash (World Bank, 2021).

Despite Morocco's progress in digital advancements, the country continues to face challenges in financial inclusion, with only 45% of the population holding bank accounts (Bank Al-Maghrib, 2023c) and a ranking of 70th in the Global Innovation Index 2023 (World Intellectual Property Organization, 2023).

To foster the growth of Fintech in Morocco, additional investments in digitalization are imperative. It is crucial to have accessible and cost-effective high-speed internet, a skilled labour force proficient in digital technologies, and digital platforms that facilitate seamless connections between businesses and consumers. Furthermore, addressing the economic hurdle of establishing infrastructure for rural coverage is essential to bridge the digital divide between rural and urban areas. By prioritizing these factors, Morocco can pave the way for the advancement of its fintech sector. (Ocampos, 2023a)

The National Strategy for Financial Inclusion in Morocco, which was introduced in 2019 under the leadership of the Ministry of Economy and Finance and Bank Al-Maghrib, aims to build upon previous initiatives and enhance access and usage of financial services for SMEs as well as financially excluded and underserved populations. This strategy focuses on various key elements such as the expansion of mobile payment services, the growth of micro-finance by developing a new regulatory framework allowing higher credit limits and relaxed interest rate restrictions, and the promotion of financial access points accessibility, particularly through the development of new models of distribution adapted to the characteristics of rural areas. Additionally, the strategy emphasizes the adaptation of banking and insurance products to meet the needs of underserved populations, including individuals with special needs, youth, women, and rural inhabitants along with the design of tailored financing mechanisms to support SMEs and start-ups financing (Ocampos, 2023b). Furthermore, the strategy also includes efforts to accelerate digital payment

systems, with the Bank Al-Maghrib, Central Bank of Morocco (BAM), committing to support innovative payment methods like mobile wallets and mobile payments through regulatory adjustments and effective communication strategies, as well as initiatives to promote financial literacy (Ocampos, 2023b).

4.3.2 Legal and Regulatory Framework on Payment Systems

The Moroccan government has established a legal framework to facilitate digitalization, encompassing laws on cybersecurity, data privacy, and the simplification of administrative processes. These laws are crucial for building trust and encouraging the use of digital tools by businesses and citizens.

BAM plays a pivotal role in creating and implementing the legal and regulatory framework governing the country's payment system. Notably, Law No. 15/95, part of the commercial code introduced by Dahir (Royal Decree) No. 1-96-83 on August 1, 1996, outlines the legal provisions related to sight accounts, fund deposits, bank transfers, and means of payment (Bank Al-Maghrib, 2024a). Additionally, Law No. 103-12, which pertains to credit institutions and similar establishments and was enacted through Dahir No. 1-14-193, grants credit institutions the authority to collect deposits and offer various payment methods to their customers. This legislation also introduced a new classification of non-bank establishments known as "payment institutions," which are authorized to maintain payment accounts and provide associated payment services (Bank Al-Maghrib, 2024a). This legal framework is further enhanced by several Bank Al-Maghrib Circulars and Decisions governing specific aspects of payment systems and methods, such as: Circular No. 5/G/97 of 18 September 1997 on the Certificate of Refusal to Pay a Check; Circular No. 6/G/97 of 22 September 1997 on the centralization and dissemination of information on payment incidents and bans on issuing checks; Circular No. 14/G/06 of July 20, 2006, relating to the implementation of the Moroccan Gross Settlements System and attached regulation; Regulatory Decision No. 392/W/2018 concerning domestic mobile payment known as “m-wallet”. (Bank Al-Maghrib, 2024a)

In 2022, Bank Al-Maghrib continued its regulatory work to transpose the Basel Committee standards. This included finalizing projects aimed at introducing the one-year transformation ratio called "NSFR," set to take effect in 2023. The Bank also contributed to

finalizing the law on secured obligations and began preparing its implementing texts (Bank Al-Maghrib, 2023c). On one hand, to support the digitization of banking services and the use of mobile payments, Bank Al-Maghrib issued a directive governing the use of cloud computing by banks and adapted the regulatory requirements for enrolling accepting merchants by payment institutions. On the other hand, the regulatory framework for developing crowdfunding platforms has been completed, paving the way for new disintermediated financing services for very small, small, and medium-sized enterprises, micro-enterprises, and startups. The Bank also finalized the regulatory texts implementing the new microfinance law, setting the requirements for the activities of microfinance institutions authorized to collect deposits (Bank Al-Maghrib, 2023c). Furthermore, in the field of participatory finance, Bank Al-Maghrib supported banks in the labeling procedures by the Higher Council of Ulema for the contractual documentation of products and contributed to issuing regulatory texts governing the technical characteristics of certificates such as Sukuk Murabaha, Mudaraba, Wakala, Musharaka, Salam, and Istisna'a (Bank Al-Maghrib, 2023c).

In terms of consumer protection in financial services, several initiatives were undertaken. The Bank issued a directive related to informing credit applicants, a directive on managing corruption risks, and a recommendation encouraging banks to promote gender equality and the economic empowerment of women. On a conventional level, the Bank advocated for adopting an interbank code of ethics for pre-judicial debt collection. Additionally, Bank Al-Maghrib amended the framework governing payment institutions and services to facilitate operations, particularly in enrolling payment agents and accepting merchants for mobile payments, thereby expanding their proximity networks (Bank Al-Maghrib, 2022).

Notably, in 2022, Bank Al-Maghrib contributed to the crypto-asset regulation project alongside national representatives from the Presidency of the Public Ministry, the Ministry of Economy and Finance, financial sector regulatory authorities, and the Foreign Exchange Office. The project examined the risks and opportunities associated with crypto-assets, international regulatory approaches, and recommendations from international standard-setters. This work is helping to draft a law governing the use of crypto-assets in Morocco, considering financial market integrity, financial stability, user and investor rights, and the

fight against money laundering and terrorism financing. The Work Group continued its efforts in 2023, with technical support from the World Bank, focusing on aligning the draft law with the high-level recommendations of the global Financial Stability Board (FSB) and ensuring compliance with Recommendation No. 15 of the Financial Action Task Force (Bank Al-Maghrib, 2022, 2023c).

Regarding the insurance sector, Bank Al-Maghrib and the Autorité de Contrôle des Assurances et de la Prévoyance Sociale (ACAPS) contributed to amending Law 17-99 on the Insurance Code. This amendment involved expanding the activities of insurance intermediaries to include providing payment services by conferring on them the status of payment agents mandated by a payment institution, and allowing payment institutions to distribute microinsurance products (Bank Al-Maghrib, 2023c).

Finally, in 2023, Bank Al-Maghrib began drafting a prudential framework for payment institutions. This framework aims to define the methods for determining the prudential capital and capital requirements of payment institutions, while also requiring these institutions to implement a system for managing all risks generated by their activities. Moreover, the Bank initiated reforms and amendments to the regulatory framework governing payment accounts and agents to boost the payments ecosystem in Morocco and ensure greater service penetration among the population. These reforms include raising payment account limits, introducing internal transactional limits by payment institutions, revising the business model of payment agents, and removing the ceiling on international fund transfers received via digital channels (Bank Al-Maghrib, 2023b).

4.3.3 The Current Level of Development of Digitalization and Digital Payment Systems

Morocco has been steadily improving its digital infrastructure to optimize various sectors of its economy, aiming to usher the country into a new phase of economic growth and global competitiveness. Key to this progress are strategic initiatives and partnerships that are fostering a robust digital ecosystem, impacting everything from administrative processes to international trade.

Morocco’s digitalization journey began with an early recognition of the internet's transformative potential. The government's commitment to leveraging digital tools for

economic growth has been evident through a series of strategic action plans. Starting in the 1990s with the e-Government project to modernize the public sector, these efforts continued with various digital strategies, such as the five-year plan (1999-2003), the e-Morocco 2010 strategy (2005-2010), Digital Morocco (2009-2013), Digital Morocco 2020, and Horizon 2025. This progression led to the establishment of the Strategic Committee for Information Systems Security and the General Directorate for Security of Information Systems in 2011, and the creation of ADD in 2017 to execute digital strategies. Morocco joined the Digital Cooperation Organization in April 2022 as its ninth member state. The most recent initiative, launched in 2024 by the International Chamber of Commerce Morocco, is DigiTradeMorocco, a task force dedicated to promoting ongoing efforts to digitalize trade (Digital Cooperation Organization, 2024; Elhazziti et al., 2023; Trade Finance Global, 2024).

These strategic plans and initiatives have positioned Morocco as a leader in the MENA region, ranking fourth by the European Center for Digital Competitiveness in 2020 (European Center for Digital Competitiveness, 2020). In the same year, the World Bank approved $500 million to support Morocco's financial and digital inclusion reforms. By 2022, Morocco had digitized 2,700 administrative procedures. Additionally, Oracle announced the opening of a new R&D facility in the country, and the General Directorate of National Security (DGSN) won the "African Excellence E-Government Award" for its successful new ID card program (Digital Cooperation Organization, 2024).

These programs are designed to gradually create a well-structured digital ecosystem that aligns with the nation's economic goals. The Moroccan ADD has been pivotal in these efforts, driving digital transformation across various sectors. The agency has emphasized the simplification of administrative procedures and the digitization of over 600 services for businesses, citizens, and inter-governmental interactions. The development of a national interoperability platform utilizing API technology has further enhanced the exchange of information between different government entities (Marzak, 2024).

In 2019, the ADD was tasked with providing the government with recommendations for advancing digital technology, which led to the formulation of strategic guidelines for 2025. These guidelines aim to achieve the following objectives: i) A digital administration that

serves citizens and businesses, with the goal of reaching a citizen satisfaction rate of over 85%; ii) A competitive economy driven by digital technology and the development of technological sectors, positioning Morocco as a leading Digital & Technological Hub in Africa; iii) An inclusive society through digital technology, aimed at improving the quality of life for citizens (Note d'Orientations Générales Pour Du Digital Au Maroc à Horizon 2025, 2020).

Additionally, the government has established a dedicated Ministry for Digital Transformation, which works closely with various public and private entities, including the Ministry of Finance, the central bank, financial institutions, and technology providers, to propel this transformation forward. The financial sector, especially in the area of digital payments, has made notable progress over the past five years. To further bolster this advancement, the central bank has also set up a Digitalization and Digital Transformation Division to oversee and manage the digital payment transformation process in the financial sector. (Bank Al-Maghrib, 2024b).

Since its first strategic plan in 2003, Bank Al-Maghrib has set itself the objective of developing payments, in particular electronic payments, in view of the needs and obstacles facing the Moroccan market, notably in terms of (i) reducing cash, (ii) developing financial inclusion, (iii) accelerating the adoption of electronic payments and their acceptance and (iv) encouraging the emergence of new financial innovations, capable of meeting the specific needs of the population. As a result, Bank Al-Maghrib has constantly stepped up its efforts to secure, promote and develop the use of electronic means of payment. Numerous legal and regulatory reforms have been introduced to revitalize and better structure the payments market by (i) introducing new players (payment institutions), (ii) strengthening the resilience of its payment infrastructures, (iii) introducing interoperability, and (iv) developing new payment methods such as mobile payments and instant transfers.

In addition, in its latest strategic plan for 2019-2023, Bank Al Maghrib has defined strategic objectives dedicated to the development of payments, including support for financial innovations benefiting the banking sector, the credibility of payment methods and the implementation of a payments development policy at sectoral and national level.

Furthermore, Bank-Al-Maghrib attaches major importance to promoting the Fintech ecosystem in the Moroccan market. The Bank has thus strengthened its position as a catalyst for innovation by creating, in addition to a digital transformation department, a one-stop shop for fintech, in line with the recommendations of the Bali Fintech Agenda. As a focal point within the Bank, the One Stop Shop's main role is to support, advise and guide innovative companies, whether regulated or not, on legal and regulatory issues. This one-stop shop is designed to be accessible, enabling an open dialogue between the regulator and all fintech structures wishing to offer innovative services to the Moroccan or foreign financial markets.

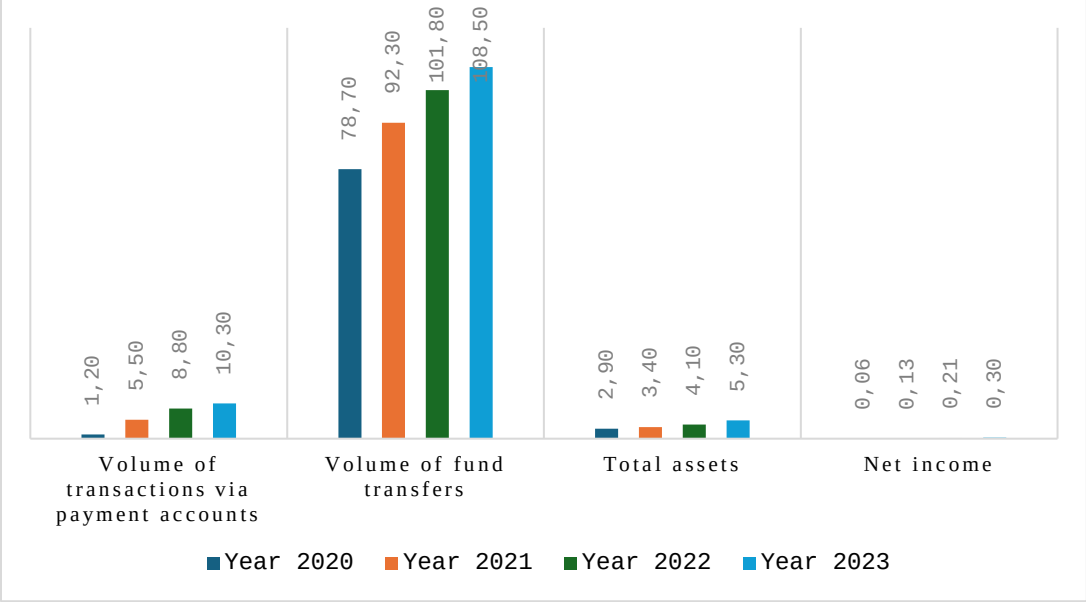
Bank Al Maghrib is cognizant of the importance of national, regional and international cooperation in creating an environment conducive to the development of fintech. Since the launch of its digital strategy in 2019, Bank Al Maghrib has been working to participate in the development of the Fintech ecosystem in collaboration with key stakeholders (public institutions, private sector players, academics, etc.).

The structure of Morocco's payment systems comprises five primary components: i) the Moroccan Gross Settlement System (SRBM), ii) Maroclear, the Central Securities Depositary, iii) the Moroccan Interbank Remote Clearing (SIMT), iv) the Casablanca Stock Exchange, and v) E-Money Switches. The SRBM, established in 2006 and managed by Bank Al Maghrib, handles large-value interbank transactions. Maroclear, created in 1997, manages the settlement and delivery of securities and is a private limited company owned by the Moroccan state, banks, Bank Al Maghrib, insurance companies, the Management and Deposit Fund (CDG), and the Casablanca Stock Exchange. Marocelar is supervised by both Bank al Maghrib and the AMMC (formerly CDVM), and is placed under the authority of the Ministry of Economy and Finance. The SIMT, introduced by Bank Al Maghrib in 2003, handles retail payments, particularly those involving non-card payment methods. The Casablanca Stock Exchange oversees securities clearing, while Card and mobile wallet transactions are managed by a private company called HPS Switch. E-Money switches encompass both electronic payment and mobile transaction switches. The switching process involves routing and handling requests for authorization, clearing electronic transactions, and settling between acquirers and issuers. The electronic switch must ensure both transaction interoperability and secure management (Bank Al-Maghrib, 2024c). The

latest system which was introduced by BAM and came into operation is the instant interbank transfer operational from June 1, 2023 has extended the range of payment methods available to the public and enabled secure real-time settlement for end-users. Furthermore, regulations for merchant payment accounts have been simplified, including the decapping of payment accounts receiving direct aid or social aid reimbursements. The use of digital financial services is encouraged for payment methods, with several measures considered by Bank Al Maghrib, especially in terms of the use of the national trusted third-party system, and the introduction of a global vision to strengthen the security levels. (Bank Al-Maghrib, 2023b)

As of 2023, Morocco's payment system infrastructure includes 26 banks and 16 payment institutions, along with various other credit institutions. The country has a total of 25,125 branches, comprising 2,144 main branches and 22,981 agent branches. In 2023, payment institutions recorded a transaction volume of MAD 10.3 billion, with fund transfers reaching MAD 108.5 billion. Their total assets were valued at MAD 5.3 billion, and their net income was MAD 0.3 billion. Figure 4.16 depicts the activity and profitability of payment institutions from 2020 to 2023 (Bank Al-Maghrib, 2023c).

Figure 4.16: Activity and Profitability Indicators of Payment Institutions



*Amounts are in billions of MAD
Source: Authors' own based on Bank Al Maghrib's Banking Supervision Report (2023)

Financial inclusion has been a key goal for Morocco, underscored by the launch of the National Financial Inclusion Strategy in 2018 by Bank Al-Maghrib and the Ministry of Economy and Finance. This strategy aims to raise financial inclusion to 50% by 2023 and 75% by 2030. Significant progress has been made, with 60% of banking transactions digitized as of 2024 (Trade Finance Global, 2024). By the end of 2023, payment accounts had surged to 10.4 million, a 51% increase from 2022, largely driven by social aid programs. The cap on international fund transfers through digital channels is now MAD 80,000, promoting financial inclusion and digital payment adoption. International transfers via digital channels reached MAD 4.8 billion, 8% of Morocco's total volume. ATMs increased by 1%, totaling 8,242 units, and new bank accounts grew by 7.2% to 36.3 million. By the end of 2023, 54% of residents had an active bank account, with 9.1 million men and 5.9 million women. The number of bankcards rose by 6.3% to 20.2 million, with 88% used for cash withdrawals. Merchant accounts accepting M-Wallet payments grew by 4% to over 51,000, representing 0.5% of the total. Mobile payment transactions increased by 17% to MAD 10.3 billion, mainly from deposits, withdrawals, and fund transfers. EFTPOS terminals grew by 23% in 2023, with a transaction value of MAD 79.2 billion, up from MAD 64.7 billion in 2022. Domestic cards accounted for nearly 87% of these transactions (Bank Al-Maghrib, 2023c).

In February 2022, Bank Al Maghrib signed a partnership agreement with CDG Invest, a subsidiary of the Caisse de Dépôt et de Gestion (CDG), to promote FinTech development in Morocco. This partnership reviewed proposals for FinTechs in financing and money transfer, focusing on digital platforms for salary advances, P2P money transfers, and crowdfunding. Bank Al Maghrib also addressed user authentication for digital financial services through an agreement with DGSN, the National Commission for the Control of Personal Data Protection (CNDP), and the Professional Group of Banks of Morocco (GPBM). This system, developed by the DGSN, allows the banking sector to verify identities for online or branch banking services, enhancing security against fraud, money laundering, and terrorist financing while complying with data protection standards. Additionally, efforts are underway to develop a draft decree for Law No. 43-20 on trust services for electronic transactions (Bank Al-Maghrib, 2022).

Morocco has achieved significant progress in digitalizing its financial services, focusing on AI, crypto-assets, and CBDC initiatives. The "Innovation Lab" at Bank Al-Maghrib has

been experimenting with Blockchain, AI, and Machine Learning technologies to explore digital transformation in the public sector. Established in 2021, a committee has been studying CBDCs and digital assets, particularly their impact on financial inclusion, monetary policy, and consumer protection. The first phase of the National Strategy for Financial Inclusion (SNIF) concluded in 2023, leading to the next phase of strategic preparations (Bank Al-Maghrib, 2023b, 2023c).

Furthermore, Bank Al-Maghrib has implemented various initiatives to enhance financial inclusion and accessibility. These include financial education for young people, empowering rural populations, and consumer protection measures, alongside efforts to improve transparency in financial services pricing. In 2023, the bank introduced a charter to facilitate banking access for individuals with disabilities (Bank Al-Maghrib, 2023b, 2023c).

A significant initiative is the introduction of Open Banking, which allows banks to share customer data with external developers in a secure manner to test innovative services. This approach aims to boost financial inclusion, stimulate competition, and foster the growth of a FinTech ecosystem. In 2023, Bank Al-Maghrib, with the support of the World Bank Group, began developing a framework for Open Banking, initially focusing on banking services before expanding to other financial sectors in collaboration with insurance and capital market regulators (Bank Al-Maghrib, 2023b, 2023c).

In May 2024, Marrakech hosted GITEX Africa, a major global tech forum, where Prime Minister Aziz Akhannouch announced the upcoming "Digital Morocco 2030" strategy. This strategy, developed with input from Boston Consulting Group (BCG), focuses on enhancing Morocco's digital economy, particularly through outsourcing and start-ups. The plan aims to increase outsourcing revenue from MAD 13 billion in 2022 to MAD 42 billion by 2030, creating 300,000 new jobs. It also seeks to expand the start-up ecosystem, aiming for 3,000 certified start-ups by 2030, up from 380 in 2022, supported by increased funding mechanisms that target raising MAD 7 billion by 2030 (Jankari, 2024).

Additionally, the strategy emphasizes human resource development, with goals to train 45,000 digital professionals annually, convert 50,000 young people to digital careers, and attract 6,000 international digital talents each year. Critical enablers include cloud computing and connectivity, with targets to expand data center capacity to 40 MW by 2030

and increase outsourcing usage to 70%. The plan also includes ambitious connectivity goals, such as providing fiber optics to 5 million households and ensuring 4G mobile coverage with speeds of at least 2 Mb/s by 2026 (Jankari, 2024).

Ultimately, "Digital Morocco 2030" outlines a comprehensive vision to transform the country into a competitive digital hub, driving economic growth and improving citizens' quality of life through significant investments in digital infrastructure, innovation, and research (Jankari, 2024).

4.3.4 Payment Systems: Current Trends, Issues, and Challenges

Payment systems in Morocco have seen significant progress and development since the onset of the COVID-19 pandemic. As the pandemic unfolded, citizens increasingly turned to digital payments, which gained widespread popularity. However, several challenges are impeding the full digital payment transformation. Morocco is lagging in QR code payments and faces operational and regulatory hurdles. While the country is in a mature phase with some advanced infrastructure, it still needs to catch up with more developed markets. Some of those challenges were identified by ADD in its General Guidelines for Digitalization in Morocco by 2025 (Note d'Orientations Générales Pour Du Digital Au Maroc à Horizon 2025, 2020) which can be classified into:

Technological Infrastructure: Morocco is aware of the need and has been working towards developing an advanced technological infrastructure. Putting advanced technological infrastructure in place would ensure business continuity and disaster recovery plans. The lack of such infrastructure poses a risk to the resilience and efficiency of digital payment systems (Idaomar et al., n.d.; Mouhssine, 2024).

Skills and Expertise: Morocco faces a shortage of skilled professionals in digital technologies that hampers the maintenance and advancement of digital payment systems. Continuous training for employees is essential to bridge this gap and build the necessary expertise within the workforce. Without a robust pool of skilled professionals, the sustainability of digital payment systems remains in jeopardy (Elhazziti et al., 2023; Mouhssine, 2024).

Regulatory Compliance: particularly in the areas of data protection and cybersecurity, presents another significant challenge. Ensuring that digital payment systems adhere to regulations governing data protection and cybersecurity is crucial for maintaining the integrity of these systems. The growing threat of cyber-attacks further complicates this issue, as protecting sensitive data and preventing breaches is becoming increasingly difficult (Mouhssine, 2024).

Cybersecurity Threats: the increasing frequency and sophistication of cyber-attacks pose a substantial risk to digital payment systems. Protecting these systems from such threats is a major concern (Mouhssine, 2024).

Financial Resources: there is often insufficient funding allocated to initiatives aimed at enhancing digital resilience. The availability of financial resources is crucial for prioritizing and implementing measures that strengthen the robustness of digital payment systems. Without adequate funding, these initiatives may not receive the support they need to be effective (Mouhssine, 2024).

Cultural Barriers: there is often resistance to change, which can hinder the adoption and integration of digital payment systems. Promoting a culture of digital resilience and overcoming this resistance is essential for the successful implementation of these systems. Without a cultural shift, the transition to digital payments may face significant obstacles (El Faiz, 2024; Mouhssine, 2024).

Governance and Coordination: governance and coordination within the digital ecosystem are critical issues. A clear governance model is needed to unite all stakeholders and ensure that their actions are coordinated effectively. Without this, the development and management of digital payment systems can become fragmented and inefficient (Elhazziti et al., 2023; Mouhssine, 2024).

Infrastructure Choices: making strategic infrastructure choices, such as the adoption of cloud technology and the construction of data centers, is crucial for the sustainability and expansion of these systems. These infrastructure decisions will play a key role in determining the future of digital payments in Morocco (Mouhssine, 2024).

These challenges reflect the broader issues Morocco faces in its digital transformation, particularly in the area of digital payments, where ensuring resilience, security, and effective governance are paramount.

4.3.5 Digital Payment Systems and Economic Activities

The impact of digital payments on Morocco's economy is multi-faceted, with substantial contributions to financial inclusion, economic growth, and overall efficiency.

1. Economic Growth and Efficiency

- Increased Efficiency: Digital payment systems streamline transactions, reducing the need for cash handling and the associated costs. This efficiency helps businesses save time and resources, allowing them to focus more on growth and innovation.
- Economic Formalization: The shift towards digital payments brings more transactions into the formal economy. This helps increase the government's tax base, enabling more public investment in infrastructure and services.
- Growth in Financial Services: The adoption of digital payment platforms has driven the expansion of financial services in Morocco, particularly in underserved areas. This expansion has contributed to economic growth by providing more people with access to banking and financial products.

2. Financial Inclusion

- Broadening Access: Digital payments have played a crucial role in enhancing financial inclusion by enabling access to financial services for individuals and businesses that were previously unbanked. This inclusion helps integrate more people into the economic system, fostering overall economic development.
- Government Programs: Government initiatives, such as mobile wallet services, have facilitated the adoption of digital payments. These programs are particularly targeted at low-income populations, furthering the reach of financial services across the country.

3. Innovation and Technological Advancements

- Spurring Innovation: The digital payments ecosystem in Morocco has spurred technological innovation, leading to the development of new financial products and services. For instance, fintech startups are increasingly emerging, offering innovative solutions tailored to the local market.
- Digital Economy Growth: The expansion of digital payment systems is closely tied to the growth of the broader digital economy in Morocco. As more businesses and consumers adopt digital payments, the demand for related technologies and services also increases, driving innovation and investment in the tech sector.

4. Environmental Impact

- Reduction in Cash Usage: The transition from cash to digital payments helps reduce the environmental impact associated with the production and disposal of physical currency. This shift contributes to environmental sustainability efforts in Morocco.

5. Specific Data and Insights

- Penetration of Mobile Payments: Mobile payment services have rapidly expanded, with mobile wallet users growing significantly over the past few years. This increase in mobile payments is a key driver of the broader adoption of digital payment systems in Morocco.
- Increase in Digital Transactions: The volume of digital transactions has seen a steady increase, reflecting the growing acceptance and trust in digital payment methods among the Moroccan population.

These impacts illustrate how digital payments are reshaping Morocco's economy, driving growth, fostering innovation, and contributing to more sustainable practices.

4.3.6 Cross-Border Digital Payment Initiatives and Collaborations

In 2023, Morocco expanded its payment systems by joining the “BUNA” inter-Arab settlement system. Bank Al-Maghrib announced this development in a press release on October 20, 2023. The bank’s participation in the “BUNA” system enhances regional integration among Arab economies by promoting the use of local currencies for cross-border payment clearing and settlement (Bank Al-Maghrib, 2023a).

Launched in February 2020 by the Arab Monetary Fund, the "BUNA" system allows Arab banks to process payments in various eligible local and international currencies, including the Saudi Riyal, Emirati Dirham, Egyptian Pound, Jordanian Dinar, US Dollar, and Euro (Bank Al-Maghrib, 2023a; BUNA, 2024).

4.3.7 Analysis of Questionnaire and Survey Results

A total of a thousand of questionnaires were distributed through social media platforms in Morocco, 286 questionnaires were collected to solicit views of end users on digital payment systems in the country. The questionnaire comprises the following main sections: (i) Background information, (ii) Motivation of users for the DPS, (iii) Types of risks users faced in using the DPS, (iv) Challenges users faced in using the DPS, and (v) Resolving problems of the DPS.

(i) Background Information

The questions in this section of the survey were used to solicit background information of the respondents' profiles by gender, age, marital status, education level, occupation, income, expenditure, savings, and familiarity with digital payment [level of awareness, common types of payments used, and uses of the payment system]. The responses are presented in Table 4.10, 4.11, and 4.12 and Figure 4.17 below:

Table 4.10: a) Respondents' profiles by Gender, Age, & Marital Status

Item	Detail	Frequency	Percentage
Gender	Male	188	65.73
	Female	98	34.27
	Total	**286**	
Age	15-29	66	23.08
	30-44	107	37.41
	45-59	81	28.32
	60 and above	32	11.19
	Total	**286**	
Marital Status	Single	87	30.42
	Married	187	65.38
	Divorced/Widow	12	4.20
	Total	**286**	

a) Distribution by Gender, Age and Marital Status

Sixty-six (66%) of the respondents are male, indicating higher participation and interest from men in using digital payment systems. With 34% of the respondents being female, there is a potential opportunity to grow this segment by focusing on educational campaigns and services tailored to attract more female users.

Over 61% of respondents fall within the 15 to 45-age range, suggesting that younger people are more inclined to use digital payment systems. This preference could stem from their familiarity with technology and digital platforms. The relatively low percentage of users above 45 years old highlights a growth opportunity by addressing digital literacy and building trust among older demographics.

With 65% of the respondents being married, this group shows significant interest, likely due to the convenience digital payment systems offer for managing household finances.

Table 4.11: b) Respondents' profiles by Education Level & Occupation

Item	Detail	Frequency	Percentage
Educational Level	Primary School	1	0.35
	High School	7	2.45
	Diploma	32	11.19
	Bachelor's Degree	74	25.87
	Master's Degree	102	35.66
	PhD	70	24.48
	Total	**286**	
Occupation	Businessperson	6	2.10
	Farmer	1	0.35
	Government Civil Servant	44	15.38
	Manager in Private Sector	26	9.09
	Self-Employed	25	8.74
	Teacher	91	31.82
	Others	93	32.52
	Total	**286**	

b) Distribution by Educational Level and Occupation

Approximately 62% of respondents hold an undergraduate degree or higher, suggesting that digital payment systems are more frequently used by individuals with higher education levels. This trend indicates a possible correlation between higher education and the adoption of digital payment technologies. The significant proportion of educated users underscores the crucial role of financial literacy in effectively utilizing digital payment systems.

The respondents come from diverse occupational backgrounds, showing that digital payment adoption spans various segments of the population. This diversity highlights the broad appeal and usefulness of digital payment solutions across different professional groups.

Table 4.12: c) Respondents' profiles by Income, Expenditure, & Savings

Item	Detail	Frequency	Percentage
Monthly Income (USD)	Below 1.000	122	42.66
	1.001-4.000	137	47.90
	4.001-7.000	11	3.85
	Above 7.000	16	5.59
	Total	**286**	
Monthly Expenditure (USD)	Below 1.000	165	57.69
	1.001-4.000	109	38.11
	4.001-7.000	3	1.05
	Above 7.000	9	3.15
	Total	**286**	
Monthly Savings (USD)	Below 1.000	261	91.26
	1.001-4.000	24	8.39
	4.001-7.000	0	0
	Above 7.000	1	0.35
	Total	**286**	

Source: Authors

c) Distribution by Monthly Income, Expenditure and Savings

Forty-eight (48%) of participants' monthly income is between 1000-4000 USD and 43% below 1000 which implies that digital payment systems are accessible to the middle-income and lower-income groups. Providers could develop features or incentives tailored to the needs and financial behaviors of different segments.

Fifty-eight (58%) of the participants spend below 1000USD and 38% of them spend between 1000 and 4000 USD monthly, indicating a balance between income and expenditure. This balance may lead users to prefer digital payments for budgeting and managing their finances effectively.

Most respondents (91%) have savings below 1000 USD, indicating an opportunity for digital payment systems to provide financial planning tools that can help users enhance their savings.

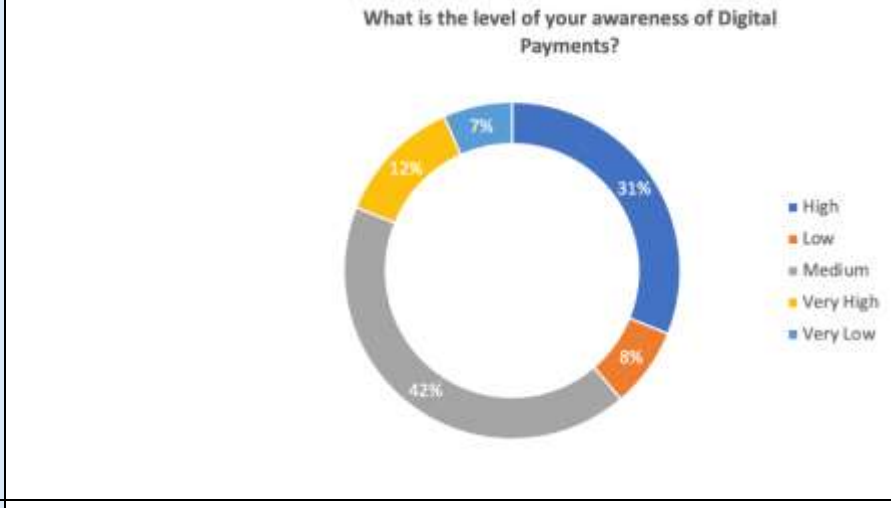
This analysis underscores the importance of targeting specific demographics to expand the adoption of digital payment systems and highlights the potential areas for growth and improvement within the user base.

d) Respondent's Familiarity with Digital Payment

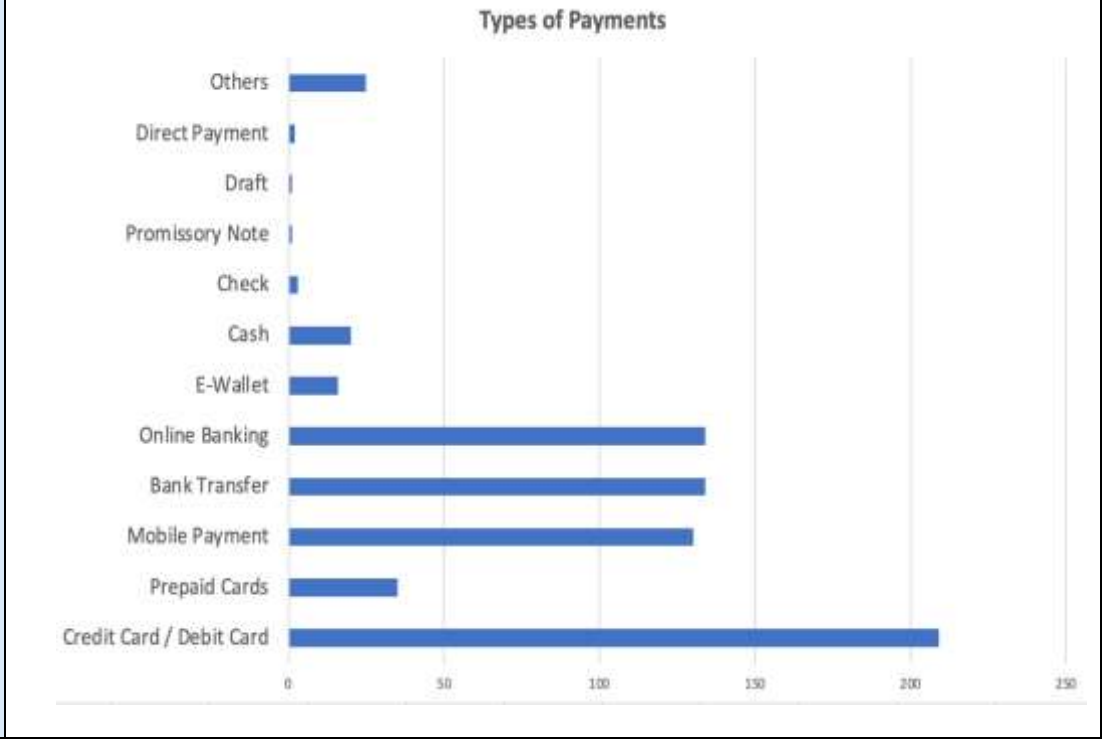
This subsection solicited the opinions of the respondents in four aspects, namely 1) the types of digital payment they mostly prefer and use, 2) whether they have made or/and received digital payments, 3) the reasons why they use digital payments, and 4) the level of their awareness regarding digital payments.

Figure 4.17: Respondent's Familiarity with Digital Payment

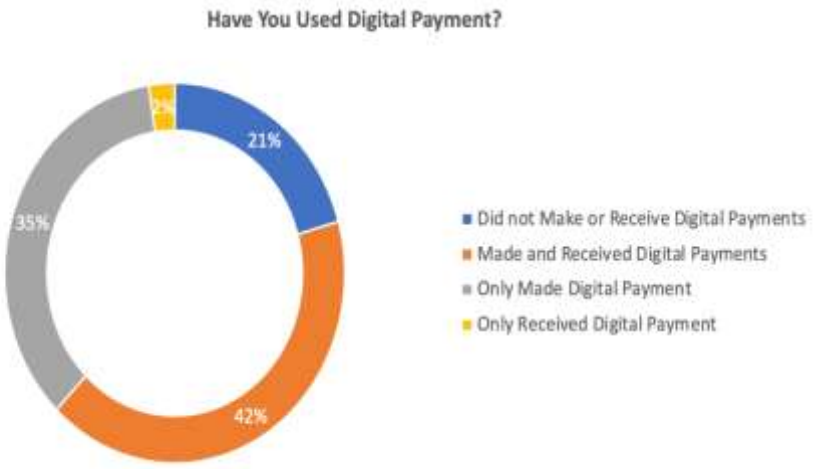
(a) Level of Awareness



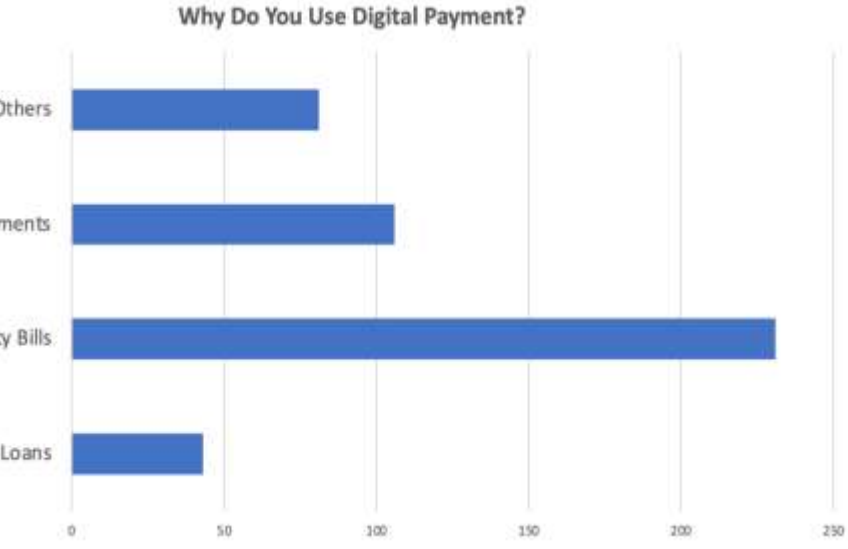
(b) Types of Payments



(c) Level of Usage of Digital Payments



(d) Uses of Digital Payments



Source: Authors

Level of Awareness and Preferred Types of Digital Payments

Forty-three (43%) of respondents are aware of digital payment systems, suggesting that these technologies are well-known among the participants. However, 50% of the respondents exhibit moderate to low awareness, highlighting an opportunity for enhanced education and outreach efforts to improve familiarity and understanding. Meanwhile with regards to preferred types of digital payment, credit and debit cards are the most popular digital payment methods among respondents, followed by online banking, bank transfers,

and mobile payments. This indicates a preference for traditional card-based transactions while other methods are still gaining traction.

Level of Usage and Reasons for Using Digital Payments

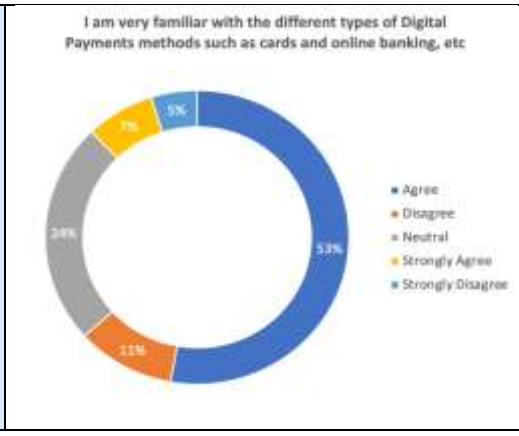
Nearly 80% of participants have used digital payments, indicating a growing reliance on these systems for various transactions. Service providers might consider strategies to encourage occasional and infrequent users to increase their usage, thereby boosting overall engagement with digital payment platforms. On the other hand, digital payments are predominantly used for bill payments and shopping, underscoring their convenience for everyday transactions. Additionally, loan payments and money transfers are significant use cases, demonstrating the utility of digital payment systems for essential financial services. This analysis underscores the importance of awareness-building and strategic initiatives to enhance the adoption and usage of digital payment systems, focusing on both existing users and potential new users.

(ii) **Motivation of Users for the DPS**

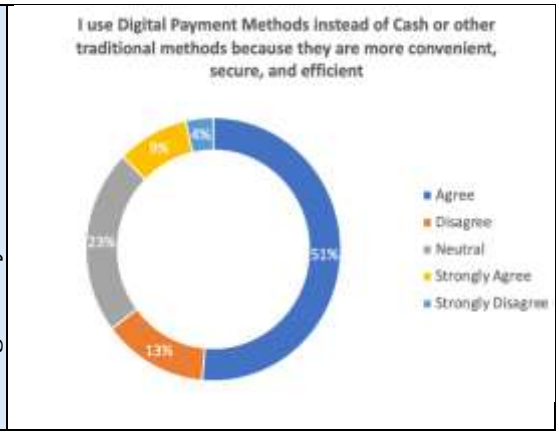
Data related to the motivation of users have been solicited by responses from 9 items of the questionnaire. Users were asked the extent to which their familiarity with DPS, cost affordability, impact, level of satisfaction, prospects, and convenience of use motivate them to use DPS**.**

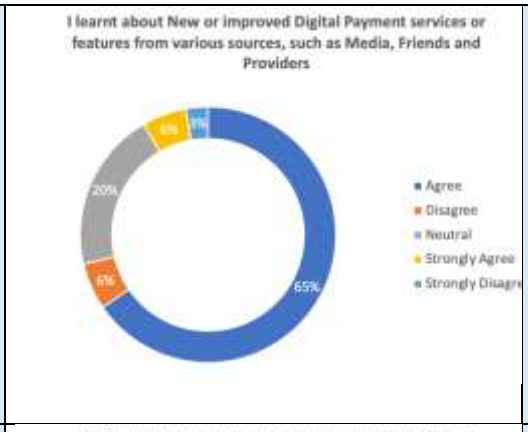
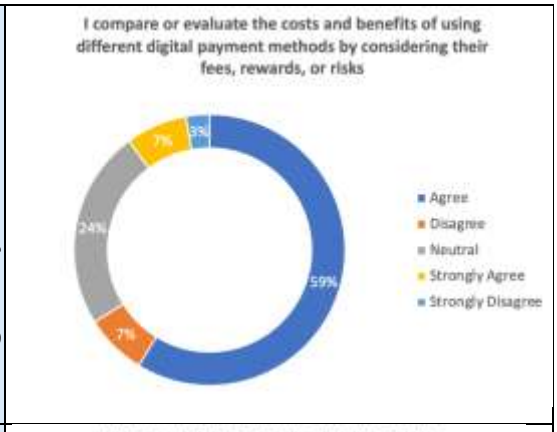
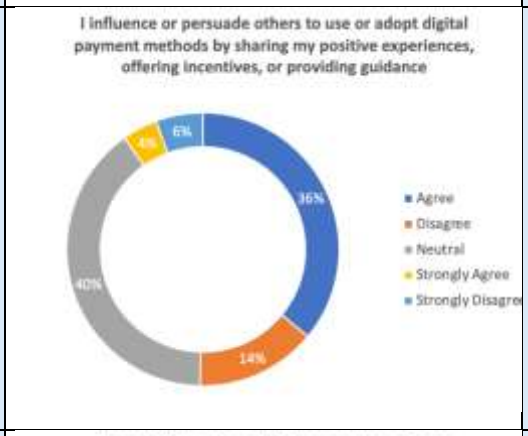
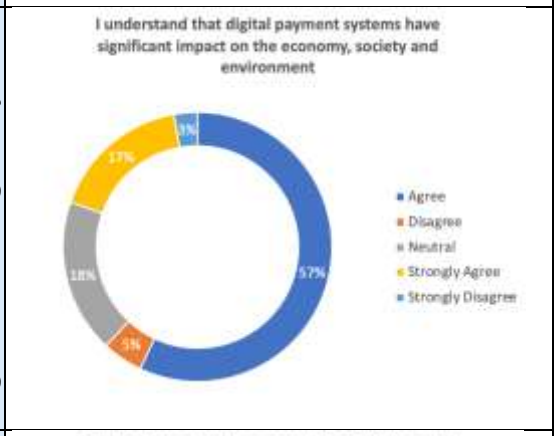
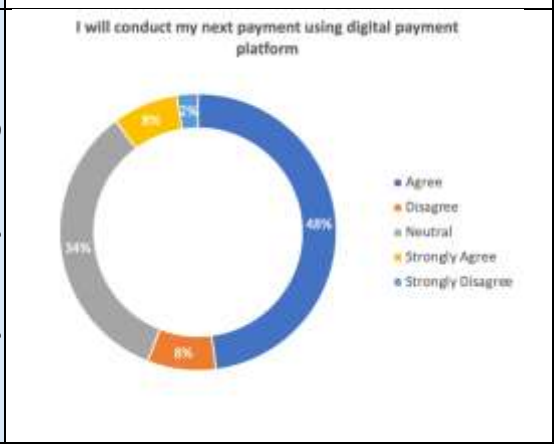
Figure 4.18: Factors Motivating Users towards DPS

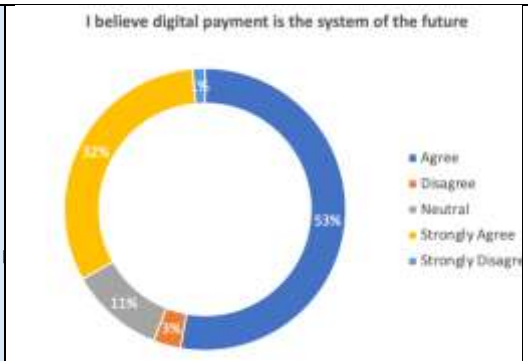
(a) Familiarity with Digital Payments Methods



(b) Convenience and Efficiency of Digital Payments Methods



(c) Sources of Learning about Digital Payment Methods		(d) Evaluating Different Digital Payment Methods	
(e) Influencing Others to Adopt Digital Payment Methods		(f) Understanding the Significance of Digital Payment	
(g) Digital Payment Experience Satisfaction		(h) Willingness to Use Digital Payment System Again	

(i) Belief that Digital Payment is the System of the			

Source: Authors

(a) Familiarity with Digital Payments Methods

Most users (60%) are familiar with digital payment methods, indicating a well-informed user base that may be more open to adopting new features and services while the remaining respondents indicate that there is a need for more awareness to be conducted.

(b) Convenience and Efficiency of Digital Payments Methods

Sixty (60%) of users have agreed that they use digital payment due to their convenience, security and efficiency while others (40%) remain neutral or do not agree. The high convenience rating indicates that digital payments meet users' expectations for ease and efficiency. Addressing the concerns of the minority who find these systems inconvenient could help improve overall user satisfaction and retention.

(c) Sources of Learning about Digital Payment Methods

More than 70% of the respondents agreed that they learnt and improved their digital payment from different sources such as social media highlighting that it is a powerful tool for spreading awareness about digital payment systems, followed by word-of-mouth recommendations. These insights emphasize the importance of maintaining a strong online presence and leveraging influencer marketing strategies.

(d) Evaluating Different Digital Payment Methods

Sixty-six (66%) of the respondents evaluate payment methods thoroughly in terms of fees, rewards, or risks. The split between thorough and partial evaluations suggests that

users are generally discerning but may still benefit from guidance or resources that facilitate informed decision-making when choosing digital payment services.

(e) Influencing Others to Adopt Digital Payment Methods

Forty (40%) of the respondents influenced others to adopt digital payment methods through sharing their positive experiences, offering incentives, or providing guidance while 40 % of the respondents remained neutral and 20% disagreed. Word-of-mouth influence is significant, showing that satisfied users are likely to advocate for digital payments, spreading their adoption further.

(f) Understanding the Significance of Digital Payment Systems

The majority of the respondents (74%) understand the significant impact of digital payment systems on the economy, society and environment, while 18% remained neutral and 8% do not understand, which indicates that further education could help those with partial or no understanding appreciate the broader benefits of digital payments.

(g) Digital Payment Experience Satisfaction

The majority of the respondents (69%) are satisfied with their digital payment experience while 21% remained neutral and 11% are not satisfied. High satisfaction levels indicate that digital payment systems meet most users' expectations. Providers should focus on addressing the concerns of those who are moderately or not satisfied to ensure sustained growth and retention.

(h) Willingness to Use Digital Payment System Again

While 56% of the respondents indicate their willingness to use the digital payment system, 34% remained neutral and 10% are not willing to do so. The strong willingness to continue using digital payment systems shows that users have confidence in these platforms. To convert moderately willing users into highly willing ones, providers should focus on improving features and addressing any lingering concerns.

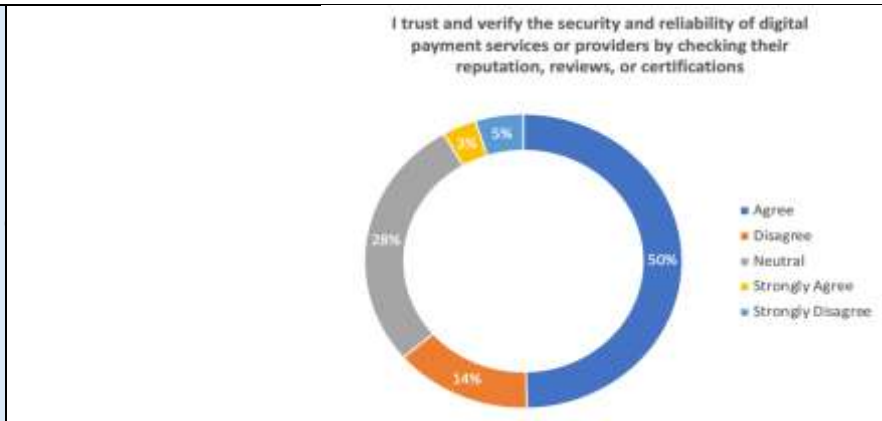
(i) Belief that Digital Payment is the System of the Future

The majority of the respondents (83%) strongly believe that digital payment is the system of the future, which indicates confidence in their long-term adoption and growth potential.

(iii) Types of Risks Users Face in Using DPS

Figure 4.19: Risks Users Face in Using DPS

Trusting and Verifying the Security and Stability of Digital



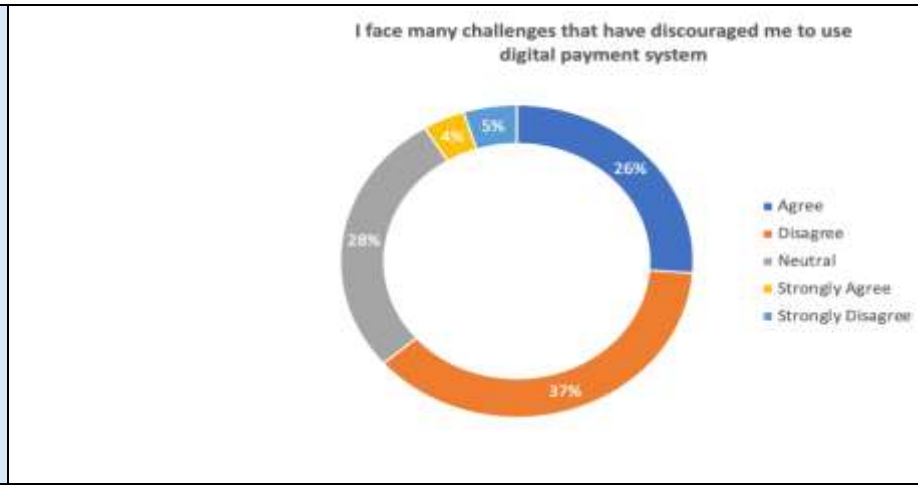
Source: Authors

Fifty-three (53%) of the respondents trust and verify the security and reliability of digital payment services or providers by checking their reputation, reviews, or certifications while 28% remained neutral and 19% do not trust, which indicates that security concern is a significant risk, highlighting the need for robust security measures and user education on safety practices. Technical and trust issues also need to be addressed to boost confidence and usability.

(iv) Challenges Users Faced in Using DPS

Figure 4.20: Challenges in Using DPS

Challenges Faced When Using Digital Payment Services



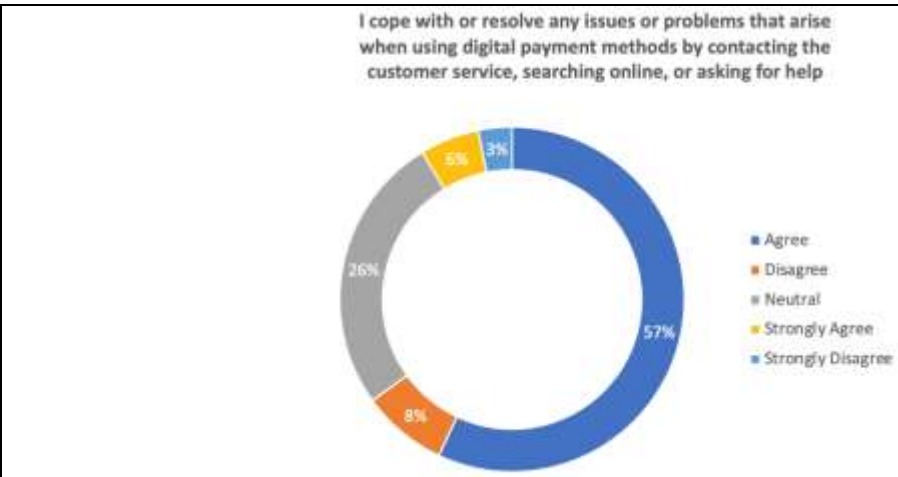
Source: Authors

Thirty (30%) of the respondents have faced challenges in using digital payment systems while 42% have not faced challenges and 28% remained neutral. These challenges could still be minimized through improved user interface and experience design. Customer support and compatibility issues also require attention to enhance user satisfaction.

(v) **Tendency towards Resolving Problems in DPS**

Figure 4.21: User's Tendency towards Resolving Problems

Coping and Resolving Issues Arising from Digital Payment Services



Source: Authors

Sixty-three (63%) of the respondents tend to resolve their issues by contacting the customer service, searching online, or asking for help while 26% of the respondents chose to remain neutral and 11% do not attend to problems. Although most of the users find it effective to resolve issues, there is room for improvement in problem-solving processes to ensure higher user satisfaction and trust.

4.3.8 Analysis of the Interview Results

This section analyses and discusses the results of the interviews conducted with 8 experts from Morocco. The 9 experts were asked 17 questions each. The responses from the 17 interview questions were categorized into the following seven themes (i) Significance of the DPS, (ii) Technology used in the DPS, (iii) Level of Satisfaction, (iv) Effectiveness and Impact of the DPS, (v) Challenges facing the DPS, (vi) Prospects of the DPS and (vii) Suggestions to enhance the DPS. The responses obtained complement findings from the

questionnaire survey and are very important to the development of the digital payment system in OIC member countries.

(v) **Significance of DPS**

This theme comprises responses to the following two questions: *Q1: How important is the digitalization of payment systems these days? Q2: Why are there needs for digitalization in the payment systems, and what are those needs in your case?* The responses in the theme were further categorized into the following three sub-themes on the extent to which DPS is significant to enhance 1) efficiency and security, 2) financial inclusion, and towards cashless society

Efficiency and Security

Most of the experts concur on the significance of digitalizing payment systems in today's economy. Five experts opine that the primary goals of digital transformation and thus the digital payment system are efficiency, speed, security, and cost reduction. They believe that digital payment systems increase efficiency and offer better control, which is crucial for both consumers and financial institutions. Meanwhile two of the experts are of the view that digitalization improves the speed and security of transactions, thus enhancing their reliability and efficiency. Furthermore, they say implementing digital payment systems can reduce transaction costs, which is a significant concern for many customers. One of the experts has highlighted the security benefits of digital systems due to transparency and traceability of transactions thereby combating fraud and tax evasion. The experts also expressed their opinions on the significance of the DPS for economic efficiency. One of the experts said that digital systems contribute to economic efficiency by increasing net banking income and handling a larger volume of transactions. He added that digitization enables automation and greater transaction handling, simplifies transaction recording for businesses and governments, making it easier to track financial activities. Three of the experts have highlighted that consumers are increasingly demanding for efficient and accessible payment solutions, driven by technological advancements and a global shift towards cashless societies. They emphasized that efficient digital payment system enhances consumer experience by offering more convenient payment options, allowing for seamless transactions and improved financial experiences.

Financial Inclusion

Financial inclusion is another significant benefit of digitalization. Two of the experts points out that digital payment systems are essential for improving financial inclusion, enabling more people to access financial services and participate in the digital economy. This view is echoed by another expert who describes how digital systems facilitate financial inclusion for unbanked populations, thereby promoting economic participation and growth. Meanwhile two of the experts emphasized the importance of expanding financial services to unbanked and underbanked populations, addressing a significant gap in financial access. Three of the experts have urged the need for financial education initiatives and strategies to curb cash usage, further supporting financial inclusion efforts.

Towards Cashless Society

Most of the experts have recognized that there is increasing global trend towards cashless societies due mainly to digitization, which reduces transaction costs, fostering innovation and growth in major sectors of the economy. They cited the example and experiences gained from the challenges of Covid-19, and how global communities quickly adopted the digital payment system, showcasing the adaptability of populations in emerging countries during crises. They noted that the need for reduced cash usage and improved transaction transparency has become increasingly important. Two of the experts have stressed the importance of decreasing dependence on cash, which is often associated with inefficiencies, high costs, and security risks. Instead, they say, digital payment systems offer a viable solution to these issues and provide secured and efficient payment methods. These views are shared by other four experts who have suggested that there is a need to enhance the user side of digital payments, focusing on reducing cash usage and improving interaction with startups and tech companies. They reiterate the importance of ease the cashless digital systems bring to consumers, businesses, and governments for buying, paying, and receiving money.

(vi) **Technology Used in the DPS and Their Impacts**

This theme comprises responses to the following five questions: *Q3: What technologies or methods are mainly used to carry out payments digitally in Morocco? Q4: What implementation/ processes/ systems have you used that make your digital payment case excel*

from other countries, and how are they unique? Q5: What are the key components and parties involved in a digital transformation? Q6: To what extent have these technologies affected the adoption of digital payments in Morocco? Q7: How is the implementation of the digital payment systems in Morocco different from others? The responses in the theme were further categorized into the following five sub-themes on: 1) Diversity of Technology Used in DPS, 2) Implementation Processes, 3) Key Components and Parties in Digital Transformation, 4) Impact of Technology on Adoption, 5) Benchmarking with Other Countries.

Diversity of Technology Used in DPS

Experts unanimously agree that Morocco's digital payment landscape is characterized by a diverse range of technologies and methods. They emphasize the extensive use of technologies such as authentication, data transmission, AI, and cloud computing, which collectively contribute to the complexity of the ecosystem. Local technology providers, including HPS and S2M, play a significant role in supporting various payment methods, such as standard and instant transfers, direct debit, mobile payments (m-Wallets), and bank card mobile payments and e-wallets, demonstrating the strength of Morocco's domestic tech sector.

Different perspectives emerge among the experts regarding the specifics of these technologies. Some focus on the growing popularity of mobile payment solutions like "Orange Money," while others delve into the technical aspects, discussing the programming languages and secure infrastructures used in system development. There is also recognition of the adoption of international solutions like SAP and Témenos, which underscores the preference for well-established, globally recognized technologies and the importance of procurement processes in ensuring system reliability.

While mobile and contactless payments are still in their early stages in Morocco, the experts agree that the market is gradually adopting advanced technologies. They provide a comprehensive overview of the various technologies currently in use, including NFC, QR codes, and e-wallets, reflecting the multi-faceted and evolving nature of Morocco's digital payment landscape.

Implementation Processes

The experts' responses regarding Morocco's digital payment systems present a range of perspectives on the country's position in comparison to global standards. Many experts agree that Morocco's approach aligns closely with international trends, following global technologies and systems that have already been implemented in other, more developed countries. Several experts note that Morocco is essentially replicating what other nations have achieved in recent years. One expert points out that the systems used in Morocco are similar to those in comparable economies, while another argues that the country's systems are not necessarily better or more advanced due to limited consumer adoption. A third expert adds that innovations like real-time payments and Unified Payment Interfaces (UPIs) are still relatively new in Morocco and align with practices in developed markets.

Despite this perceived lack of uniqueness, some experts highlight Morocco's distinctive contributions. One expert emphasizes the role of locally developed technologies that are not only used within the country but also exported abroad. This demonstrates that Morocco is not simply following global trends but is also capable of producing and sharing its own technological innovations. This aspect is significant in illustrating Morocco's ability to integrate into the global digital payment landscape while contributing original solutions.

From a consumer perspective, another expert praises the convenience, security, and immediacy of digital payment methods in Morocco, particularly for international transactions. This expert highlights widely recognized platforms such as Visa, Mastercard, and PayPal, which allow consumers to conduct transactions with ease. This suggests that while Morocco may not be unique in its system offerings, it has successfully integrated global payment solutions to meet local consumer needs.

Other experts focus on the technical aspects of digital payment systems, suggesting that the success of these systems depends on their specific implementation. They stress factors such as ergonomics, functionality, and system scope, which can vary depending on the needs of different institutions. This view suggests that Morocco's payment systems may not be distinctive at the national level but can excel when tailored to the unique requirements of individual organizations.

Another expert introduces the centralization of electronic payment services through the Centre Monétique Interbancaire (CMI) as an example of Morocco's strategic adaptation of digital payment systems. This centralized management enhances efficiency, security, and reliability across financial institutions, suggesting that while Morocco may follow global standards, it has customized these practices to suit its own financial landscape.

One expert offers a detailed overview of Morocco's unique initiatives that distinguish its digital payment ecosystem. These include public-private partnerships, interoperable payment infrastructures, enhanced transaction security, and national programs aimed at dematerializing payments. These initiatives, coupled with in-depth behavioral studies, show Morocco's commitment to financial inclusion and security while adapting digital payment systems to local cultural and consumer preferences. The investment in interoperability and public-private collaborations indicates Morocco's forward-thinking approach to creating a cohesive and inclusive digital payment framework.

Key Components and Parties in Digital Transformation

The majority of experts agree that the digital transformation of payments involves a broad range of stakeholders and components. Financial institutions, including banks and fintech companies, are central players in the ecosystem. Additionally, regulators and central banks play crucial roles in overseeing and regulating payment systems to ensure security and compliance. Government ministries, such as those responsible for finance and digital transformation, contribute by setting policies and providing guidance on digital initiatives.

One expert highlights the importance of technological infrastructures, including electronic payment systems, network interoperability, and security protocols. This expert emphasizes that platforms facilitating digital payment processing, such as card systems, mobile wallets, and online payment gateways, are essential for a functional digital payment ecosystem. Security measures, including two-factor authentication and compliance with standards like PCI-DSS, are critical for protecting transactions against fraud and cyber threats.

Another expert underscores the role of various support functions within organizations, such as IT departments, logistics, and human resources. These departments are integral in managing and supporting digital payment systems, indicating that the successful

implementation of these systems requires coordinated efforts across multiple organizational functions.

Several experts point out the need for education and awareness initiatives to promote the adoption of digital payments. This includes user training programs and customer support services to help individuals and businesses effectively use digital payment systems. Additionally, innovative payment solutions and the continuous development of new technologies are essential for advancing the digital payment landscape.

The expert responses also reflect the significance of collaboration between stakeholders. Public-private partnerships and collaborations between regulators, financial institutions, technology providers, and businesses are key to developing and implementing digital payment systems. This collaboration helps ensure that digital solutions are secure, interoperable, and tailored to meet the needs of various users.

In summary, the digital transformation of payments involves a complex network of stakeholders and components, including financial institutions, regulators, technology providers, and government agencies. The successful implementation of digital payment systems requires technological infrastructure, security measures, education and awareness, and strong collaboration among all parties involved. This collective effort aims to create a seamless, secure, and efficient digital payment ecosystem.

Impact of Technology on Adoption

Several experts highlight the positive effects of various technologies on the adoption of digital payments. Technologies such as authentication methods, including face recognition and fingerprint technology, cloud computing, AI, and big data, have significantly enhanced the implementation and appeal of digital payment systems. These advancements contribute to improved security, efficiency, and user experience, which in turn foster greater adoption among consumers. The integration of mobile payments and the proliferation of smartphones, particularly during the COVID-19 pandemic, have also been pivotal in increasing the usage of digital payment methods.

Some experts point out specific technologies and their direct impact on the adoption process. For instance, the availability of home-grown technologies has facilitated adoption,

although regulatory challenges have occasionally delayed certain developments. Security is emphasized as a crucial factor; robust and user-friendly systems are more likely to gain user trust and encourage adoption. On the other hand, poor user experience due to inefficient or insecure systems can deter users from embracing digital payments.

The transformation of payment systems in Morocco over the past decade is notable, with a significant shift from traditional methods like checks to more modern digital solutions. The introduction of instant transfers, mobile wallets, and the growing use of bank cards and contactless payments illustrate the ongoing evolution in the sector. The widespread adoption of mobile payments, which began in 2018, is particularly significant, though it requires continued efforts to enroll merchants and educate users.

Overall, the technological advancements have played a crucial role in reshaping Morocco's payment landscape. The increased accessibility of smartphones, lower data costs, innovative solutions from financial institutions and startups, and supportive government initiatives have collectively driven the adoption of digital payments. The ongoing development of new payment methods and technologies continues to influence how Moroccans conduct financial transactions, demonstrating a clear trend towards increased digitalization in the payment sector.

Benchmarking with Other Countries

A common observation among experts is that Morocco's digital payment systems are fundamentally similar to those employed globally, with widespread use of technologies like authentication, mobile payments, and cloud computing. The country has gradually been making noticeable progress in the adoption and advancement of certain technologies. For instance, AI and other innovative technologies look promising and could soon become prevalent such as is the case in more developed countries.. The country’s digital payment landscape often mirrors that of other nations and is expected in the near future to adopt cutting-edge technologies.

One key difference highlighted is Morocco's emphasis on locally developed technologies. While the country follows global trends, it also leverages homegrown solutions.. For example, during 2023, the National Working Group aimed at framing the use of cryptoactives in Morocco, continued its work, which focused mainly on aligning the draft

law on cryptoactives with the high-level recommendations of the global FSB and its compliance with Recommendation No. 15 of the Financial Action Task Force. Such unique initiative in the Moroccan context is envisaged to overcome regulatory constraints that hinder the development and broader adoption of innovative financial technologies.

Another distinction is the relatively recent initiation of digital payment projects in Morocco compared to other countries with more mature systems. Countries like Malaysia and Türkiye have advanced digital payment systems and more extensive implementations, such as QR code payments, which are not yet widely available in Morocco. This delay in the rollout of such technologies indicates that Morocco is still in a developmental phase, striving to catch up with more advanced nations.

Technological infrastructure in Morocco has seen significant changes, with a substantial impact on payment systems. The integration of smartphones, improved network coverage, and the expansion of financial inclusion have all played roles in accelerating the adoption of digital payments. The Moroccan government's initiatives, such as the 'Maroc Digital 2020' program and partnerships between the central bank, commercial banks, and technology providers, underscore a strategic approach to fostering a more inclusive and innovative payment ecosystem.

Distinctive features of Morocco's digital payment systems include a strong focus on financial inclusion and public-private cooperation. The country has implemented national programs and initiatives that emphasize collaboration between various stakeholders to enhance the digital payment landscape. Examples include the use of m-wallets, QR code payments, and contactless mobile payments, which are becoming increasingly popular despite the challenges of adapting to local needs and regulatory constraints.

Overall, while Morocco's digital payment systems are largely aligned with international practices, the country's unique regulatory environment, the focus on local technology, and the stage of technological development contribute to a distinctive approach in comparison to other nations.

(vii) **Level of Satisfaction**

This theme presents responses to the following question: *Q8: How satisfied are you with the availability, security, and convenience of digital payment services in Morocco?* The experts have focused their responses on the level of satisfaction related to the following three main areas, namely 1) satisfaction level on the availability of DPS, 2) satisfaction level on the security of DPS, 3) satisfaction level on the convenience of DPS. The experts have also provided views on challenges for meeting those levels of satisfactions and have suggested areas for improvement to overcome the challenges.

Satisfaction level on the availability of DPS

Experts generally find the availability of digital payment services in Morocco satisfactory. However, they also point out that, despite the accessibility of these services, they are not extensively promoted. The experts have highlighted that this insufficient promotion negatively affects public awareness, limiting the widespread adoption of these services. Another expert observes that digital payment options are present in various locations, such as gas stations and grocery stores, indicating a decent level of accessibility. However, it is also noted that access to these services is uneven, with urban and technologically savvy users benefiting from better availability compared to those in rural areas.

Satisfaction level on the security of DPS

Two of the experts express confidence in the security of digital payment systems, attributing this assurance to the oversight provided by the Central Bank of Morocco. However, another expert highlights that individual perceptions of security can vary based on personal financial literacy and trust levels. Additionally, concerns are raised about the security implications of a market dominated by established companies, with one expert suggesting that FinTech companies might have a limited role in enhancing security measures.

Satisfaction level on the convenience of DPS

While most experts acknowledge that digital payment services in Morocco are generally convenient, there are notable challenges that need to be addressed. Two experts commend

the systems for being reliable and user-friendly, but they also highlight the lack of widespread acceptance and awareness, which diminishes the overall effectiveness of these services.

A significant challenge identified by the experts is the low level of financial and digital literacy, particularly in rural areas. Two experts emphasize the urgent need to enhance financial education and awareness as a critical step toward increasing the adoption of digital payments. Additionally, there is a concern about cybersecurity awareness. One expert stresses the importance of improving knowledge in this area to foster greater trust in digital payment systems.

While the current levels of security and service availability are deemed acceptable by one expert, they also highlight the necessity for continuous improvements to keep pace with evolving user expectations and technological advancements. These improvements are crucial for ensuring that digital payment systems remain secure, reliable, and accessible to all users, including those in under-served regions.

(viii) **Effectiveness and Impact of the DPS**

This theme comprises responses to the following question: *Q9: How do you perceive the impact of digital payment systems on the economy, society, and environment of Morocco? Q10: How do you assess the level of innovation and competition in the digital payment market in Morocco? Q11: How do you rate the quality and effectiveness of the policies and regulations governing digital payment systems in Morocco?* The responses in the theme were further categorized into the following four sub-themes on: 1) Impact on Economy, Society, and Environment, 2) Level of Innovation and Competition in the Digital Payment Market, 3) Effectiveness of Policies and Regulations.

Impact on Economy, Society, and Environment

Economic Impact: The impact of digital payment systems on Morocco's economy is generally viewed as significant and beneficial. Experts agree that these systems play a crucial role in economic development by enhancing financial inclusion and boosting economic growth. One expert points out that digital payments can facilitate real-time transactions and improve government visibility into financial activities, which helps in

better control of economic indicators and development strategies. Another emphasizes that digital payments can accelerate economic growth by speeding up transactions and the movement of products and services, thus improving economic flow. Additionally, the increased tax revenues resulting from digital transactions and the modernization of traditional payment methods are seen as positive effects. The introduction of digital systems is also credited with fostering new business models and increasing transaction efficiency, contributing to overall economic advancement. Overall, digital payment systems are considered a key factor in stimulating economic growth, improving efficiency, and attracting foreign investment.

Societal Impact: The societal impact of digital payment systems in Morocco is largely positive, with a focus on increased financial inclusion and modernization of societal processes. Digital payments are believed to improve access to financial services for underserved populations, including those in rural areas, thereby enhancing societal inclusion and convenience. The transition from traditional to digital payment methods is seen as a significant step towards societal modernization, altering consumption habits and making transactions more accessible. The empowerment of women through increased financial autonomy and the improvement of financial literacy among the population are also highlighted as important societal benefits. The ability of digital payments to facilitate transactions without the need for physical travel contributes to broader societal benefits, particularly for those in remote or underserved areas.

Environmental Impact: The environmental benefits of digital payment systems are noted by several experts, emphasizing reductions in paper use and physical infrastructure. Digital payments contribute to environmental sustainability by minimizing the need for paper-based transactions and reducing pollution associated with paper use. The decreased reliance on physical travel for transactions also helps lower greenhouse gas emissions, contributing to overall environmental conservation. By moving towards clean technology and reducing paper consumption, digital payment systems are seen as having a positive impact on the environment, aligning with broader sustainability goals.

Innovation and Competition in the Digital Payment Market

Level of Innovation: The experts generally agree that Morocco's digital payment market is experiencing notable innovation. There is recognition of a robust environment for technological advancement, driven by both local and international players. Government strategies, such as the 'Roadmap for the Development of Digital Payments in Morocco 2020-2025,' are praised for fostering innovation. This is complemented by the growing presence of fintech startups and the involvement of global tech giants, which contribute to a vibrant and evolving market.

One expert specifically points out Morocco's high level of technological innovation, noting that the country has a strong pool of skilled computer engineers and is active in both importing and exporting technology. This suggests a dynamic technological environment capable of supporting significant digital advancements. Additionally, ongoing initiatives and the presence of a regulatory framework supporting innovation further enhance the market's capacity for technological development.

Level of Competition: Despite the positive outlook on innovation, the level of competition in Morocco's digital payment market is perceived as uneven. While there is a growing number of service providers, including fintech startups, banks, and telecom operators, the market is still seen as somewhat controlled by incumbent financial institutions. This control can limit the entrance and impact of new players, which in turn affects the overall competitive dynamics of the market.

The responses indicate that while local startups and international players contribute to market competition, the barriers to entry remain significant. In comparison to more mature markets like Malaysia, Turkey, and the UK, Morocco's digital payment market is described as still developing. The competition is not as intense as in these more advanced markets, where a higher number of players and lower barriers foster a more competitive environment.

In summary, Morocco's digital payment market demonstrates a high level of innovation, driven by government initiatives, skilled professionals, and active participation from various players. However, the competition is not as pronounced as it could be, primarily due to the dominance of incumbent financial institutions and significant barriers to entry for

new fintech companies. Addressing these barriers and fostering a more open market could further enhance competition and drive the overall growth of digital payment systems in Morocco.

Effectiveness of Policies and Regulations

The quality and effectiveness of the policies and regulations governing digital payment systems in Morocco receive varied assessments from the experts, highlighting both strengths and areas for improvement.

Positive Assessments: Most of the experts view the existing policies and regulations as largely effective. One expert notes that the stability of digital payments and the availability of payment systems in the market indicate effective regulations. Similarly, another expert points out that the Moroccan policies are very appropriate for implementing new systems, and the existing frameworks are robust. The involvement of regulatory bodies, such as the Commission Nationale de Protection des Données à Caractère Personnel (CNDP), which ensures data protection, is also seen as a positive factor supporting consumer protection. Additionally, recent developments, including a draft law for the oversight of Financial Market Infrastructures (FMIs), are acknowledged as steps towards aligning Morocco's regulatory framework with international standards.

Areas for Improvement: Despite these positive views, there are concerns about the pace and scope of regulatory adaptation. An expert feels that Moroccan policies are flexible with tendency to mix risk reduction, investor and consumer protection and rapid innovation. However, there is a perception that while the regulations support existing technologies, it could be further enhanced to foster innovation, particularly for fintech companies. This is echoed by another expert who suggests that current policies could better encourage fintech and innovative solutions. Furthermore, there is a recognition that the regulatory framework for cryptocurrencies could be leveraged for the adoption and integration of such technologies.

General Observations: The effectiveness of the regulatory environment is seen as satisfactory in managing current digital payment systems but requires regular updates to keep pace with technological advancements. The draft laws and ongoing consultations

indicate a commitment to improving the legal framework, but experts emphasize the need for these frameworks to be more proactive and inclusive of emerging technologies to better support innovation in the digital payments sector.

Overall, while the regulatory environment in Morocco provides a solid foundation for digital payment systems, there is a consensus that enhancing support for innovation and adapting more swiftly to technological changes could further improve the effectiveness of these policies.

(ix) **Challenges Facing the DPS**

This theme comprises responses to the following question: *Q12: What are the challenges of transforming to digital payments in Morocco? Q13: What are the challenges resulting from the transformation to digital payments in Morocco? Q14: How do you think these challenges could be overcome in Morocco?*

The transition to digital payments in Morocco encounters a complex array of challenges that intertwine societal, infrastructural, and economic factors based on the experts' insights:

Cultural, and Behavioral Barriers

One of the primary obstacles to digital payments in Morocco is the strong cultural preference for cash transactions. Overcoming this resistance involves not only addressing entrenched habits but also tackling deeper issues related to trust and the perceived utility of digital payments. To address these challenges, comprehensive educational campaigns should be launched using various channels such as TV, social media, and community workshops in both Arabic and French. Additionally, offering incentives like discounts, cashback, or rewards can encourage the adoption of digital payments. Gradual implementation of digital payment systems, complemented by adequate training and user feedback adjustments, can facilitate smoother adaptation and overcome resistance.

Infrastructure Limitations

Infrastructure limitations significantly impact the adoption of digital payments, particularly due to the uneven distribution of digital and mobile network coverage, especially in rural areas. To mitigate these issues, increased investment in expanding

internet and mobile network coverage is essential. Collaborations with telecom companies to improve connectivity in underserved regions are crucial. Furthermore, providing financial or tax incentives to small merchants for installing and maintaining digital payment systems can help address the lack of electronic payment terminals in small businesses and informal markets. Support and training for effective system use are also necessary to encourage adoption.

Financial Literacy and Security Concerns: Low levels of financial and digital literacy, particularly among the elderly and those with limited education, present significant barriers to the adoption of digital payments. To overcome these barriers, targeted training programs should be developed and implemented to enhance financial and digital literacy, focusing on rural and low-income populations. These programs should be accessible and relevant to the needs of these groups. Addressing security concerns is also vital; maintaining high security standards for digital payments and conducting cybersecurity awareness campaigns can help build user trust and protect personal and financial data.

Regulatory and Compliance Issues: The regulatory framework for digital payments in Morocco needs to evolve continuously to keep pace with technological advancements. Collaborating with regulators, financial institutions, and technology providers is essential to create supportive regulatory environments that accommodate new technologies such as cryptocurrencies and CBDCs. Ensuring that regulations balance security standards with user experience will help foster trust and facilitate widespread adoption. Ongoing stakeholder engagement is necessary to develop and implement regulations that support innovation while maintaining user protection.

Economic and Operational Costs: High costs associated with implementing and using digital payment systems pose a significant challenge for both businesses and consumers. To address these financial barriers, strategies should be implemented to lower the costs of digital payment systems, including providing financial support or incentives for adoption. Ongoing training and support for merchants are also crucial to help them effectively use digital payment systems. Resources for troubleshooting and system operation should be made available to ensure smooth integration and functionality.

Digital Divide and Financial Inclusion: Limited access to technology and digital financial services among unbanked and underbanked populations is a major challenge. Developing affordable and user-friendly digital financial products tailored for these groups is essential. Public-private partnerships can play a key role in addressing the digital divide and enhancing financial inclusion, with a focus on marginalized groups such as women and rural populations. Ensuring that digital financial services are accessible to all segments of society is crucial for achieving comprehensive financial inclusion.

Continuous Innovation and Adaptation: The rapid pace of technological innovation in digital payments requires businesses to continually adapt to stay competitive. Establishing incubators and accelerators to support fintech startups with funding, infrastructure, and mentorship can stimulate innovation and competition in the digital payments market. Encouraging investment in research and development will also help businesses keep up with new advancements and offer cutting-edge solutions.

Resistance from Existing Market Players: Resistance from traditional financial institutions and businesses that benefit from the current system can impede the adoption of digital payments. Engaging with existing market players to address their concerns and demonstrate the benefits of digital payments is essential. Providing solutions that minimize disruption to existing operations can help facilitate a smoother transition and encourage wider acceptance of digital payment systems.

(x) Prospects of the DPS Transformation in Morocco

This theme comprises responses to the following questions: *Q15: What are the prospects of transforming to digital payments in Morocco? Q16: How do you anticipate the future trends and developments of digital payment systems in Morocco and globally?* The responses in the theme were further categorized into the following two sub-themes on: 1) prospects of digital payment transformation in Morocco, 2) future trends and developments of digital payment systems in Morocco and globally.

Prospects of digital payment transformation in Morocco

The prospects for transforming to digital payments in Morocco are generally optimistic, driven by multiple factors and accompanied by several opportunities and challenges.

1. Expansion of Financial Inclusion: Digital payments are expected to significantly enhance access to financial services for unbanked or underbanked populations, particularly in rural areas. Mobile wallets and basic payment accounts are crucial for broadening financial inclusion. Additionally, tailored digital payment solutions are anticipated to empower traditionally excluded groups such as women and informal workers, providing them with greater financial autonomy and access to services.

2. Modernization of the Economy: The transition towards digital payments is likely to reduce Morocco's reliance on cash, thus modernizing the economy. This shift will promote the formalization of transactions and improve economic transparency. Digital payments are also poised to benefit SMEs by simplifying transactions, reducing operational costs, and opening up online sales channels.

3. Improvement of Public Services and Governance: Digitizing government payments, including social benefits and subsidies, is expected to enhance the efficiency and transparency of public services. This change will improve targeting of beneficiaries and reduce management costs. Additionally, digital payments will support governance by improving traceability and assisting in the fight against corruption and fraud.

4. Technological Innovation and Competition: The Moroccan market is anticipated to attract more fintech startups, which will drive innovation in payment services. Emerging technologies such as blockchain-based payments and AI solutions for fraud detection are expected to be introduced. Public-private partnerships will play a vital role in fostering innovation and expanding digital payment services, with collaborative efforts focused on improving infrastructure and service delivery.

5. Support for Sustainable Growth: Digital payments will contribute to a more sustainable economy by reducing paper use and physical travel, supporting Morocco's sustainable development goals. They will also facilitate business models based on sharing and reuse, promoting more responsible consumption and a circular economy.

6. Future Challenges and Opportunities: Despite the positive outlook, several challenges must be addressed to fully realize the benefits of digital payments. These include enhancing digital education, expanding infrastructure, and updating regulations. The resilience and adaptability of payment systems will be crucial in overcoming these

challenges. Additionally, the digital transformation will open opportunities for new financial services, such as digital loans, online insurance, and wealth management, contributing to a more diverse and dynamic financial sector.

Overall, the transition to digital payments in Morocco is viewed as promising, with significant potential for improving financial inclusion, modernizing the economy, and supporting sustainable growth. However, addressing the existing challenges and seizing emerging opportunities will be essential for successful implementation.

Future trends and developments of digital payment systems in Morocco and globally

As the global landscape of financial technology evolves, the future of digital payments in Morocco and beyond is poised for significant transformation.

Technological Advancements: Experts anticipate that AI will play a critical role in the future of digital payments. AI is expected to influence all aspects of payment systems, from user interactions to core system operations. Increased adoption of AI and machine learning for enhancing security and personalization in digital transactions is also anticipated. Additionally, blockchain technology is expected to become more prominent, reshaping the financial landscape and pushing countries like Morocco to explore innovative solutions to remain competitive.

Open Banking and Digital Currencies: Open banking policies are anticipated to impact digital payments by requiring financial institutions to share data with third parties. This shift is expected to increase the number of FinTech companies offering services based on banking data. The potential adoption of cryptocurrencies and a move towards a cashless society are also seen as transformative trends. This could lead to the widespread use of cryptocurrencies, simplifying transactions and reducing costs.

Integration of Emerging Technologies: Experts foresee the integration of various technologies, such as blockchain and IoT, to enhance payment systems. The implementation of blockchain technology and IoT will enable seamless payments through connected devices, improving transaction transparency and security. Cross-border payments are also expected to become more efficient with alternatives like Buna, offering simplified solutions compared to traditional methods like SWIFT.

Regulatory and Security Developments: Future developments in digital payments will likely involve continuous improvements in regulation and security. Monitoring technological advancements, regulatory changes, and consumer preferences will be crucial for fully leveraging the benefits of digital payments. Enhanced security measures and robust regulations are expected to support the growth and adoption of digital payment systems.

Financial Inclusion and Economic Growth: Digital payments are expected to further financial inclusion, particularly in underbanked and rural areas. This expansion will empower traditionally excluded groups and support economic growth by modernizing financial systems and encouraging the formalization of transactions.

Overall, the future of digital payments in Morocco and globally is promising, driven by technological advancements, evolving regulatory frameworks, and a focus on financial inclusion and security.

(xi) **Suggestions to Enhance the DPS**

This theme comprises responses to the following question: *Q17: What suggestions do you provide to the relevant stakeholders in Morocco, that include policy makers, regulators, financiers, and end users?* The responses in the theme were further categorized into the following seven sub-themes on: 1) Regulatory and Policy Framework, 2) Infrastructure Development, 3) User Education and Awareness, 4) Collaborative Efforts and Ecosystem Building, 5) Security and Trust, 6) Strategic and Long-Term Planning. The experts provided these suggestions to ensure the successful implementation and growth of digital payment systems in Morocco and in OIC member countries in general.

1. Regulatory and Policy Framework

Supportive Regulation: Policymakers should establish a balanced regulatory framework that fosters innovation while ensuring security and data protection. This includes creating supportive policies that facilitate fintech innovation and broaden access to digital payment systems.

Regular Supervision: Regulators need to monitor and supervise payment solution providers regularly, requesting reports and holding meetings to address challenges and ensure compliance.

2. Infrastructure Development

Investment in Digital Infrastructure: Financial institutions should invest in their digital infrastructures to support the digital payments ecosystem. This involves upgrading systems and integrating advanced technologies to enhance service delivery.

Strengthening Public Infrastructure: Improving public infrastructure is essential for the broader adoption of digital payments and the creation of a conducive environment for digital ecosystem growth.

3. User Education and Awareness

Education and Awareness Campaigns: There is a need for ongoing education and awareness campaigns to inform end users about the benefits of digital payments and security practices. This helps users adopt digital payments confidently and safely.

Promoting Digital Literacy: Enhancing financial and digital literacy among users can improve their engagement with digital payment systems and protect them from fraud and misuse.

4. Collaborative Efforts and Ecosystem Building

Collective Effort: Advancing digital payments requires a collaborative approach involving all stakeholders, including policymakers, financial institutions, and innovation centers. This collective effort is crucial for addressing challenges and seizing opportunities.

Encouraging Innovation: Supporting fintech startups and promoting a digital culture can stimulate innovation and growth in the digital payments sector. This includes creating an incentive environment and fostering public-private partnerships.

5. Security and Trust

Enhancing Security Measures: Implementing robust security standards and educating users about cybersecurity best practices are vital for maintaining trust in digital payment systems.

Protecting User Data: Ensuring that digital payment systems adhere to high security standards and protecting user data from breaches are critical for building and maintaining user confidence.

6. Strategic and Long-Term Planning

Adaptation to Global Trends: Policymakers and regulators should stay informed about global trends and technological advancements in digital payments to adapt and implement effective strategies.

Future-Ready Infrastructure: Investing in future-ready infrastructure and technologies, such as AI and blockchain, will position Morocco to leverage emerging opportunities and enhance the digital payment experience.

4.3.9 Specific Needs to Improve the Payment Systems in the Country

To enhance the payment systems in Morocco, several specific needs must be addressed:

1. **Building Trust and Awareness**: There is a critical need to build trust and awareness among consumers regarding the benefits and security of digital payment systems. This can be achieved through comprehensive public awareness campaigns that educate consumers about the convenience and safety of digital payments.
2. **Strengthening Infrastructure**: Improving the digital infrastructure, especially in rural and underserved areas, is essential. This includes expanding internet access and ensuring reliable and secure payment gateways that can handle high volumes of transactions.
3. **Regulatory Simplification**: Simplifying the regulatory environment for digital payments will encourage businesses to adopt and integrate these systems. Streamlining regulations and reducing bureaucratic hurdles can make it easier for FinTech companies and traditional financial institutions to innovate and offer new payment solutions.
4. **Cost Reduction**: Addressing the cost concerns associated with digital transactions is crucial. Reducing transaction fees or offering subsidies could incentivize both consumers and businesses to shift from cash to digital payments.
5. **Cultural Shift**: Encouraging a cultural shift from cash-based transactions to digital payments requires sustained efforts. Incentivizing digital transactions through discounts, cashback offers, or loyalty programs could help change consumer habits.

4.3.10 Case Studies: Lessons Learnt and Knowledge Transfer among OIC Member Countries

The Moroccan case study offers valuable lessons that can be shared and transferred among OIC member countries:

1. **Importance of Public Trust**: Building public trust in digital payment systems is a universal challenge that many OIC member countries face. Morocco's experience highlights the importance of targeted awareness campaigns and the need for governments to play an active role in promoting the security and reliability of these systems.
2. **Infrastructure Development as a Priority**: The Moroccan case underscores the significance of robust digital infrastructure as a foundation for successful digital payment adoption. OIC countries with similar geographic and economic conditions can benefit from prioritizing infrastructure development, particularly in rural areas.
3. **Regulatory Frameworks Must be Adaptive**: Whereas it is acknowledge that Morocco's legal and regulatory framework is fairly flexible and adaptable, there is a need for continuous modifications and improvements whenever appropriate. OIC member countries should consider adopting more flexible and adaptive regulatory approaches to encourage innovation while ensuring consumer protection.
4. **Cultural Considerations in Policy Implementation**: The cultural preference for cash in Morocco is a factor that resonates with many OIC member countries. Policymakers need to consider cultural aspects when designing strategies to promote digital payments, ensuring that interventions are culturally sensitive and context-specific.

4.3.11 Country-Specific Policy Recommendations

For Morocco, the following policy recommendations are proposed to enhance the adoption of digital payments:

1. **Implement Comprehensive Public Awareness Campaigns**: The government should launch nationwide campaigns to educate the public on the benefits and security of digital payments, aiming to build trust and shift consumer behavior away from cash transactions.

2. **Invest in Digital Infrastructure**: Priority should be given to expanding and upgrading digital infrastructure, particularly in rural areas, to ensure that all citizens have access to reliable digital payment options.
3. **Streamline and Simplify Regulations**: The regulatory environment for digital payments should be reviewed and simplified to reduce barriers to entry for FinTech companies and encourage innovation in payment solutions.
4. **Reduce Transaction Costs**: The government could consider subsidizing transaction fees or offering incentives for businesses and consumers to use digital payment systems, making them a more attractive alternative to cash.
5. **Promote Cultural Shift Through Incentives**: Policies that promote a shift in consumer behavior, such as offering incentives for digital transactions, should be implemented. This could include tax breaks for businesses that adopt digital payment systems or discounts for consumers who make digital payments.

4.3.12 Implications of Policy Recommendations for OIC Member Countries

The policy recommendations outlined for Morocco have broader implications for OIC member countries:

1. **Scalability of Awareness Campaigns**: OIC countries can adopt Morocco's approach to public awareness, scaling it to fit their unique socio-economic contexts. A well-informed public is more likely to embrace digital payments, leading to increased adoption across the region.
2. **Shared Focus on Infrastructure Development**: Investing in digital infrastructure is a common need among many OIC member countries. Collaborative efforts, such as shared investments or knowledge exchanges, could accelerate infrastructure development across the OIC region.
3. **Adopting Flexible Regulatory Frameworks**: The need for adaptive and flexible regulatory frameworks is relevant to many OIC countries, particularly those with nascent digital economies. Learning from Morocco's experience, these countries can create environments that encourage innovation while ensuring consumer protection.

4. **Cultural Adaptation of Policies**: The cultural context in each OIC country must be considered when implementing policies to promote digital payments. Morocco's experience demonstrates the importance of culturally sensitive approaches, which can be tailored to fit the diverse cultural landscapes within the OIC.
5. **Regional Collaboration on Cost Reduction Strategies**: OIC countries could benefit from a coordinated approach to reducing the costs associated with digital payments. By sharing strategies and experiences, member countries can develop cost-effective solutions that encourage the adoption of digital payments across the region.

4.4 MOZAMBIQUE

4.4.1 Introduction

As an active participant in the OIC with a sizeable Muslim population, Mozambique anchors Africa's southern frontier. It boasts a diverse culture merging African, Portuguese, and other influences. Its population is approximately 34.5 million, with a density of 43 people/km^2 and 40.2% residing in urban areas (INE, 2019). The 2022 GDP figure is estimated at $18.41 billion, driven mainly by agriculture, natural resources, and services (World Population Review, 2024). Urbanization is increasing, particularly in major centers like Maputo, Beira, and Nampula. The country has actively adopted digitalization, with 7.54 million internet users recorded in January 2022, reflecting a 22.9% increase from the 2021 figure of 5.81 million users, and the internet penetration rate of the total population is 23.1% (DataReportal, 2022) . Good internet penetration and a large number of internet users are important ingredients for digital payment systems.

Recently, Mozambique has taken bold steps to reform its payment systems, which are critical to boosting financial inclusion and global economic integration. The Interbank Company of Mozambique (SIMO) network, the backbone of national card payment switching, is at the forefront of this modernization. This initiative has unlocked a new era of interoperability for card payments both domestically and internationally, signifying a transformative stride towards a broad-reaching and efficient financial ecosystem. The strategic alliance between the Bank of Mozambique and Euronet, a global leader in electronic payment services, has been instrumental in these advancements. Their joint efforts have culminated in the licensing and establishing a robust interbank electronic payment system, linking most of Mozambique's commercial banks. This system adheres to international standards and supersedes its predecessor in managing the interbank transaction network more effectively.

Furthermore, the extensive modernization of Mozambique's payment systems, including the recent implementation of RTGS, Automated Clearing House (ACH), and the development of wallet solutions (MPesa, E-Mola, and Mkesh) is expected to have a profound impact on financial inclusion in the country. By making financial services more accessible and efficient,

these reforms support Mozambique's strategic position in the SADC region and its overall economic development.

Mozambique's journey from the initial stages of payment systems to an emerging digital payment player is a reference within the OIC member states. This case study demonstrates how Mozambique has progressed within the digital financial space, providing a blueprint for growth and progression in the financial sector.

4.4.2 Legal and Regulatory Framework on Payment Systems

Bank of Mozambique (BM) adheres to international standards and best practices, including the Principles for Financial Market Infrastructures (PFMI) of the BIS, while performing its supervisory role. Mozambique's major international payment systems are VISA International (the main), Mastercard, and American Express, which are accepted across the country's payment terminals.

The National Payments System (NPS) in Mozambique encompasses a structured and well-organized network of participants, services, subsystems, payment instruments, technology, and procedures that facilitate the transfer of funds or monetary values for payments and their circulation within the economy. To function legally, payment service providers, including banks, non-bank financial institutions, and other entities that offer payment services, must acquire licenses or authorization from BM. Presently, the BM is updating this Law to adjust its regulations to reflect the current state of the payment system, considering significant advancements and international best practices.

The payment systems in Mozambique are governed by a series of important laws, the salient ones are Law No. 1/92, Law No. 2/2008, Law No. 3/2017, and Law No. 4/2016. Law No. 1/92 outlines the fundamental nature, objectives, and functions of the Bank of Mozambique as the Central Bank of the Republic. Meanwhile Law No. 2/2008 is the cornerstone of the NPS and empowers BM to oversee and regulate the NPS, including FinTech entities.

The Electronic Transactions Law, Law No. 3/2017, represents a comprehensive regulatory framework for electronic transactions, focusing mainly on electronic commerce and government-related activities. Its overarching aim is to ensure a secure and efficient

utilization of information and communication technologies. It applies to individuals and entities, whether public or private, that engage in electronic transactions and encompasses various aspects of electronic transactions and governance. The Law seeks to establish a structured regulatory framework that promotes transparency, security, and efficiency in electronic transactions, thereby safeguarding the interests of all parties.

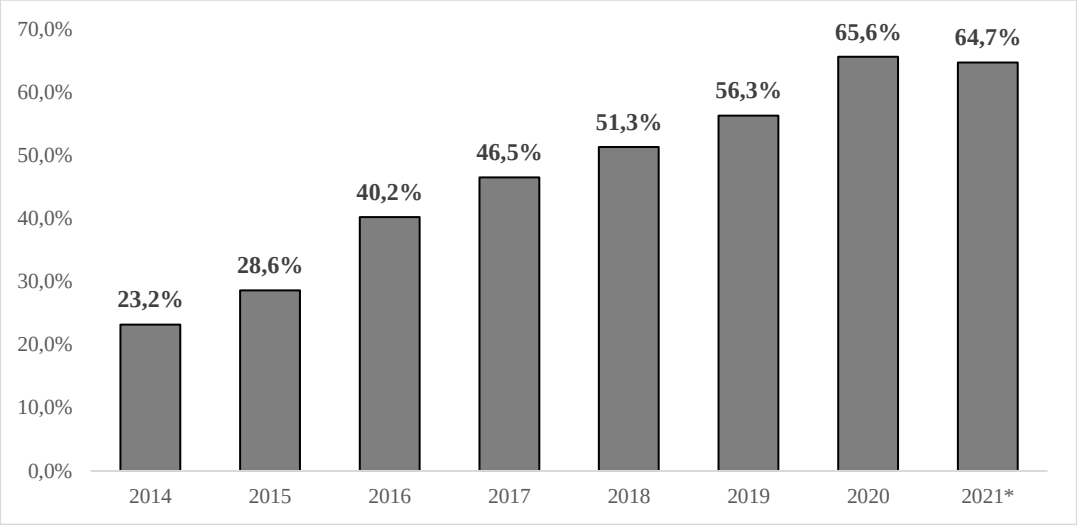
The Telecommunications Law (Law No. 4/2016) and its related regulations are crucial in digital finance. This is mainly because mobile phone operators are significant providers of digital financial services. Consequently, these regulations oversee various aspects of economic activities, including the regulation of payment services offered by these mobile phone operators. According to the National Financial Inclusion Strategy 2016-2022, published in December 2023, one of the strategic objectives underway is to establish a single regulatory framework for electronic money issuance activity.

In 2018, the Bank of Mozambique introduced the Regulatory Sandbox. This regulatory framework permits emerging financial and non-financial institutions, payment service providers, and other supervised entities to conduct testing of their solutions and business models under the Bank of Mozambique's supervision. This initiative allows participants to experiment with new technologies and ideas without being subjected to the full range of regulatory requirements that would generally apply to them. It creates a controlled environment for supervised entities to test and refine their products and services before launching them. Currently, this regulatory environment offers a platform for supervised entities to test their solutions and business models, with the Bank of Mozambique ensuring that they operate within the guidelines outlined in this framework. These supervised entities include digital wallets and payment aggregators, cross-border remittances, loans and credits, and crowdfunding, among other areas of interest.

4.4.3 The Current Level of Development of Digital Payment Systems

Digital financial services, such as digital wallets, are being used to make financial services more accessible outside the traditional banking system. Mobile money services have grown significantly with increased investments by mobile network operators to expand their coverage and promote the use of these services.

Figure 4.22: Adults with Mobile Money Accounts in Mozambique (2014-2021)

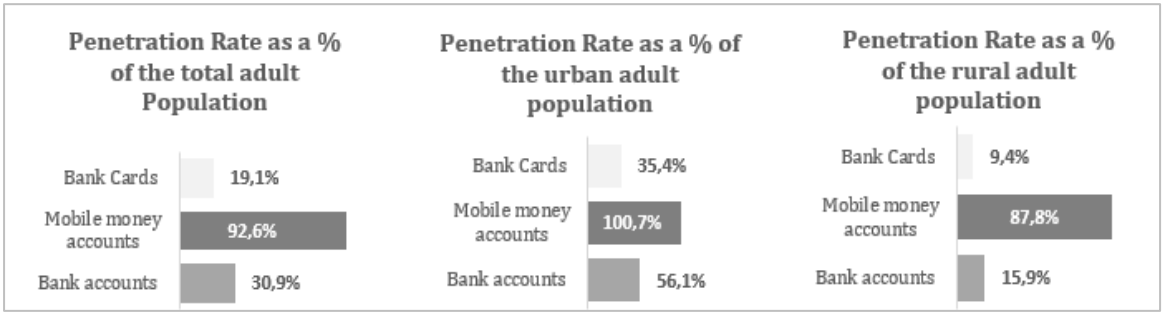


*The Survey was conducted until June 2021

(Statista, 2024e)

Figure 4.22 indicates that nearly 65% of the adult population in Mozambique had a mobile money account in the first quarter of 2021. The share slightly decreased from around 66% in 2020. However, it has overall increased in the period under review. (Statista, 2024e)

Figure 4.23: Mobile Money Penetration Rates



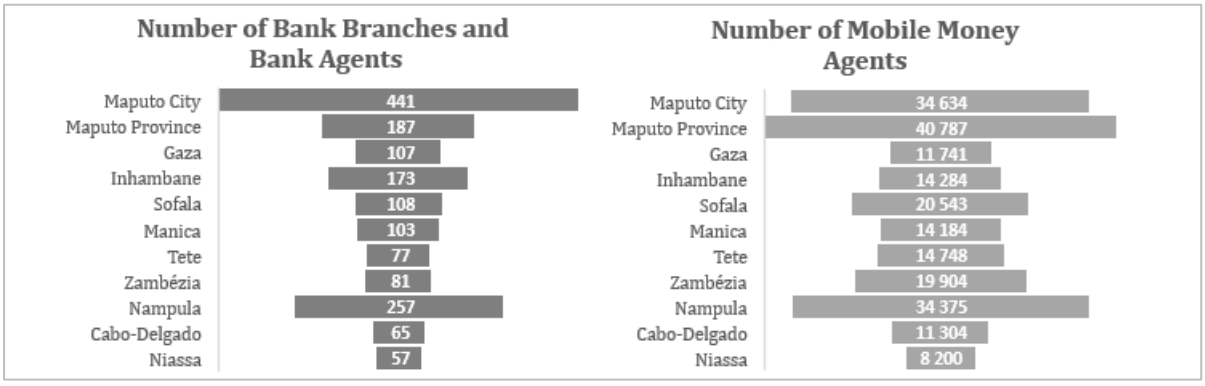
(Bank of Mozambique, 2023)

Figure 4.23 indicates that mobile money services have a higher penetration level in urban and rural areas than traditional banking products such as bank accounts and credit cards.

According to the FinScope survey conducted in 2019 (FinMark, 2019), Mozambique has witnessed a significant increase in its financial inclusion rate, which has gone up from 40% in 2014 to 54% in 2019 due to the successful implementation of mobile money.

As of July 2022, the three mobile wallets operating in Mozambique - M-Pesa, mKesh, and e-Mola - have been interconnected (Bank of Mozambique, 2022). This development has enabled customers of these three electronic money platforms to transfer and receive money between each other, which was previously not possible due to the need for interoperability.

Figure 4.24: Provincial Mobile Money Agent Penetration vs. Banking Service



(Bank of Mozambique, 2023a)

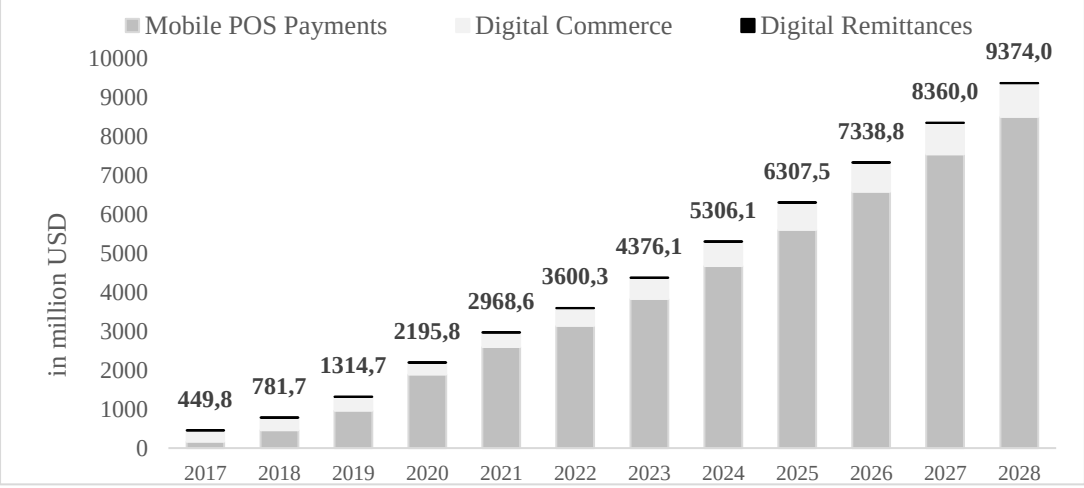
Figure 4.24 below depicts the penetration level of Mobile Money agents compared to banking services by province. Both mobile money and traditional banking services are prevalent in the most significant urban centers, namely the City and Province of Maputo, as well as the province of Nampula.

According to Mozambique's National Financial Inclusion Strategy 2016-2022, expanding and diversifying the network of access points to financial services was one of their main objectives of financial inclusion (Pillar 1 - Access To And Use Of Financial Services). However, there was a significant difference between rural and urban areas regarding access to formal financial services, as shown in Figure 4.24 above and confirmed in the Final Evaluation Report (Bank of Mozambique, 2023f). The provinces of Maputo, Sofala, and Nampula, as well as the city of Maputo, have the highest number of access points per 100,000 adults; while Niassa, Cabo Delgado, and Manica have the lowest access points (Bank of Mozambique, 2023f).

4.4.4 Payment Systems: Current Trends, Issues and Challenges

4.4.4.1 Current Trends in the Payment Systems

Figure 4.25: Digital Payments in Mozambique – Transaction Value Forecast by Segment



(Statista, 2024d)

Figure 4.25 shows that the digital payments market in Mozambique is projected to grow by 15.28% (2024-2028) resulting in a market volume of US$9374.00m in 2028. (Statista 2024d)

The market's largest market is Mobile POS Payments with a projected total transaction value of US$4,676.00m in 2024. (Statista 2024d)

In November 2023, the Bank of Mozambique issued a statement announcing the full integration of all commercial banks and electronic money institutions into a single national network (Bank of Mozambique, 2023c). This integration has been carried out exclusively on the new SIMO platform managed by the Bank of Mozambique and is expected to significantly contribute to promoting electronic payments in Mozambique. The new SIMO platform offers diverse products and services, focusing on interoperability between electronic money institutions, banks, and other financial service providers. The platform also meets international standards for payment systems, which requires contactless technology for all bank cards and POS terminals, enhancing security and convenience for users (Bank of Mozambique, 2023c).

In 2017, the Bank of Mozambique launched an international tender to provide RTGS platform, which fits into a broader project of modernizing the NPS by prioritizing the digitization of payment methods (Bank of Mozambique, 2023e). This project began in 2000, and the RTGS system was officially launched in November 2023 by the governor of the Bank of Mozambique, with the participation of Montran Corporation, the company that won the tender (Bank of Mozambique, 2023e). The RTGS system ensures faster transaction speeds and meets the ISO20022 quality standard, enhancing automation, reducing fraud, and enabling higher-quality analysis (Bank of Mozambique, 2023e).

4.4.4.2 Emerging Legal and Regulatory Issues

(i) **Terrorism *and Money Laundering***

Mozambican authorities have classified the Electronic Money Institutions sector as having a "high" threat level in terrorism financing, indicating a need for robust regulatory oversight. While such measures are necessary for safeguarding against illicit financial activities, they must be balanced with efforts to promote financial inclusion and ensure that legitimate users are not unduly burdened.

To strengthen the procedures to stop and prevent terrorism and money laundering, customers of Electronic Money Institutions, which work through mobile phone companies, face transaction limits beginning at the end of March 2024. The decision is outlined in a notice from the Bank of Mozambique, which requires Electronic Money Institutions to categorize clients into three levels based on risk (Bank of Mozambique, 2024b):

a) Level I, lower-risk clients undergo simplified identification procedures and have lower transactional limits up to an annual transfer cap of 500,000 meticais (around USD 8000) and 40,000 meticais (around USD 630) per transaction.

b) Level II clients with standard or enhanced identification measures fall within transactional limits. They have a maximum account balance of 500,000 meticais, corresponding daily transfer and withdrawal limits, and a transaction limit of 75,000 meticais.

c) Level III, Micro, and small businesses, defined by the Commercial Code, undergo standard or enhanced identification procedures. They have a maximum account

balance of three million meticais, with daily transfer and withdrawal limits and no other restrictions. The limits outlined do not apply to medium and large enterprises, as defined in the Commercial Code, and to organs and institutions of Public Administration.

(ii) **The *Regulatory Sandbox***

Even though the Bank of Mozambique has established a regulatory sandbox, approved its license, and met specific regulatory requirements, it does not include business development and fundraising programs.

According to a statement by the Governor of the Bank of Mozambique, during the launching of the 5th Edition of the Regulatory Sandbox, the first four editions, held from 2018 to 2023, involved seventeen FinTechs. Since starting the Regulatory Sandbox in 2018, the Bank of Mozambique has only licensed two companies to operate in the market. These are Mukuru, approved to provide fund transfer services, and Paytek, approved to provide payment initiation services (Bank of Mozambique, 2024a). Companies need to receive responses from the Bank of Mozambique regarding the review of their licensing dossier. According to the Governor, in addition to Mukuru and Paytek, three FinTechs have submitted licensing applications, while others are preparing the necessary documentation to submit authorization requests.

4.4.5 Digital Payment Systems and Economic Activities

Mozambique's digital economy is still at its infant stage. The country ranks relatively low compared to the rest of the world and the African continent in terms of connectivity and accessibility, digital use, e-administration, and e-commerce: 151/170 on GSMA's 2019 mobile connectivity index, 150/176 on ITU's 2017 Information and Communication Technology (ICT) Development Index, 163/193 on UNDESA's 2020 e-Government Index, and 136/152 on UNCTAD's 2020 e-Commerce Index, Torgusson, C. (2021). The foundational building blocks needed to propel digital transformation still need to be developed. A survey on mobile telephony usage in Mozambique, encompassing 12,510,571 people who own a mobile phone and are aged 16 and older, revealed that the average usage of mobile telephony services is 54.5% of the population in rural areas and 45.5% in urban

areas. Among this number, the more significant percentage belongs to men, at about 59.2%, and 40.8% for women. The young population constitutes the majority of mobile telephony service users, with the age group of 20 to 24 years appearing as the largest, at about 14.1%, followed by the age group of 25 to 29 years, at about 12.2% (INCM, 2023).

According to World Bank data, in 2021 (World Bank, 2021), the percentage of individuals using the internet in Mozambique, as a percentage of the population, stood at 17%.

The Government of Mozambique, through the Ministry of Transport and Communications (MTC), is implementing with the support of the World Bank the Mozambique Digital Acceleration Project (PADIM), whose objective is to increase digital adoption and inclusion and support selected foundations to induce accelerated digital transformation (Torgusson, C, 2021)

The proposed project is designed to increase broadband internet access, promote increased digital inclusion, and accelerate country-wide digital transformation, focusing on critical digital foundations and enablers. The project is designed around three integrated and mutually reinforcing components, jointly contributing to Mozambique's green, resilient, and inclusive development, with a fourth component dedicated to contingent response to future emergencies, namely: (i) Digital Access and Inclusion; (ii) Foundations for Accelerated Digital Transformation (iii) Project Management, Institutional Coordination, and Citizen Engagement; (iv) Contingent Emergency Response Component (Torgusson C, 2021).

4.4.5.1 E-Commerce

E-Commerce businesses in Mozambique often use social media platforms like Facebook, Instagram, and WhatsApp to interact with customers. Payments are commonly made through mobile money and bank transfers. A few active e-commerce sites in Mozambique include Bazara by Vodacom, Krolyc, Mukhero, and Xava. Only Bazara accepts card payments, while others rely on mobile money transactions and bank transfers. Furthermore, mobile wallets like Mkesh, e-Mola, and Mpesa enable the purchase of prepaid

electricity and airtime and the payment of utilities such as water, TV, and Internet bills (International Trade Administration, 2024).

4.4.5.2 E-Government

There are several government projects, namely, Government-to-Person (G2P) Payments in National Institute of Social Action (INAS), Person-to-Government (P2G), payment of National Social Security Institute (INSS), state payments to employees e-SISTAF, access and payment of customs duties and processes via MCNET (FSDMoç & FINTECH.MZ, 2021). However, each project is developed in a standalone and disjointed way. It only involves some existing financial operators and consequently does not reach all its clients.

The Revenue Administration (Autoridade Tributária, AT) is developing its digital interface (Portal do Contribuinte) to allow all taxpayers to file and pay all taxes electronically. This interface connects the taxpayer with e-tributação (electronic tax filing system to collect all taxes). It is currently operational for only two types of taxes: VAT and the simplified tax for small taxpayers (IMF, 2024).

According to FinTech Report 2021 (FSDMoç & FINTECH.MZ, 2021), numerous state payments are still made by non-digitized citizens, requiring physical visits to crowded counters and offices, while these processes could be digitized and seamlessly integrated into the national financial system, making it easier for citizens to fulfill their obligations to the state with lower costs for both parties. The agency that has a lead role in the digitalization of government and supports the implementation of the strategy is the National Institute of Electronic Government (INAGE), created in 2017 (World Bank, 2019). Sitting at the Ministry of Science and Technology, INAGE's key attributions include: i) coordinate the implementation of activities in the domain of ICT in collaboration with public and private sectors, as well as civil society; ii) manage the shared interoperability platform for electronic government; iii) implement and manage the government's data center's and associated services; and iv) promote innovation and modernization of the public administration (World Bank, 2019). Table 4.13 below compares utility payment methods in 2017 and 2021 for individuals aged 15 and above.

Table 4.13: Utility Payment Methods Among Individuals Aged 15+ (2017 vs. 2021)

Methods of making utility payments	2017	2021
Made a utility payment: using a financial institution account	6%	12%
Made a utility payment: using a financial institution account (% who paid utility bills, age 15+)	22%	39%
Made a utility payment: using a mobile phone	10%	14%
Made a utility payment: using a mobile phone (% who paid utility bills, age 15+)	35%	46%
Made a utility payment: using an account	13%	16%
Made a utility payment: using an account (% who paid utility bills, age 15+)	43%	54%
Made a utility payment: using cash only	13%	8%
Made a utility payment: using cash only (% who paid utility bills, age 15+)	45%	26%

(Global Findex database, 2021)

The use of financial institution accounts and mobile phones for payments increased from 6% to 12% and from 10% to 14%, respectively. Among those who paid utility bills, the usage rose from 22% to 39% for financial institution accounts and 35% to 46% for mobile phones. The use of accounts for utility payments increased from 13% to 16%, while cash-only payments decreased from 13% to 8%, with a notable drop from 45% to 26% among those who paid utility bills.

4.4.6 Cross-Border Digital Payment Initiatives and Collaborations

Informal cross-border trade is estimated to make up 30-40% of the total intra-regional trade value in the SADC, amounting to approximately 17.6 billion USD (FMT & FSD, 2023). Traders find it challenging to plan their expenses when using digital money, so they prefer to have a set amount of cash on hand. This approach helps them easily track how much money is available. Once the cash is spent, they know they have maximized their purchasing within their budget.

In the context of the launch of the regulatory sandbox by the BM, one of the participating companies in the first editions, Mukuru, obtained a license from the BM and is currently operating in Mozambique (Bank of Mozambique, 2023b).

Mukuru is a digital platform founded in the UK in 2004 focusing on financial inclusion via innovative technology. In 2009, it started offering remittance services for UK and European Union (EU) migrant workers to send money to Zimbabwe (Mukuru, www.mukuru.com). To address the challenges of informal remittance channels, Mukuru

partnered with Inter-Africa in South Africa, creating a safer and more reliable system. Collaborating with the South African Reserve Bank, Mukuru introduced a streamlined KYC document capture method. It also launched a free USSD platform for easier transactions and, in 2018, developed proprietary FinTech solutions for compliance and scalability. In 2019, Mukuru introduced the WhatsApp business, which quickly became responsible for 25% of its transactions (Mukuru, www.mukuru.com).

4.4.7 Specific Needs to Improve the Payment Systems

The nation performs worse than the region in all connection-enabling categories (infrastructure, cost, consumer preparedness, and content and services). Mozambique still needs to prepare to use digital technology since people, companies, and the government have not adopted broadband satisfactorily. The challenge of limited internet access and partial telecommunications network coverage significantly impacts the financial sector. Addressing this issue requires solutions that go beyond just the telecommunications sector. While innovative solutions like SMS-based applications could alleviate the limitations of restricted internet access, they would not be effective in areas where the telecommunications network coverage still needs to be improved. The affordability of broadband-enabled devices is also a significant barrier to access in Mozambique, while other demand-side barriers relate to digital illiteracy. Digital skills are a prerequisite for benefiting from any technology.

4.4.8 Case Studies: Lessons Learnt and Knowledge Transfer among OIC Member Countries

The Mozambique case study offers valuable lessons for OIC member countries at the infant stage of developing their digital financial ecosystems. The following are the salient lessons that can be transferred to these OIC member countries.

1. **Digital Infrastructure Development:** Mozambique's emphasis on enhancing digital infrastructure, such as implementing RTGS and ACH, is crucial for modernizing payment systems. OIC member countries can learn from this by prioritizing similar infrastructure projects to improve transaction efficiency and financial inclusion.

2. **Regulatory Framework:** Establishing clear and adaptive legal and regulatory frameworks in Mozambique, such as the Electronic Transactions Law and the Regulatory Sandbox, has fostered innovation while ensuring compliance. The OIC member countries concerned can adopt these frameworks to encourage FinTech growth and enhance financial inclusion.
3. **Public-Private Partnerships:** Mozambique's strategic partnerships, particularly with Euronet for electronic payment services, demonstrate the benefits of collaboration between the public and private sectors. OIC member countries can replicate this approach by fostering similar partnerships to leverage private sector expertise and resources for national financial development.
4. **Financial Inclusion Strategies:** Initiatives like mobile money interoperability and targeted financial inclusion strategies in Mozambique have significantly increased financial access. OIC countries can implement similar inclusive financial strategies and promote mobile banking solutions to enhance access to financial services, especially in underserved areas.
5. **Digital Literacy and Education:** Mozambique's efforts in promoting digital literacy and conducting educational campaigns have facilitated the adoption of digital financial services. OIC member countries can benefit from implementing comprehensive digital literacy programs to increase public awareness and usage of digital financial tools.
6. **Government Initiatives:** Government-led projects like the Mozambique Digital Acceleration Project highlight the significant role of government initiatives in promoting digital transformation. OIC countries can accelerate digital adoption and drive economic growth by implementing similar government-led projects focused on critical digital foundations and enablers.

By adopting these lessons, OIC member countries concerned can enhance their digital payment systems, fostering a robust and inclusive financial ecosystem.

4.4.9 Country-Specific Policy Recommendations

To advance in digital payments, Mozambique requires greater government engagement and a comprehensive approach that addresses political, regulatory, financial, and technological dimensions. Here are key recommendations:

1. **Enhance Digital Literacy:**

   a) Educational Campaigns: The government should promote digital literacy through educational campaigns to increase public awareness and understanding of digital financial services. Collaborations with the private sector, particularly mobile phone companies, can be pivotal.

   b) Focus on Rural Areas: These campaigns should prioritize rural areas with higher levels of financial illiteracy, ensuring that these communities are included in the digital transition.

2. **Expand Internet Access**.

a) Subsidies and Public Funds: The government should subsidize internet access, utilizing public funds and support from non-profit organizations. This initiative can expand internet access, particularly in rural areas, by establishing free or cheaper access points in community centers, schools, and other public establishments.

b) Infrastructure Development: Incentivize telecommunications companies to invest in infrastructure development through tax exemptions, subsidies, and public-private partnerships. These partnerships can help identify and prioritize regions with low connectivity.

3. **Strengthen Regulatory Framework:**

a) Centralized Monitoring: The creation of the INAGE should facilitate the centralization of monitoring for various digital payment services available to the public. This will ensure a more coordinated and efficient regulatory environment.

b) Updated Legislation: Update and harmonize existing laws to reflect advancements in digital payment systems, ensuring they are aligned with international best practices and standards.

4. Promote Financial Inclusion:

a) Comprehensive Study on Remittances: Conduct an extensive study on the national and international transfer market, focusing on remittances. This study will identify gaps, challenges, and opportunities, allowing for the design of financial inclusion strategies that meet the needs of remittance recipients.

b) Inclusive Strategies: Develop strategies that promote economic accessibility within the financial ecosystem, ensuring that digital financial services are accessible to all population segments.

5. Encourage Public and Private Sector Collaboration:

a) Incentive Programs: Implement incentive programs to encourage telecommunications companies to invest in underserved regions. These programs could include tax exemptions or subsidies to make infrastructure development more attractive.

b) Public-Private Partnerships: Foster partnerships between the public and private sectors to jointly address connectivity challenges and expand access to digital financial services.

6. Implement the Digital Acceleration Project:

a) Focus on Digital Transformation: The Mozambique Digital Acceleration Project should aim to increase broadband internet access, promote digital inclusion, and accelerate digital transformation nationwide. This project should focus on critical digital foundations and enablers, contributing to Mozambique's green, resilient, and inclusive development.

4.5 UNITED KINGDOM

4.5.1 Introduction

Although the UK is not a member of OIC, it is, however, a very important country that has a very mature banking and financial system and a very sophisticated digital payment system. It may, therefore, be used as a comparative benchmark, to gauge the development and progress of its experiment in the digitalization of the payment system in some other countries elsewhere.

Being a leading global financial hub and center, the UK offers insights into the evolution of digital payments amidst dynamic market dynamics and regulatory interventions. It serves as an exemplary case study for digital payment systems in view of its advanced sophisticated financial infrastructure, robust regulatory framework, and high level of technological adoption (The Economist, 2023).

The UK's Banking sector is one of the oldest existing systems. It can be traced back to the 17th Century and is one of the largest in the world. Digital payments in the UK are characterized by a light use of cash and a heavy use of debit, credit and merchant cards, and a rapid adoption of electronic wallets like Apple Pay, Google Pay, and PayPal. Indeed, it is noticeable how few domestic payments are in the UK. (Statista, 2024f)

The UK 's economy is dominated by the service sector, which includes banking, finance, retail, hospitality, as well as public services like health and education. Its GDP is highly concentrated in England, followed by Scotland, Wales, and Northern Ireland. Other industries include manufacturing, construction, agriculture, and utilities, account for around a fifth of economic output altogether. (UK Parliament, 2024)

Before Brexit and before the COVID-19 pandemic, the British economy and payment landscape was already undergoing rapid digital transformation. Instead of cash, individuals started using mobile and online banking. E-wallets gained popularity, offering consumers more convenient ways to manage their finances and make instant payments anytime and anywhere. According to UK Finance, contactless payments accounted for over half of all debit card transactions in 2019 (UK Finance, 2019).

The Faster convenient and secure Payments Service was, in fact, launched since 2008. This allowed individuals and businesses to make almost instant bank transfers and payments online (24/7) without the need of cash. Contactless payment technology gained greater popularity, offering a convenient and quick way to pay for goods and services, especially during and after the Pandemic COVID-19. Businesses also adopted digital payment technologies, with many adopting online payment gateways and POS systems to accommodate changing consumer preferences. However, cash remained a widely used payment method, particularly for small-value transactions. Thus, the UK made steady growth, though it faced uncertainties due to the impending departure from the EU. The UK was a member of the EU single market, allowing for the free movement of goods, services, capital, and people within the bloc. London, as a global financial hub, played a significant role in the European and global financial markets. The UK government aimed to maintain the country's position as a global FinTech hub, emphasizing innovation and competition. Brexit may have led to regulatory divergence from the EU in some areas, potentially affecting cross-border payments and regulations governing FinTech companies (HM Treasury, 2019; UK Finance, 2020; Tetlow and Pope, 2020, Pay.UK, 2021).

The financial sector was a key driver of the UK economy, contributing significantly to its GDP. It encompassed banking, insurance, asset management, and other financial services. London's financial district, the City, was home to numerous multinational financial institutions, attracting talent and investment from around the world (HM Treasury, 2019, 2022, 2023a).

Brexit negotiations created uncertainty for businesses, with concerns about trade agreements, regulatory changes, and access to the EU market. However, the economy remained resilient, supported by strong consumer spending, low unemployment, and robust business investment. Before the Brexit, the UK was part of the EU's single market and customs union, which facilitated trade, investment, and labor mobility. However, the UK voted to leave the EU in June 2016, a process of withdrawal, that officially occurred on 31st January 2020. Before Brexit, UK-based financial institutions enjoyed passporting rights, allowing them to provide services across the EU without additional licenses. Post-Brexit, these rights ceased, affecting cross-border operations (Owen *et al.*, 2017, Pay.UK, 2021).

The outbreak of the pandemic COVID-19 in early 2020 had another profound impact, which was not necessarily negative on the global economies of the world, including the UK. Lockdowns, travel restrictions, and reduced consumer spending led to a sharp contraction in almost all services, especially the use of cash. Nevertheless, this led to an unprecedented surge in the level of contactless payment instead of cash. People accepted to use contactless payment methods, like tap-and-go with debit and credit cards and mobile wallets as a result of minimizing physical contact. This shift accelerated the adoption of digital payments. As with lockdowns and social distancing measures, online shopping became more prevalent and consumers turned to digital payments for their e-commerce transactions, favoring debit and credit cards and online platforms instead of using cash as cash was perceived as a potential carrier of the virus. Many individuals and businesses preferred digital options to reduce the risk of transmission (Zhou et al., 2023).

The UK Governments also encouraged digital payments during the pandemic, providing incentives or waived fees for electronic transactions to promote cashless alternatives. This also allowed retailers and restaurants to adapt to and adopt online ordering and delivery. Digital payments facilitated these new business models. This in turn led to Mobile payment apps gaining popularity. Services like Apple Pay, Google Pay, and PayPal saw increased usage as people sought touchless payment solutions. In a nutshell, the pandemic altered consumer behavior, leading to a re-evaluation of payment preferences. Digital payments became more habitual (Miller, 2023).

The use of cash money in the UK has decreased significantly since 2016, especially during the coronavirus pandemic. As a result, the UK economy experienced significant fluctuations due to both Brexit and the COVID-19 pandemic. While challenges persist, policymakers and businesses are working to navigate this complex landscape and foster recovery. ~~T~~he pandemic COVID-19 created new options and opportunities to accelerate the shift towards digital payments in the UK. To meet the increased demand for contactless digital payment, the UK government raised the contactless payment limit from £30 to £45 to “50 and to £100 between 2020 and 2023. (Siddiqui, 2020, Bank of England, 2021, Miller, 2023; UK Finance 2023).

Businesses quickly adapted to the new normal by implementing contactless payment terminals, QR code payments, and online ordering systems. Digital wallets and P2P payment apps also saw a surge in usage as people sought touch-free and hygienic payment options. The pandemic underscored the importance of resilient and secure payment systems, prompting increased investment in FinTech infrastructure and cybersecurity measures (Davies, 2024).

Prior to these events, the UK economy experienced steady growth, with services (including finance, retail, and hospitality) being a major contributor. Manufacturing and construction also played significant roles. The UK GDP levels were relatively stable, although growth rates varied over time. Nowadays, the UK has managed to exit these disasters, and the Businesses have managed to adapt to new trade rules, customs procedures, and regulatory frameworks post-Brexit. Some sectors faced disruptions, while others explored opportunities outside the EU (Study Smarter, 2024).

The digital payment landscape in the UK has advanced significantly, reflecting a high level of development and adoption of digital payment systems. Recently, the UK ’s technology ecosystem is using the supported expertise available through AI and cyber security, which have helped create a successful digital transformation of financial services operations (Gov. UK, 2024).

4.5.2 Legal and Regulatory Framework on Payment Systems

The payment system in any country have become very important, as it allows people, businesses, and governments to reduce the use of cash and replace it with transferring money online through the use of cards, mobile and online banking, more easily and offers us safety and considerable benefits from the monetary system. The UK has a unique, comprehensive and multifaceted complex legislative and a regulatory framework applicable to payment systems. The legal and regulatory framework on payment systems in the UK comprises a combination of legislation, regulatory oversight by governmental authorities, and industry standards aimed at ensuring the safety, efficiency, and integrity of payment transactions (CMA, 2021; Pay.UK, 2021; HM Treasury, 2023b; The Economist, 2023).

The UK financial system is monitored by the Bank of England and is highly regulated by agencies that report to the Bank of England which continue to support the evolution of digital payments, driving convenience, efficiency, and security in financial transactions though its regulatory frameworks and industry initiatives. This has great impact in reducing risks and preventing any issues and problems before they even happen (Bank of England, 1998, 2019, 2020, 2022, 2024).

In the UK, the main legislation that applies to the Payment Systems Regulator (PSR) is the Financial Services (Banking Reform) Act 2013. Payment systems in the UK are regulated under general legislation and specific regulation from the Bank of England, the Financial Services Authority, and the Office of Fair Trading (HM Treasury, 2022).

Payment systems are also regulated under conducting of business rules issued by the Financial Services Authority. Generally, payment services are not regulated under conduct of business rules. The issuer of e-money may be an e-money institution "authorized" to issue e-money and provide payment services under the Electronic Money Regulations (made under the Payment Services Directive) as implemented into UK's law (UK. Gov., 2015, 2023a, 2024).

In the UK, the regulation includes various legal texts that set out the objectives, duties, and powers of the payment systems regulator. There are several institutions that oversee the operation of payment systems in the UK. Usually, they are the Bank of England, the Financial Conduct Authority (FCA) or other financial regulatory authorities that monitor, control and regulate financial institution in order to identify, assess, analyze and manage all the financial risks including the risks that are associated with payment systems and at the same time safeguard the interests of consumers using the payment systems (Bank of England, 2020; Financial Conduct Authority, 2017, 2022).

Bank of England (BoE) plays a focal and a crucial role in overseeing the safety and efficiency of payment systems in the UK. For instance, it conducts and operates the RTGS, which settles large-value payments between banks and financial institutions in real time (Bank of England, 2020).

FCA: The FCA regulates the conduct of firms providing payment services and electronic money issuance. It oversees compliance with the PSR and conducts supervision to ensure

consumer protection, market integrity, and competition within the payment services industry (Financial Conduct Authority, 2017, 2022; Competition and Market Authority, 2021).

PSR: Established under the PSR, this independent regulatory body is responsible for promoting competition, innovation, and the interests of service users in payment systems. It monitors and enforces compliance with the PSR and investigates anti-competitive behavior or market abuses (Payment Systems Regulator, 2020). In conducting these operations these institutions follow a number of standards such as:

1. ISO 20022: This international standard for electronic data interchange is widely adopted in payment systems to facilitate interoperability, standardization, and automation of financial messages. It enhances efficiency, reduces operational risks, and supports the integration of domestic and international payment systems (Bank of England. 2024).

2. Payment Card Industry Data Security Standard (PCI DSS): Developed by the Payment Card Industry Security Standards Council, PCI DSS sets requirements for safeguarding cardholder data and preventing fraud in payment card transactions. Compliance with PCI DSS is mandatory for entities processing card payments to protect sensitive information (Payment Card Industry Council, 2016, 2023).

3. Open Banking Standards: Introduced to promote competition and innovation in retail banking, open banking standards facilitate secure access to customer account data and payment initiation by third-party providers through APIs. They enable customers to authorize the sharing of their financial information with authorized third parties for payment services and account aggregation (Competition and Market Authority, 2021).

4.5.3 The Current Level of Development of Digital Payment Systems

In recent years, especially during and after the COVID-19 Pandemic, the UK has seen significant changes in payment behavior. It has witnessed a substantial evolution and significant sophistication in its digital payment systems. For example, the COVID-19 Pandemic led to shifts in spending patterns, with more and more people are now using contactless payments, online banking, and mobile wallet channels instead of Cash.

The use of cash money has decreased significantly since 2016. This is due to the influence of technological advancements, shifts in consumer behavior, and some external factors such

as the COVID-19 pandemic. While the use of cash continues to decline in the UK, it remains, however, an essential part of the payment ecosystem, ensuring inclusivity and resilience. Although cash ranks perhaps as the second most popular payment option in the UK, it has been on a steady decline for several years as electronic payment methods skyrocket in popularity. The percentage of cash payments declined from 62% in 2006 to just 15% in 2021. However, more than a million people in the nation almost exclusively use cash for their daily transactions (UK Finance, 2020, 2022, 2023; Pay.uk, 2021).

Instead of Cash, E-wallets have become increasingly popular in the UK payment landscape. They include among others, the most widely used digital wallets in the UK, namely Apple Pay, Google Pay, and Samsung Pay as they allow users (payees) to securely store their payment information and make contactless payments using their smartphones or other devices. E-Wallets offer convenience, security, and flexibility for online transactions, money transfers, and budget management (Commencis, 2023).

The UK has made significant strides in the development and sophistication of its digital payment systems, marked by widespread adoption of various forms such as contactless and mobile payments, innovation in open banking, and growing interest in cryptocurrency and blockchain technology. This is driven by technological innovation in FinTech, regulatory initiatives, and changing consumer preferences (HM Treasury, 2019, Pay.UK, 2021; Statista, 2023; Miller, 2023; PwC, 2024).

Payments are essential to the UK's economy – to people, to businesses – and are a major source of the UK's competitive growth, at the heart of a dynamic and changing financial services sector. In fact, The UK was one of the first countries in the world to establish a system for instant payments when it launched Faster Payments in 2008. Today, the UK has a thriving and successful payments market which has been transformed in part by legislation designed to support competition, but also due to wider technological innovation and evolving user preferences. A large and growing number of payment services businesses have entered the market with new technologies, functionalities, and end-user facing services that enrich payment 'journeys' and make it is easier than ever before for consumers and businesses to make payments. Digital payments in the UK are characterized by a heavy use of cards, and a rapid adoption of wallets like Apple Pay, Google Pay, and PayPal (Pay.UK, 2021; Gov.UK., 2023a; Statista, 2023a)

Digital payment systems in the UK have reached an advanced stage of development, characterized by widespread adoption of contactless and mobile payments. Contactless payments account for a significant portion of debit card transactions, while mobile payment solutions such as Apple Pay and Google Pay have gained traction among consumers. Open Banking initiatives and the growing acceptance of cryptocurrency further demonstrate the maturity of digital payment ecosystems in the UK. Cards remained king in the UK POS and e-commerce payments landscape, though. Their dominance is noticeable in POS payments, especially, due to the substantial integration of contactless (tap to pay) technology in issued credit and debit cards (Statista, 2023a).

The Current trends in the digital payment systems in the UK include the rise of P2P payments, the integration of biometric authentication, and the emergence of DeFi platforms. However, challenges such as cybersecurity threats, regulatory compliance, and interoperability issues persist, requiring continuous innovation and collaboration among stakeholders to address. Digital payments consist of various electronic payment methods, involving banking debit and credit cards, internet online banking, electronic fund transfer, e-money, mobile payment systems (MPS), mobile and smart watches payment systems, and quicker payments, real-time payment systems (RTPS). (UK Finance, 2023, Statista, 2023b). This has taken may forms such as:

1. Contactless Payments: which have gained widespread public acceptance in the UK, with consumers, increasingly using contactless cards, mobile wallets, and wearable devices for transactions. According to the UK Finance report (2023), contactless payments accounted for over 60% of all debit card transactions in the UK in 2022, reflecting a significant shift towards cashless transactions (UK Finance, 2023).

2. Mobile Payments: The adoption of mobile payment solutions has surged in recent years, propelled by the proliferation of smartphones and the availability of mobile banking apps. Services such as Apple Pay, Google Pay, and Samsung Pay have gained traction among consumers, offering convenience and security in digital transactions. Statista (2023) reported that mobile proximity payment transaction value in the UK amounted to £123 billion in 2022, demonstrating the increasing reliance on mobile devices for payments (Statista, 2023b).

3. Open Banking: The implementation of Open Banking standards has catalyzed innovation in the financial sector, enabling secure access to banking data and fostering competition among financial service providers. Open Banking APIs facilitate the development of innovative payment solutions, including account aggregation, payment initiation, and personalized financial management tools (Finance Magnet, 2023)

4. Cryptocurrency and Blockchain: The UK has emerged as a prominent hub for cryptocurrency and blockchain technology, with growing interest from investors, businesses, and regulators. Cryptocurrency exchanges, blockchain startups, and FinTech firms offering crypto-related services have proliferated in the UK, contributing to the diversification of payment options and financial services (Financial Conduct Authority, 2023).

5. Regulatory Framework: Regulatory initiatives, including the Payment Services Regulations 2017 and the Open Banking Standards, have played a crucial role in shaping the digital payment landscape in the UK. Regulatory bodies such as the FCA and the Bank of England have implemented policies to promote competition, innovation, and consumer protection in the payment industry, fostering a conducive environment for the development of digital payment systems (Pay.UK, 2021; Bank of England, 2022; Financial Conduct Authority, 2022; UK Finance, 2023; Statista, 2023b).

4.5.4 Payment Systems: Current Trends, Issues, and Challenges

In today's digital payment system, both the payer and the payee use the digital method to either send or receive the due amount of money. This kind of digital payment is also called cashless transaction performed through different digital channels, via online modes without the physical exchange of money. It has multiple advantages, such as simplicity, convenience, improved access to financial resources, economic advancement, security, and efficient tracking for both the buyers (payer) and the sellers (Payee) together with the advantages to banks, other financial institutions and all related stakeholders. Nowadays, Digital payment is widely used in various industries due to its safety and convenience. Additionally, the growing preference for digital payments over cash is changing the way people handle money, which is having a major impact on businesses (Capital One, 2021; Davies. 2024, Yahoo Finance, 2024).

Digital Payment Market size was valued at USD 88.8 Bn in 2021, registering a CAGR of 17.5% during the forecast period (2023-2030), and the market is projected to be worth USD 379.1 Bn by 2030 (Digital Payment Market Innovative Report, 2024). The Access Bank UK Ltd (2008) also stated that mobile payments, ATM, debit cards, faster payments and CHAPS have been the pivotal digital payment systems in the UK . Understandably, these digital payment systems have been evolving to meet increasing customer demands for instant payments such as person-to-business 'real-time' payments even internationally at any time and everywhere. According to Access Bank UK Ltd (2008), digital payments (also known as electronic payments) are used interchangeably with the following descriptions: e-payments; e-commerce payments; online payment; micro payment; e-payment systems; online payment systems; online purchasing systems; online payment gateways; online checkouts; etc. (The Access Bank UK Ltd, 2008; Yahoo Finance, 2024)

The UK together with the EU are leveraging advanced analytics solutions to deal with the emerging issues such as money laundering and the risks of financing terrorism. They are trying to strengthen the efforts of tackling money laundering, but the regulators and supervisors are concerned about the payment sector’s use of new technologies, crypto assets, and AI (European Council, 2024).

The Emerging legal and regulatory issues in the UK's digital payment landscape include data privacy concerns, regulatory sandboxes for FinTech experimentation, and the regulation of emerging technologies such as blockchain and artificial intelligence. Balancing innovation with consumer protection remains a key priority for regulatory authorities (Financial Conduct Authority, 2022).

4.5.5 Digital Payment Systems and Economic Activities

Digital payment systems play a vital role in driving economic activities in the UK by enhancing financial inclusion, reducing transaction costs, and promoting e-commerce and digital entrepreneurship. The efficiency and accessibility of digital payments contribute to economic growth, job creation, and the overall competitiveness of the UK's economy (Sharma, 2023).

4.5.6 Cross-Border Digital Payment Initiatives and Collaborations

For several years and through EU membership in particular, the UK has been involved in several initiatives aimed at creating, developing and, more recently, establishing real-time retail payment services that are beneficial to the whole continent. Such projects include EBA CLEARING's former STEP-1 real-time settlement system and its new pan-European payment system project under the moniker of "Europe 2.0"; the European Automated Clearing House Association SEPA instant credit transfer scheme; the ERPB's pan-European Payment Solution Providers register; and the joint initiative of EBA CLEARING and EBA Association to further explore the possibility of establishing a coherent market infrastructure for data-rich payments through the use of API communication (European Commission, 2020).

Cross-border digital payment initiatives and collaborations between the UK and international partners are essential for facilitating global trade, remittances, and financial integration. Initiatives such as the SEPA and collaborations with non-EU countries promote interoperability and standardization in cross-border transactions, fostering greater efficiency and transparency (Bank of England, n.d.).

4.5.7 Specific Needs to Improve the Payment Systems

To further enhance payment systems in the UK, specific needs include strengthening cybersecurity measures, promoting innovation through regulatory sandboxes, fostering interoperability among payment providers, and enhancing consumer education and protection. Collaboration between public and private sectors is crucial to address these needs effectively (Nasar, 2024).

4.5.8 Case Studies: Lessons Learnt and Knowledge Transfer among OIC Member Countries

There has been a remarkable transformation in the area of international or cross-border payment systems and remittance services, driven mainly by the use of new digital technology and globalization. Cross-border retail transactions and cross-border money transfers by migrant workers have expanded dramatically due to the increased connectivity of trading operations. Instead of using traditional bank services, tens of millions of people around the world are using a new breed of technology-based companies to offer better value for money and better transfer services. Nations and countries should learn and share their

experiences and best practices with and from countries in the cutting-edge of digitizing payment systems to assist other nations and countries, including OIC member countries in their quest towards building sophisticated digital payment system, inclusive economies and achieving greater economic growth and development.

A number of lessons could be learnt by all OIC member countries from the UK's experience with digital payment systems. These include the importance of regulatory agility, stakeholder engagement, and technological innovation in driving adoption and mitigating risks. Knowledge transfer among OIC member countries can focus on adapting regulatory frameworks, fostering public-private partnerships, and leveraging digital infrastructure to promote financial inclusion and economic development.

Payment systems everywhere have evolved rapidly in recent years, underpinned by technological advances and driven by a number of objectives. The creation of a safe, secure, efficient, accessible, and competitive payment system infrastructure is widely viewed as a necessary prerequisite for both financial inclusion and more efficient financial intermediation. This has been made possible by the arrival and use of smartphones and electronic wallets.

It is now very important and pertinent for all countries to consider transferring knowledge and best practices in digital payment adoption and regulations among and within OIC member countries. This, among other benefits, is to minimize the speed differential, which has been noted to cause potential costly effects and instability to emerging and high growth economies should they lag far behind in the level of adoption of digital payments. This will also involve identifying, among the numerous global practices, the best combination of policies and incumbent regulations that could be implemented to support the process of digitalization of payments in the member countries. Countries with relatively low, minimum or basic level of digital payments adoption are to be particularly given much attention. However, this does not come without costs as there are several challenges in the digitization process, such as the absence of digital infrastructure, lack of educated people, unwillingness of the masses to transition from cash to a digitally efficient system, and national systems lacking compatibility with international standards.

This raises important questions: how to begin with rejuvenating the payment systems? What kind of policy is required, and what are the challenges to developing countries?

CHAPTER 5: CONCLUSION AND POLICY RECOMMENDATIONS

This final chapter provides actionable policies that will help enhance collaboration and cooperation in reforming digital payment systems among OIC member countries. These practical policy recommendations will not only enhance cross-border collaboration but will also help member countries with low level of development to upgrade their payment systems in preparation for further regional integration. The policy recommendations for deepening payment system reforms include their rationales which would help policy makers in arriving at informed conclusions. Before the policy recommendations, this chapter provides a roadmap for a well-functioning digital payment system which could be considered by individual jurisdictions within the OIC member countries when reforming their payment ecosystem.

5.1 Concluding Remarks

Payment system remains one of the fastest developing sectors in the financial industry globally and should be closely watched for massive transformation. Therefore, there is a need for the OIC member countries to monitor global developments, identify best practices, and spearhead significant initiatives that will transform digital payment systems in the region. Beyond the need for a major leap towards digital economy, transformation of the payment systems within the OIC member countries would enhance economic efficiency and promote intra-OIC trade while reducing transaction costs.

Despite the advantages, there are challenges that need to be addressed. Cybersecurity remains a key issue to be considered by regulators and supervisory authorities and this can be collectively addressed when there is cross-border collaboration. Another important issue is digital literacy, which calls for the need to introduce educational and awareness initiatives to help improve the level of digital literacy among the populations of consumers in the OIC countries. Therefore, efforts toward transforming the digital payment systems in the OIC member countries through shared vision would help achieve the much-needed advancements in economic infrastructures and boost intra-OIC trade and economic activities.

5.2 Detailed Policy Recommendations

To ensure digital transformation of the payment systems, there is a need to consider the various roles of, and action plans required from various stakeholders within the ecosystem. This is even more important in a situation where various countries in the OIC region are of different levels of development. Therefore, the detailed and specific policy recommendations are meant for varying levels of development. Based on the case studies discussed in this report and their corresponding findings and recommendations, the specific policy recommendations are classified based on different development levels below:

1. Policies directed to OIC member countries with matured and advanced level of development in payment systems
2. Policies directed to OIC member countries with intermediate level of development in payment systems
3. Policies directed to OIC member countries with low level of development in payment systems

The final section of this chapter focuses on general recommendations that require joint implementation at the OIC regional level for digital transformation of payment systems of member countries.

5.2.1 Policy Recommendations for Matured and Advanced Jurisdictions

The policy recommendations discussed here are more relevant to matured and advanced jurisdictions within the OIC member countries, as they are specifically derived from the case studies of Malaysia, Türkiye and the UK.

1. Transfer of Knowledge and Technical Expertise on Digital Payment Systems

Countries with matured and advanced digital payment systems should consider the following recommendations and action plans to transfer knowledge and technical expertise on the transformation of digital payment systems to other member countries:

Table 5.1: Recommendations & Action Plans: Transfer Knowledge & Technical Expertise

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	*Introduce Capacity Building Initiatives on digital payment system*	a. Organize training programs for technical and regulatory teams in central banks of other member countries. b. Organize other capacity building events such as workshops and seminars to share best practices with other member countries.	Develop a training or capacity building program.	Central Bank
2.	*Offer Technical Assistance on digital payment system*	a. Introduce exchange programs for technical staff from central banks of member countries with a view to exposing them to latest advances in RegTech, cybersecurity measures, and other relevant aspects of regulation of digital payment systems. b. Provide the needed support for the establishment of digital payment infrastructure for less developed jurisdictions.	Provide both on-site and remote technical assistance and introduce exchange programs for on-the-job training	Central Bank
3.	*Help enhance regulatory framework on digital payment system*	a. Assist less developed jurisdiction in developing their regulatory policies for digital payment systems. b. Share relevant templates of policies and provide examples of successful regulatory frameworks c. Share published research reports on case studies related to digital payment systems transformation.	Share regulatory policies, including relevant templates, and provide policy briefings	Central Bank

Source: Authors

2. Continuous Enhancement of Cyber Security Protocols

Despite having developed digital payment systems, jurisdictions with matured and advanced systems should continue to enhance their cyber security measures given the heightened nature of cybersecurity risks such as fraud and data breach which continue to evolve very fast. OIC member countries, regardless of their level of development, are exposed to cyber risks; hence, the need to continuously improve, enhance and finetune measure to prevent and mitigate such risks. There is a need for ironclad cybersecurity protocols in the entire digital payment systems ecosystem.

Table 5.2: Recommendations & Action Plans: Continuous Enhancement of Cyber Security

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	*Conduct regular risk assessment and management*	a. Conduct scheduled risk assessments and document all findings for digital payments services and solutions b. Ensure risk management plans are up-to-date and are reviewed in line with findings derived from regular risk assessments	Mandate all financial institutions and payment systems companies to conduct regular risk assessments to identify potential vulnerabilities.	Central Bank, Financial Institutions, Digital Payments Solutions providers
2.	*Adopt international best practices in cybersecurity and latest technology*	a. Regulated entities should be compelled to implement and regularly update international cybersecurity standards such as ISO//IEC 27001 b. Enforce mandatory compliance with relevant cybersecurity regulations and international standards c. Regulated entities should embrace innovation that will enable them to stay ahead of security threats through regular investments in latest cybersecurity solutions	Ensure all regulated entities adopt and implement latest cybersecurity standards and ensure they invest in latest cybersecurity solutions	Central Bank, Financial Institutions, Digital Payments Solutions providers

3.	*Enforce enhanced data protection and encryption*	a. Mandate all regulated entities to implement multifactor authentication to prevent unauthorized access b. Prioritize full encryption of data in all digital payments. c. Introduce data loss protection solutions to combat breaches associated with payment systems data	Issue regulatory guidelines to regulated entities on enhanced data protection, authentication and encryption	Central Bank

Source: Authors

3. Enhancing End-to-End Sharī'ah Compliance in Digital Payment Systems

Since the majority of the OIC member countries have introduced the Islamic financial system which falls under the regulatory and supervisory role of central banks, there is a need to ensure that the digital payment ecosystem does not in any way contradict the principles underpinning Islamic finance. The regulatory and supervisory role of the central banks for Islamic financial institutions does not only include products but also extends to services, comprising payment systems; hence, the need to ensure end-to-end Sharī'ah compliance of products, services, processes and systems.

Table 5.3: Recommendations & Action Plans: Enhancing End-to-End Sharī'ah Compliance

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	Ensure all aspects of digital payment systems adopted by Islamic financial institutions are Sharī'ah compliant	a. Aspects of payment systems such as e-wallet and its parameters utilized by Islamic banks should be Sharī'ah compliant b. Sharī'ah governance should be extended to digital payment systems for Islamic financial institutions	Introduce Regulatory Guidelines on Sharī'ah Compliance in Digitalization of Financial Services	Central Bank
2.	*Introduce training and capacity building programs*	a. Mandatory annual training and capacity development workshops for	Include in the Shariah governance framework the need to attend mandatory training programs on	Central Banks, Financial Institutions

		Sharī'ah scholars on digitalization b. Introduce specialized trainings on Sharī'ah issues in digital payment systems	digitalization of financial services	

Source: Authors

5.2.2 Policy Recommendations for Jurisdictions with Intermediate Level of Development

For countries with fairly developed digital payment systems that are considered to be at intermediate level of development, a number of country-specific recommendations have been provided in the report. These policy recommendations will not only be relevant to the country chosen in the case studies of this report but will also be useful to other OIC member countries that fall within this broad category.

1. Continuous Promotion of Digital Literacy to Enhance Financial Inclusion

Digital literacy is key to understanding the dynamics of digitalization and the specific features of the digital payment systems. Efforts toward promoting digital literacy are key to transforming the digital payment systems. To achieve this, some regulatory and supervisory measures need to be introduced. Such initiatives, as enumerated below, would help promote financial inclusion of consumers who are not tech-savvy.

Table 5.4: Recommendations & Action Plans: Promoting Digital Literacy

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	*Introduce regular public awareness campaigns on digital literacy*	a. Utilize verified unsolicited emails and direct text messages to promote digital literacy b. Campaigns on digital literacy through the social media, bank apps, radio and television to reach a wider audience	Mandate payment system solutions providers and financial institutions to organize regular public awareness campaigns online and offline about the importance of digital literacy	Central Bank, Digital Payments Solutions providers

2.	*Facilitate smart public-private partnerships on digital literacy*	a. Utilize corporate social responsibility (CSR) to promote digital literacy b. Smart partnership to focus on how to utilize digital payment solutions to enhance financial inclusion	Encourage public-private partnerships through CSR where digital payment solutions providers and financial institutions drive digital literacy campaigns	Central Bank, Financial Institutions, Digital Payments Solutions providers
3.	*Incentivize participation in digital literacy programs*	a. Incentives to be provided to businesses and users for participation in digital literacy programs b. Continuous learning to be encouraged through various non-monetary incentives to encourage contiguous learning and knowledge-sharing	Encourage the introduction of incentives relating to digital literacy programs as part of market conduct supervision	Central Bank, Financial Institutions

Source: Authors

2. Investment in Technology and Digital Infrastructure

Countries with an intermediate level of development in their digital payment systems should consider investing massively in technology and digital infrastructure as part of their digital transformational reforms. Such investments, which should not only be made by the government and regulatory authorities but also the private sector, including the financial institutions and payment systems solutions providers, are crucial to enhancing efficiency, increasing accessibility, improving security, and promoting scalability in the digital payment systems of a country.

Table 5.5: Recommendations & Action Plans: Investing in Tech & Digital Infrastructure

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	*Invest in broadband expansion, upgrading data centers and enhance*	a. Investing in, and expanding, high-speed internet access, particularly fifth	Regulatory authorities and government to partner with telecommunications	Relevant Government Ministry, central banks, financial

	mobile network coverage	generation of cellular technology (5G) b. Upgrading data centers is paramount to support the increase in digital payments c. Investments are required to enhance mobile network coverage which will support expansion of mobile payments	companies to boost investment in digital infrastructure and set minimum standards of technology adoption for regulated entities	institutions, telecom companies
2.	*Invest in capacity building through training and technical assistance from developed jurisdictions*	a. Sponsor professionals to enhance their skills in the digital payment systems b. Explore technical assistance from developed jurisdictions and invest in exchange programs for technical skills transfer	Ensure adequate budgetary allocation for capacity building and technical skills transfer	Relevant government ministry, Central Bank
3.	*Adopt sustainable practices through massive investment in energy-efficient technologies*	a. Encourage financial institutions and payment systems companies to invest in energy-efficient technologies b. Incentivize the adoption of sustainable practices in the deployment of digital payment systems	Introduce Green Technology Policy for Digital Payments	Relevant government ministry, Central Bank, technology providers

Source: Authors

3. Regulatory Enhancement to Deepen the Implementation of Digital Payment Systems

There is also the need to consider further regulatory enhancement to develop and deepen the wider adoption of digital payment solutions in countries with an intermittent level of development. This will help spur further development since any new technological upgrade to be widely adopted with significant impact on the users is expected to be supported by an efficient legal and regulatory framework.

Table 5.6: Recommendations & Action Plans: Regulatory Enhancements

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	Develop a comprehensive regulatory framework based on best practices in digital payment systems regulation	a. Ensure the regulatory framework is adaptable to emerging technologies including future market developments b. Enhance interoperability between different digital platforms for seamless consumer experience c. Ensure regulatory framework helps to strengthen cybersecurity measures d. Include relevant provisions in the regulatory framework relating to consumer protection in digital payments	Draft and implement a comprehensive and all-encompassing regulatory framework for digital payment systems, which is not only adaptable to emerging technologies but also provides for future market developments	Central Bank and relevant government authority
2.	*Introduce a monitoring and evaluation policy for all financial institutions and digital payments service providers*	For continuous monitoring and evaluation of digital payment systems, there is a need to implement an industry-wide framework which will be used to enhance regulatory policies	Develop a monitoring and evaluation framework for digital payment systems to be adopted by all regulated entities	Central Bank

Source: Authors

5.2.3 Policy Recommendations for Jurisdictions with Low Level of Development

It is pertinent to observe that there are still some jurisdictions within the OIC member countries that require further development and enhancement in their digital payment systems. Such countries require massive transformation of their digital payment systems framework. These countries are generally classified under the category of jurisdictions with low level of development. It is expected that such jurisdictions will benefit from the numerous policy recommendations highlighted above but there are more to be explored which are considered specific to such jurisdictions. Since a few of the recommendations have been partly discussed above under the category of jurisdictions with intermittent level

of development, the policy recommendations here will be addressed in single table below with some categorization.

Table 5.7: Recommendations & Action Plans: Jurisdictions with Low Level of Development

No.	Recommendations	Specific Description	Action Plan	Responsibility
1.	*Enhance Internet Access and Infrastructure*	a. Develop public-private partnerships to expand internet infrastructure, particularly in underserved rural areas. b. Provide subsidies and incentives to telecommunications companies to encourage investment in these regions.	Collaborate with relevant Government Ministries and Telecommunication Companies to enhance mobile and internet penetration rate	Central Bank and relevant government authority
2.	*Promote Digital Literacy and Financial Inclusion*	a. Launch nationwide digital literacy campaigns focusing on rural areas with more prevalent financial illiteracy. b. Collaborate with mobile network operators to enhance outreach and effectiveness.	Develop an Industry Wide Digital Literacy and Financial Inclusion Policy	Central Bank and Financial Institutions
3.	*Strengthen the Regulatory and Legal Framework*	a. Regularly update and harmonize legal and regulatory frameworks to reflect advancements in digital financial services. b. Expand the regulatory sandbox to include a broader range of FinTech innovations and streamline the licensing process to facilitate faster adoption of new technologies.	Overhaul the Legal and Regulatory Framework for Payment Systems	Central Bank and relevant government authority
4.	*Improve Cybersecurity Measures*	a. Implement robust cybersecurity protocols, including establishing a national cybersecurity agency dedicated to	Create a Framework for Cybersecurity Policy adoption by financial institutions and	Central Bank, relevant government authority, and Financial Institutions

		monitoring and responding to digital threats. b. Strengthen financial institutions' capabilities to monitor and report suspicious activities related to money laundering and terrorism financing.	digital payment services providers with minimum standard requirements	
5.	*Encourage Public-Private Sector Collaboration*	a. Encourage collaboration between the public and private sectors to promote digital financial services b. Incentivize public-private partnerships through tax exemptions, subsidies, and shared infrastructure projects to expand digital financial services.	Establish a central coordinating body to oversee the integration of digital financial services across different sectors	Central Bank, relevant government authority, and private sector stakeholders
6.	*Promote Cultural Shift Through Incentives to utilize digital services*	a. Policies that promote a shift in consumer behavior, such as offering incentives for digital transactions, should be implemented.	Introduce Polices and Campaigns that incentivize the use of digital services	Central Bank and Financial Institutions
7.	Implement a Digital Acceleration Project	a. Introduce a Digital Acceleration Project, focusing on increasing broadband access, promoting digital inclusion, and building the necessary digital infrastructure for nationwide transformation	Develop the Digital Acceleration Project to transform the digital payments system ecosystem	Central Bank, relevant government authority, and international development partners such as the World Bank
8.	Invest in research and development related to digital transformation of payment system	a. Allocate national budget and seek for funds from international development partners for research and innovation on digital transformation	Establish a national fund for digital payments innovation	Central Bank and Financial Institutions

Source: Authors

5.3 A Roadmap for a Well-Functioning Digital Payment System

In designing a well-functioning digital payment system, there is a need for a regulator or supervisory authority to consider several key factors and initiatives given the rapid technological developments being experienced in the sector. There is also a need to keep abreast of technological innovations of unofficial entities who promote DeFi with its top-notch digital payment capabilities. Therefore, to stay ahead of the curve and provide added value to financial consumers, regulators and supervisory authorities need to up their games in financial technology regulatory through a number of far-reaching initiatives.

A typical roadmap for OIC member countries which intend to sustain or introduce a robust digital payment system should include a number of key initiatives. Firstly, evaluation of the existing digital payment systems with a view to identifying areas of improvement. A SWOT analysis could be utilized for the assessment where the strengths and weaknesses of the existing payment system of the country are clearly identified. This will provide a clear roadmap for areas of improvement and opportunities that lie ahead for such a jurisdiction. Once such assessment is completed, the regulatory gaps need to be addressed.

Secondly, the regulatory framework to be introduced should endeavor to fill the gaps identified and address the opportunities explored earlier. The common areas often discussed in digital payment system include privacy, security, trust and consumer protection. Therefore, without stifling or restricting innovation, a robust regulatory framework should support deepening the digital payment system. A related aspect is the need to enhance security protocols which is essential in building consumer confidence in the payment system.

Therefore, the third initiative requires the implementation of robust security measures which are targeted at cyber-attacks and fraud, which have become the bane of modern digital systems. The role of the regulatory and supervisory authorities in this endeavor cannot be overemphasized. Mandatory minimum security protocols should be introduced in the regulatory framework to avoid potential systemic risks that could compromise the entire digital payment ecosystem for the country.

Fourthly, seamless user-experience with transaction efficiency would enhance confidence in the digital payment system. With high volume of transitions taking place in

the digital payment platforms, it is essential that user experience in terms of navigation and accessibility is enhanced. Also, given the different demographics using the platforms. This has an element of financial inclusion. The way and manner the platform is designed will determine how unbanked and underbanked populations are encouraged to be involved in the digital economy. This requires educational and awareness initiatives to encourage and educate such unbanked and underbanked populations to use digital payment systems while highlighting the benefits of such systems.

Fifthly, the regulators and supervisory authorities should ensure interoperability among payment systems providers and financial institutions in their jurisdiction to ensure seamless transactions and respect user preferences. Any efficient regulatory framework should ensure that relevant protocols are introduced for such seamless transactions and the users should be given the choice to choose the type of payment solution they desire at zero cost. Efforts should also be put in place for constant monitoring and evaluation of the payment systems performance with feedback mechanism to optimize performance.

Sixthly, there is the need to introduce a robust crisis management plan which will address downtimes associated with digital systems. It is possible for such downtimes to lead to disputes in digital payments; hence, the need to ensure legal support is available to address consumer complaints and disputes. This will help protect consumer rights and ensure an efficient grievance remedial system is available for consumers.

Seventhly, the digital payment system should ensure international standards compliance which will help promote further economic and trade integration within the OIC member countries. This will help boost cross-border transactions and global trade when more member countries comply with international standards. Within the central banking space globally, the available international standards include the World Bank Payment Systems, Analytical Framework by the International Monetary Fund, BIS's Regulatory Requirements for Non-Bank Payment Service Providers, and Atlantic Council's standards for digital assets.

Eighthly, regulators and supervisory authorities should utilize regulatory sandboxes for digital payment innovations to foster innovative payment solutions. This provides significant support to startups in the digital payment space. Beyond regulatory sandboxes, efforts should be introduced to ensure smart partnerships through the expansion of the

digital payment ecosystem. A smart collaboration between the key players such as financial institutions, technology providers, and merchants, which is coordinated by the regulatory and supervisory authority, will help deepen innovation within the digital payment space.

Ninthly, while innovative practices are encouraged in the digital payment ecosystem, there is a need to consider the environmental impact of the infrastructure being used. Regulators and supervisory authorities should aim for sustainable solutions and provide adequate incentives to encourage such solutions. Therefore, sustainability should be at the core of any regulatory framework for digital payment system.

Finally, the roadmap for a well-functioning digital payment system should ensure the regulatory framework is future proof with key policies that will anticipate future technologies and trends. With the rapid technological innovation in the financial ecosystem, largely driven by unofficial entities, the supervisory and regulatory authorities should ensure that the digital payment systems are not only robust and efficient but should anticipate future technological trends.

5.4 General Policy Recommendations for the OIC Countries on Payment Systems

POLICY ADVICE 1: Developing an Interoperability Framework for Digital Payment System among the OIC member countries to clear and settle financial transactions and payments in real-time to help foster economic cooperation, facilitate smoother cross-border transactions and promote international trade.

Rationale / Explanation:

It is crucial to develop an interoperability framework for digital payment systems among the OIC Member Countries. This would help create an efficient, robust and integrated market which will boost intra-trade among the member countries. It is expected that such a framework will allow for a wider choice of payment services and provide a seamless market integration with fast and instant payments and unified consumer protection standards.

POLICY ADVICE 2: Developing Legal Framework to Establish a Regulatory Authority at the OIC level to oversee the implementation of a regional multilateral cooperation on payment systems.

Rationale / Explanation:

It is pertinent to harmonize policy and regulatory frameworks through a multilateral cooperation on payment systems. This is expected to ultimately lead to the establishment of a regulatory authority at the OIC level. The multilateral cooperation will include aspects such as knowledge transfer and technology transfer which will be unified under a single regulatory authority. Once transfer of knowledge and technology and sharing of knowledge is achieved among member countries, there would be greater regulatory harmonization among OIC member countries. Such cross-border cooperation would enhance the resilience digital payments systems, technological advancement, and competitiveness among the OIC member countries.

POLICY ADVICE 3: Scaling up Collaborative Efforts Towards Strengthening Cybersecurity Among Central Banks of Member Countries

Rationale / Explanation:

It is necessary to scale up efforts towards strengthening cybersecurity collaboration among member countries. Beyond some bilateral cooperation identified, there is a need to widen such collaborations and expand it to involve all member countries with a view to identifying cross-border risks. Expanding cross-border collaboration and scaling up bilateral collaborations on cybersecurity related to digital payment systems to multilateral agreements could help protect financial systems of OIC member countries against increasing cyber threats.

POLICY ADVICE 4: Developing The OIC Digital Payment Systems Platform to Boost Intra-OIC Trade

Rationale / Explanation:

It is important to develop a taskforce among the Central Banks within the OIC region to take a cue from some successful collaborations among some countries such as Malaysia and Indonesia, particularly in their cross-border collaborations to establish The OIC Digital Payment Systems Platform. The OIC could consider introducing its unique cross-border payment systems platform where all payments are settled in local currencies. This should be based on a currency swap arrangement through the digital platform and settled in real-time. Therefore, in addition to addressing a payment systems challenge, this suggestion would also help in enhancing the monetary policy objective of regulators and supervisory authorities within the OIC region.

POLICY ADVICE 5: Setting-up a Dedicated Task Force of Digital Payment Experts to Continue to Harness Latest Technology in Payment Systems

Rationale / Explanation:

It is crucial to introduce a dedicate task force of digital payment experts to provide a platform for knowledge sharing and harness best practices. The task force will also help to provide digital payment toolkits for member countries with less developed payment systems. Such will help countries that are yet to develop their payment systems to the desired level. The toolkits will help countries with less developed payment systems adapt, innovate, and upgrade their systems in preparation for the OIC regional integration.

POLICY ADVICE 6: Collectively Investing in Digital Literacy and Technical Skills Development to Build a Sustainable Future Workforce

Rationale / Explanation:

It is imperative for policymakers to collectively invest in digital literacy and technical skills development to develop a strategic pool of future workforce for digital payment systems. A

special fund can be created for skills development which will focus on education and training program specially designed to enhance skills in digital finance, blockchain technology and payment systems. The matured economies within the OIC region could provide technical assistance to less developed economies.

POLICY ADVICE 7: Introducing the OIC Digital Currency to be Spearheaded by the Central Banks and Regulated Centrally at the OIC

Rationale / Explanation:

It is important to consider the need to introduce a unified OIC Digital Currency in form of CBDC. The project towards realizing such a unified digital currency should begin and key milestones should be identified for the actualization of this laudable objective. At best, member countries who are interested should begin the project and others may join later once they receive the required approvals. A pilot project of not less than 10 countries among member countries may collaborate on the pilot project.

POLICY ADVICE 8: Promoting Financial Inclusion through Expansion of Digital Payment Platforms with Simplified Technology for Unbanked and Underbanked

Rationale / Explanation:

It is important to promote financial inclusion to further deepen the promotion of digital payments and expansion of relevant technological infrastructure in rural areas and among the underserved, it is expected that such policies would help improve financial inclusion among consumers in OIC member countries, where many in the regional bloc are still considered underbanked. Simplified technology for the expansion of mobile payment platforms, which will be accessible to the unbanked and underbanked population, would help promote financial inclusion.

POLICY ADVICE 9: Enhancing Consumer Education and Protection in the Risks Associated with the Use of Digital Payment Systems

Rationale / Explanation:

Collaborative efforts should be introduced to enhance consumer education and protection in key risks associated with the use of digital payment systems. Potential risks such as fraud and data breaches should be the focus of all member countries to ensure that even though digital payment systems are being promoted, consumers should not fall for digital predators. Initiatives should be introduced to enhance financial literacy and education with particular focus on cyber risks. In addition, enhancing consumer protection framework should be introduced and adopted across the member countries. Robust security measures should be introduced which should be embedded with real-time monitoring to identify and prevent illegal and unauthorized online activities.

POLICY ADVICE 10: Fostering Sustained Innovation in the FinTech Sector and Providing Regulatory Support to Startups in the Digital Payment Space to Encourage Healthy Competition

Rationale / Explanation:

It is pertinent to create a health environment for FinTech startups to thrive and innovate through regulatory support in form of sandboxes and innovation hubs with specific focus on innovation in the digital payment space. This will lead to the establishment of FinTech hubs where there would be healthy competition among start-ups with a view to introducing cutting-edge technology in driving the digital payment revolution among the OIC member countries.

REFERENCES

4CB. (2019). TARGET Instant Payment Settlement User Handbook (2.1.1).

Abd Shukor, R., Mooi, W. K., & Ibrahim, J. A. (2023). The future of Malaysian SMEs in the digital economy. Qeios.

Abdullah, N., Redzuan, F., & Daud, N. A. (2020). E-wallet: Factors influencing user acceptance towards cashless society in Malaysia among public universities. Indonesian Journal of Electrical Engineering and Computer Science, 20(1), 67-74.

Aguilar, A., Frost, J., Guerra, R., Kamin, S., and Tombini, A. (2024). "Digital payments, informality and economic growth", *BIS Working Papers*, No. 1196, 8 July 2024.

Ahmad, N. W., Bahari, N. F., Ripain, N., & Atan, N. S. (2022). The Influence of Coronavirus Disease (COVID-19) Pandemic on the Use of Digital Payment in Malaysia. e-Jurnal Penyelidikan dan Inovasi, 1-20.

Ahmed, T., & Mohamed, S. (2022). OIC Megatrends Report 2022: FinTech Flourishing, Societies Changing.

Andrew G. Haldane, Stephen Millard and Victoria Saporta, (2008), "General introduction: The future of payment systems", in Haldane, Andrew G., Stephen Millard, and Victoria Saporta, (eds.) The future of payment systems. Routledge.

Anyanzwa, J. (2024). Small businesses cry foul over EAC payment system. Retrieved June 7, 2024, from The East African website: https://bit.ly/3XcqgeU

Asadullah, M. N., Mansor, N., & Savoia, A. (2021). Understanding a "development miracle": poverty reduction and human development in Malaysia since the 1970s. Journal of Human Development and Capabilities, 22(4), 551-576.

Asli, D.-K., Klapper, L., Singer, D., & Ansar, S. (2022). The Global Findex Database 2021. World Bank Group.

Azhar, Azeem (2021) The Future of Digital Payments, in Harvard Business Review, https://hbr.org/podcast/2021/06/the-future-of-digital-payments accessed 11/05/2024

Aziz, Z. A. (2013). The Central Bank Financial Stability Mandate and Governance Challenges1. Financial Stability, SEACEN, 1.

Bank Al-Maghrib. (2022). Rapport Annuel Sur La Supervision Bancaire - Exercice 2022. https://www.bkam.ma/Publications-et-recherche/Publications-institutionnelles/Rapport-annuel-sur-la-supervision-bancaire/Rapport-annuel-sur-la-supervision-bancaire-exercice-2022

Bank Al-Maghrib. (2023a). FMA BUNA. https://www.bkam.ma/content/download/793755/8794105/CdP_Buna_Fr.pdf

Bank Al-Maghrib. (2023b). Rapport Annuel 2023. https://www.bkam.ma/Publications-et-recherche/Publications-institutionnelles/Rapport-annuel-presente-a-sm-le-roi/Rapport-annuel-2023

Bank Al-Maghrib. (2023c). Rapport Annuel Sur La Supervision Bancaire - Exercice 2023. https://www.bkam.ma/Publications-et-recherche/Publications-institutionnelles/Rapport-annuel-sur-la-supervision-bancaire/Rapport-annuel-sur-la-supervision-bancaire-exercice-2023

Bank Al-Maghrib. (2024a). Legal Framework of Payment Systems and Means. https://www.bkam.ma/en/Find-information-about/Regulation/Legal-framework-of-payment-systems-and-means

Bank Al-Maghrib. (2024b). Organizational chart. https://www.bkam.ma/en/About-us/Organization/Organizational-chart3

Bank Al-Maghrib. (2024c). Systems and means of payment. https://www.bkam.ma/en/Systems-and-means-of-payment/Financial-markets-infrastructure-and-monitoring/Overview

Bank for International Settlement. (2003). “The role of central bank money in payment systems”, Committee on Payment and Settlement Systems, Bank for International Settlements, Basel, Switzerland, August 2003, p. 2.

Bank Negara Malaysia (2024). “Financial Stability Review – Second Half 2023”, Bank Negara Malaysia, 2024, p. 20.

Bank Negara Malaysia (2023). “Regional Payment Connectivity Expansion to Include State Bank of Vietnam”, Press Release, 25 August 2023. Retrieved on 16 April 2024 from https://www.bnm.gov.my/-/mou-rpc-expansion-sbv

Bank of England (2020) “Bank of England: To Revamp Payments, Eyes Digital Currency” Retrieved on 15/05/2024 from https://www.pymnts.com/digital-first-banking/2020/bank-of-england-to-revamp-payments-eyes-digital-currency/

Bank of England (2021) The UK economy during Covid-19: insights from the Bank of England's Citizens' Panels. Retrieved on 19/05/2024 from https://www.bankofengland.co.uk/about/get-involved/citizens-panels/the-uk-economy-during-covid-19-insights-from-the-bank-of-englands-citizens-panels

Bank of England (2024) ISO 20022: Implementing the global payments messaging standard within CHAPS and RTGS Retrieved on 19/05/2024 from https://www.bankofengland.co.uk/payment-and-settlement/rtgs-renewal-programme/iso-20022

Bank of England. (2022) “Policy paper: UK Digital Strategy” Retrieved on 08/06/2024 from https://www.gov.uk/government/publications/uks-digital-strategy/uk-digital-strategy

Bank of England. (1998). Bank of England Act 1998. Retrieved 10/05/2024 from https://www.legislation.gov.uk/ukpga/1998/11/contents.

Bank of England. (n.d.) “cross-border-payments” Retrieved on 08/06/2024 from https://www.bankofengland.co.uk/payment-and-settlement/cross-border-payments

Bank of Mozambique (2015). "National Financial Inclusion Strategy: 2016-2022." Maputo, Mozambique.

Bank of Mozambique (2022). “Interoperability of mobile money operators in effect (mkesh, m-pesa and e-Mola)”. Press Release, 11 July 2022. Retrieved on 08 July 2024 from https://www.bancomoc.mz/media/edrlrwxe/communiqu%C3%A9-interoperability-of-mobile-money-operators-in-effect-mkesh-m-pesa-and-e-mola.pdf.

Bank of Mozambique (2023a). "Distribuição dos Pontos de Acesso pelos 154 Distritos de Moçambique - IV Trimestre de 2023." Retrieved on 07 May 2024 from https://www.bancomoc.mz/media/atebtqbc/distribui%C3%A7%C3%A3o-dos-pontos-de-acesso-pelos-154-distritos-de-mo%C3%A7ambique-iv-trimestre-de-2023.xlsx.

Bank of Mozambique (2023b). "Intervenção de sua excelência o governador do Banco de moçambique, dr. Rogério Zandamela Por ocasião do lançamento da 4.ª edição do Sandbox regulatório do banco de moçambique". Press Release, 27 January 2023. Retrieved on 08 July 2024 from https://www.bancomoc.mz/media/x1rpgkfj/lan%C3%A7amento-da-4-%C2%AA-edi%C3%A7%C3%A3o-do-sandbox-regulat%C3%B3rio-do-bm.pdf.

Bank of Mozambique (2023c). "Entrada em funcionamento pleno da rede única nacional de pagamentos eletrónicos". Press Release, 28 November 2023. Retrieved on 08 July 2024 from https://www.bancomoc.mz/pt/media/noticias/entrada-em-funcionamento-pleno-da-rede-unica-nacional-de-pagamentos-electronicos/.

Bank of Mozambique (2023d). "Indicadores Estatísticos de Inclusão Financeira - IV Trimestre de 2023." Retrieved on 19 April 2024 from https://www.bancomoc.mz/pt/media/noticias/indicadores-de-inclusao-financeira-iv-trimestre-de-2023/.

Bank of Mozambique (2023e). "Banco de Moçambique launches system". Press Release, 30 November 2023. Retrieved on 19 April 2024 from https://www.bancomoc.mz/en/media/highlights/banco-de-mocambique-launches-real-time-gross-settlement-system/.

Bank of Mozambique (2023f). "Relatório da Avaliação Final da Estratégia Nacional de Inclusão Financeira (2016-2022)".

Bank of Mozambique (2024a). "Governor of the Banco de Moçambique Launches the 5th Edition of the Regulatory Sandbox." Press Release, 26 January 2024. Retrieved on 02 May 2024 from https://www.bancomoc.mz/en/media/highlights/governor-of-the-banco-de-mocambique-launches-the-5th-edition-of-the-regulatory-sandbox/.

Bank of Mozambique (2024b). "Limites Transacionais Aplicáveis às Instituições de Moeda Eletrónica". Notice n° 07/GBM/2024

Bank of Zambia. (2024). The Southern Africa Development Community Real Time Gross Settlement (SADC-RTGS) System. https://doi.org/10.1093/oso/9780197745571.003.0023

Basir, A. A. (2009). Payment systems in Malaysia: recent developments and issues.

Basir, Amir Akmar (2009) : Payment systems in Malaysia: Recent developments and issues, ADBI Working Paper, No. 151, Asian Development Bank Institute (ADBI), Tokyo

Basu, Paritosh. "Digital transformation with decentralised finance-liberating from CeFi to DeFi and CeFi in DeFi." The Management Accountant Journal 57, no. 7 (2022): 75-80.

Bech, M., Faruqui, U., & Shirakami, T. (2020). Payments without borders. BIS Quarterly Review, (March), 53–65.

Bhuiyan, M. R. I., Akter, M. S., & Islam, S. (2024). How does digital payment transform society as a cashless society? An empirical study in the developing economy. Journal of Science and Technology Policy Management. https://doi.org/10.1108/JSTPM-10-2023-0170.

Buna. (2024). Buna. Retrieved June 11, 2024, from Buna website: https://buna.co/

Camacho, J. " The roots of great innovation are never just in the technology itself They are always in the wider historical context. They require new ways of seeing." David Brooks, New.

Capital One. (2021). The business case for digitizing payments. Retrieved from https://www.capitalone.com/commercial/insights/business-case-for-digitizing-payments/

Chan, E. (2023). Recent de-dollarisation efforts and the role of USD. RSIS Commentaries, 057-23.

Chong, P. S. (2023). The Malaysian millennia's intention to use mobile payment systems–extending the mobile technology acceptance model (Doctoral dissertation, UTAR).

COMCEC. (2015). RETAIL PAYMENT SYSTEMS IN THE OIC MEMBER COUNTRIRES. Proceedings of the 5th Meeting of the COMCEC Financial Cooperation Working Group, (October). Ankara.

Commencis. (2023) "Digital wallets: what are they, and why are they so popular?" Retrieved 09/06/2024 from https://www.commencis.com/thoughts/digital-wallets/

Competition and Market Authority (2021), Corporate Report, Update on Open Banking, Published 5 November 2021, Retrieved on 19/05/2024 from https://www.gov.uk/government/publications/update-governance-of-open-banking/update-on-open-banking

CPMI. (2023). Exploring Multilateral Platforms for Cross-Border Payments.

Cusolito, A. P., Gévaudan, C., Lederman, D., & Wood, C. (2022). The upside of digital for the Middle East and North Africa: how digital technology adoption can accelerate growth and create jobs. World Bank Publications.

Dan, S. S., & Dewi, E. F. (2023). The Future of Digital Finance In Southeast Asia: A Legal Perspective. Prenada Media.

DataReportal, (2022). "Digital 2022: Mozambique. Global Digital Insights". Retrieved on 11 May 2024 from https://datareportal.com/reports/digital-2022-mozambique.

DataReportal. (2023). Digital 2023: Morocco. https://datareportal.com/reports/digital-2023-morocco?rq=morocco

Davies, N. (2024). The Future of Payments in the UK: Get Ready with QR Codes. Retrieved on 28/05/2024 from https://paywithatoa.co.uk/blog/future-of-payments-uk/

Demery, L., & Demery, D. (1991). Poverty and macroeconomic policy in Malaysia, 1979–1987. World development, 19(11), 1615-1632.

Digital Cooperation Organization. (2024). Morocco. https://dco.org/council/morocco/

Economist Intelligence Unit. (2018). The Automation Readiness Index: Who is Ready for the Coming Wave of Automation?

El Amri, M. C., Mohammed, M. O., & Bakr, A. M. (2021). Enhancing Financial Inclusion Using FinTech-Based Payment System. In M. M. Billah (Ed.), Islamic Fintech (1st ed., pp. 505–542). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-45827-0_11

El Faiz, S. (2024). Transition digitale: que doit faire le Maroc? https://www.lebrief.ma/transition-digitale-que-doit-faire-le-maroc-147803/

Elhazziti, M. A., Alexandre, D., Ferraz, C., Elazzouzi, E., & Master, M. (2023). Digital Transformation in Morocco: Challenges and Perspectives. Journal of US-China Public Administration, 20(2), 83–97. https://doi.org/10.17265/1548-6591/2023.02.001

Escap, U. (2018). Enhancing cybersecurity for industry 4.0 in Asia and the Pacific.

European Center for Digital Competitiveness. (2020). Digital Riser Report 2020.

European Commission. (2020) “Questions & Answers: EU-UK Trade and Cooperation Agreement” Retrieved on 08/06/2024 from https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2532

European Council. (2024). “Fight against money laundering and terrorist financing in the EU”. Retrieved on 08/06/2024 from https://www.consilium.europa.eu/en/policies/fight-against-terrorism/fight-against-terrorist-financing/

Finance Magnet. (2023) “Open Banking: Catalyzing Financial Innovation and Empowering Consumers”. Retrieved on 02/06/2024 from https://www.financemagnates.com/fintech/education-centre/open-banking-catalyzing-financial-innovation-and-empowering-consumers/

Financial Conduct Authority. (2017). Payment Services Regulations 2017. Retrieved 12/05/2024 from https://www.fca.org.UK /publication/consultation/cp17-13.pdf

Financial Conduct Authority. (2022) “Regulatory Sandbox” Retrieved on 08/06/2024 from https://www.fca.org.uk/firms/innovation/regulatory-sandbox

Financial Conduct Authority. (2022). FCA Business Plan 2022/23. Retrieved 12/05/2024 from https://www.fca.org.uk/publication/business-plans/business-plan-2022-23.pdf

Financial Sector Deepening (FSDMoç), & FINTECH.MZ, (2021). “FINTECH.MZ 2021 Report. The New Catalysts of the Digital Economy”. Retrieved on 11 May 2024 from https://issuu.com/media4development/docs/fintech_2021_-

Findexable. (2021). Global Fintech Rankings Report.

FinMark Trust (FMT), & Financial Sector Deepening (FSD) Network. (2023). "Summary Report on Women Cross-Border Traders Between South Africa and Mozambique: A Summary Report Highlighting the Key Findings from the 2023 Diagnostic Study”.FinMark Trust (FMT), & Financial Sector Deepening (FSDMoç), (2019). “Finscope Consumer Survey Report”. Retrieved on 29 March 2024 from

https://finmark.org.za/system/documents/files/000/000/155/original/Mozambique_Survey-2020-07-311.pdf?1597303567 (n.d.).

Franciska, A. Martina, and S. Sahayaselvi. "An overview on digital payments." International Journal of Research 4, no. 13 (2017): 2101-2111.

Fry, M. J., et al. (1999). *Payment Systems in Global Perspective*, London: The Bank of England, 1999, p. 4.

FSB. (2020). Enhancing Cross-border Payments: Stage I report to the G20.

Ghazali, N., & Kandiah, P. (2014). Financial Services Act 2013. A Significant Development in the Financial Services Industry in Malaysia. Int'l. In-House Counsel J., vol. 7 No. 7, 1-9.

Global Findex Database. Retrieved on 11 May 2024 from https://databank.worldbank.org/source/global-financial-inclusion

Gov.UK. (2015) Consultation outcome Implementation of the EU payment accounts directive. Updated 16 November 2015. Retrieved on 19/05/2024 from https://www.gov.uk/government/consultations/implementation-of-the-eu-payments-accounts-directive/implementation-of-the-eu-payment-accounts-directive

Gov.UK. (2023a) Terms of Reference - Future of Payment review. Retrieved on 19/05/2024 from https://www.gov.uk/government/publications/future-of-payments-review-2023/terms-of-reference-future-of-payments-review

Gov.UK. (2023b) “Closed consultation: Levelling-up and Regeneration Bill: consultation on implementation of plan-making reforms”. Retrieved on 08/06/2024 from https://www.gov.uk/government/consultations/plan-making-reforms-consultation-on-implementation/levelling-up-and-regeneration-bill-consultation-on-implementation-of-plan-making-reforms

Gov.UK. (2024) “Digital Development Strategy 2024 to 2030”, Policy paper Published 18 March 2024. Retrieved on 17/05/2024 from https://www.gov.uk/government/publications/digital-development-strategy-2024-to-2030/digital-development-strategy-2024-to-2030

Gulf Payments. (2024). AFAQ. Retrieved June 11, 2024, from Gulf Payments website: https://bit.ly/3Xjz56D

Hamsin, M. K., Halim, A., Anggriawan, R., & Lutfiani, H. (2023). Sharia E-Wallet: The Issue of Sharia Compliance and Data Protection. Al-Manahij: Jurnal Kajian Hukum Islam, 17(1), 53–68. https://doi.org/10.24090/mnh.v17i1.7633

Haron, H., Sajari, A., Dewanti, R., Ganesan, Y., & Anderes, G. U. I. (2023, November). Digital Transformation in Community Development of Malaysia and Indonesia. In ICCD (Vol. 5, No. 1, pp. 232-242).

Haut Commissariat au Plan. (2023). Rapport National sur la population et développement au Maroc. https://www.hcp.ma/downloads/?tag=Dernières+parutions

Haut Commissariat au Plan. (2024). Chiffres Clés.

HM Treasury. (2019). The FinTech Sector Strategy: Securing the UK's position as a global hub for FinTech. Retrieved 11/05/2024 from https://www.gov.uk/government/publications/fintech-sector-strategy-sectorear

HM Treasury. (2022) "Payments Regulation and the Systemic Perimeter: Consultation and Call for Evidence" Retrieved on 19/05/2024 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1091941/Payments_Regulation_and_the_Systemic_Perimeter_-_Consultation_and_Call_for_Evidence.pdf

HM Treasury. (2023a). "Annual Review of UK Financial Services 2023" Retrieved on 18/05/2024 from https://assets.publishing.service.gov.uk/media/64ad6d32fe36e0000d6fa6a9/State_of_the_sector_annual_review_of_UK_financial_services_2023.pdf

HM Treasury. (2023b). "Future financial services regulatory regime for crypto-assets Response to the consultation and call for evidence" Retrieved on 19/05/2024 from https://assets.publishing.service.gov.uk/media/653bd1a180884d0013f71cca/Future_financial_services_regulatory_regime_for_cryptoassets_RESPONSE.pdf

ICIEC. (2022). How digital transformation can support finance and investment. Retrieved August 30, 2024, from Islamic Development Bank website: https://bit.ly/3vDxflA

Idaomar, C., Ben Kiran, A., & Chafik, K. (n.d.). After 20 years of Digital Strategies in Morocco: Achievements and Challenges Through the Analysis of International Indicators. Retrieved August 14, 2024, from www.ijfmr.com

Instituto Nacional das Comunicações de Moçambique (INCM), (2023). "Divulgados Resultados do Inquérito sobre Utilização de Telefonia Móvel em Moçambique.". Press Release 26 May 2023. Retrieved on 26 April 2024 from, https://www.incm.gov.mz/index.php/sala-de-imprensa/noticias/563-divulgados-resultados-do-inquerito-sobre-utilizacao-de-telefonia-movel-em-mocambique.

Instituto Nacional de Estatística (INE), (2019). "IV Recenseamento Geral da População e Habitação, 2017 Resultados Definitivos". Maputo-Moçambique.

International Monetary Fund (2023). World Economic Outlook Database, October 2023". *IMF.org*. International Monetary Fund. Retrieved 16 April 2024 from https://www.imf.org/en/Publications/WEO/weo-database/2023/October/weo-report?c=548,&s=NGDPD,PPPGDP,NGDPDPC,PPPPC,PCPIPCH,LUR,LP,GGXCNL_NGDP,GGXWDG_NGDP,BCA,&sy=2022&ey=2024&ssm=0&scsm=1&scc=0&ssd=1&ssc=0&sic=0&sort=country&ds=.&br=1

International Monetary Fund (IMF). African Dept. (2024). "Republic of Mozambique: Third Review Under the Three-Year Arrangement Under the Extended Credit Facility, Requests for Modification of the Monetary Policy Consultation Clause, Waiver of Nonobservance of Quantitative Performance Criterion, Financing Assurances Review. Press Release; Staff Report; and Statement by the Executive Director for the Republic of Mozambique." IMF Staff Country Reports, 2024(008), A001. Retrieved April 09, 2024, from https://doi.org/10.5089/9798400264757.002.A001.

International Trade Administration. U.S. Department of Commerce. (2024). "Mozambique - Country Commercial Guide". Retrieved 08 August 2024 from https://www.trade.gov/country-commercial-guides/mozambique-ecommerce.

Ismail, N.A. and M. M. Masud (2020),'Prospects and Challenges in Improving E-Commerce Connectivity in Malaysia, in Chen, L. and F. Kimura (eds.), E-commerce Connectivity in ASEAN. Jakarta, Indonesia: Economic Research Institute for ASEAN and East Asia, pp.78-98.

Isono, I., & Prilliadi, H. (2023). "ASEAN's Digital Integration", e-Conomy SEA 2022. Retrieved 16 April 2024 from https://economysea.withgoogle.com/home/

ITU-D. (2024). The ITU ICT SDG Indicators. Retrieved August 19, 2024, from The Telecommunications Development Sector website: https://www.itu.int/en/ITU-D/Statistics/Pages/SDGs-ITU-ICT-indicators.aspx

Jankari, R. (2024). Digital Morocco 2030 : les contours d'une stratégie en construction. https://telquel.ma/2024/05/20/exclusif-les-details-de-la-strategie-maroc-digital-2030_1838602

Jomo, K. S., & Tan, E. C. (2006). External liberalization, economic performance, and distribution in Malaysia. External liberalization in Asia, post-socialist Europe, and Brazil, 232.

Julian, C. C., & Ahmed, Z. U. (2009). Doing business in Malaysia. Thunderbird International Business Review, 51(1), 53-69.

Kadar, H. H. B., Sameon, S. S. B., Din, M. B. M., & Rafee, P. A. B. A. (2019). Malaysia towards cashless society. In Proceedings of the 3rd international symposium of information and internet technology (SYMINTECH 2018) (pp. 34-42). Springer International Publishing.

Kagan, J. (2024a). Mastercard: Definition and Ranking in Global Payments Industry. Retrieved June 3, 2024, from Investopedia website: https://bit.ly/3RbJ0HH

Kagan, J. (2024b). Visa Card: Definition, Types, How They Work, vs. Mastercard. Retrieved June 3, 2024, from Investopedia website: https://bit.ly/3Vn5cAV

Kamis, R., Ismail, S., & Abd Rahman, N. H. (2023). A Study of Literature and Practical Gaps in e-Wallet Acceptance: The Case of Malaysia. Information Management and Business Review, 15(4 (SI) I), 181-190.

Kinyanjui Kinuthia, B. (2011). Markets vs. Government: Foreign Direct Investment and Industrialization in Malaysia. Economía mexicana. Nueva época, 20(2), 409-443.

Kusuma, L., Deniswara, K., & Gui, A. (2023, August). Customer Experience Perspective on Quick Response Code Indonesia Standard Payment Method. In 2023 International Conference on Information Management and Technology (ICIMTech) (pp. 633-638). IEEE.

Kylasapathy, P., Hwa, T. B., & Zukki, A. H. M. (2017). Unlocking Malaysia's Digital Future: Opportunities, Challenges and Policy Responses. Bank Negara Malaysia Annual Report.

Lahsasna, A. (2018). Financial consumer in Malaysia: regulators efforts and measurements for consumer protection. An international comparison of financial consumer protection, 317-331.

Lajis, S. M., Bacha, O. I., & Mirakhor, A. (2016). Regulatory Framework for Islamic Finance: Malaysia's Initiative. Macroprudential Regulation and Policy for the Islamic Financial Industry: Theory and Applications, 177-192.

Laricchia, F. (2023). "Global smartphone penetration rate as share of population from 2016 to 2022", *Statista*, September 28, 2023. Retrieved on 18 April 2024 from https://www.statista.com/statistics/203734/global-smartphone-penetration-per-capita-since-2005/

Lee, M. J., & Oseni, U. A. (2015). IFSA 2013: Commentaries on Islamic banking and finance. Malaysian Current Law Journal Sdn Bhd.

Liu, Y. (2022). Privacy and Regulatory Compliance for Central Bank Digital Currency (Master's thesis, Queen's University (Canada)).

Maechler, A. M. and Moser, T. (2019). "The evolution of payment systems in the digital age: A central bank perspective", Swiss National Bank, Speech delivered at Zurich, 28 March 2019, p. 4.

Mahmud, J. (2024). Digital Payments and Economic Growth: Analyzing the Contribution of bKash to Bangladeshâ€™s GDP. *International Journal of Research and Innovation in Applied Science*, *9*(2), 55-63.

Marzak, A. (2024). Maroc digital 2030, formation, IA, ...les défis de la transition numérique exposés au Gitex Africa 2024. https://lematin.ma/nation/les-defis-de-la-transition-numerique-exposes-au-gitex-africa-2024/229034

Maskerey, J. () "Future Ready Payments 2030: A dynamic, purposeful and united agenda for the UK" Retrieved on 08/06/2024 from https://www.pwc.co.uk/industries/financial-services/insights/future-ready-payments-2030.html

MIDA (2024). "Digital economy to contribute 22.6% of GDP and create 500,000 jobs by 2025", Malaysian Investment Development Authority. Retrieved on 19 April 2024 from www.mida.gov.my/mida-news/digital-economy-to-contribute-22-6-of-gdp-and-create-500000-jobs-by-2025/

Mhlanga, D. (2022). Digital financial inclusion in the Fourth Industrial Revolution. In Digital Financial Inclusion: Revisiting Poverty Theories in the Context of the Fourth Industrial Revolution (pp. 117-136). Cham: Springer International Publishing.

Miller, A. (2023). 5 Top Payment Methods in the UK in 2023: Info for Merchants. Retrieved on 28/05/2024 from https://pay.com/blog/top-payment-methods-in-the-uk

Mohd Haridan, N., Sheikh Hassan, A. F., Mohammed Shah, S., & Mustafa, H. (2023). Financial innovation in Islamic banks: evidence on the interaction between Shariah board and FinTech. Journal of Islamic Accounting and Business Research, 14(6), 911-930.

Mohdhar, A., & Shaalan, K. (2021). The future of e-commerce systems: 2030 and beyond. Recent Advances in Technology Acceptance Models and Theories, 311-330.

Mouhssine, N. (2024). Digitalisation au Maroc: les progrès réalisés et les défis à relever selon l'ADD. https://lematin.ma/economie/digitalisation-au-maroc-les-progres-realises-et-les-defis-a-relever-add/228981.

Mukuru. "About Us." Retrieved 13 April 2024 from https://www.mukuru.com/.

Nasar, M. (2024) "Enhancing Security in Bank Payment Systems for UK Banking Government Policy Compliance" Retrieved on 08/06/2024 from https://www.linkedin.com/pulse/enhancing-security-bank-payment-systems-uk-banking-mohammed-nasar--h8lae/

Ng, J. M. (2015). From Greenback to Redback: The Journey of Renminbi from Local Circulation to Reserve Currency. In Investing in Asian Offshore Currency Markets: The Shift from Dollars to Renminbi (pp. 136-156). London: Palgrave Macmillan UK.

Note d'Orientations Générales Pour Du Digital Au Maroc à Horizon 2025 (2020).

Owen, J., Stojanovic, A., Rutter, J. (2017) Trade after Brexit Options for the UK's relationship with the EU, Institute for Government, Retrieved on 19/05/2024 from (instituteforgovernment.org.uk) https://www.instituteforgovernment.org.uk/sites/default/files/publications/IFGJ5896-Brexit-Report-171214-final_0.pdf.

PAPSS. (2024). Connecting Payments: Accelerating Africa's Trade. Retrieved June 4, 2024, from https://papss.com/

Patil, Pushp P., Yogesh K. Dwivedi, and Nripendra P. Rana. "Digital payments adoption: an analysis of literature." In Digital Nations–Smart Cities, Innovation, and Sustainability: 16th IFIP WG 6.11 Conference on E-Business, E-Services, and E-Society, I3E 2017, Delhi, India, November 21–23, 2017, Proceedings 16, pp. 61-70. Springer International Publishing, 2017.

Patra, B., & Sethi, N. (2023). Does digital payment induce economic growth in emerging economies? The mediating role of institutional quality, consumption expenditure, and bank credit. Information Technology for Development, 1-19.

Pay.UK. (2021) "Future trends in payments" Retrieved on 20/05/2024 from https://newseventsinsights.wearepay.uk/media/32vooooz/future-trends-in-payments.pdf

Payment Card Industry Council. (2016). "Payment Card Industry (PCI) Data Security Standard", Retried on 19/05/2024 from https://www.globalpaymentsinc.com/-/media/global-payments/files/central-europe/pci-dss-docs/pci_dss_v3-2.pdf?la=en-cz

Payment Card Industry Council. (2023). PCI Security Standards Council. Retrieved on 12/05/2024 from https://www.pcisecuritystandards.org/

Payment Systems Regulator. (2020) The Payment Systems Regulator Limited Annual report and accounts 2019/20 Retrieved on 19/05/2024 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916822/PSR_Annual_report_and_accounts_2019-20_.pdf

Peneder, M. (2022). Digitization and the evolution of money as a social technology of account. Journal of Evolutionary Economics, 32(1), 175-203.

Pereira Duarte, D., Teixeira de Abreu, M., & Jamal, Z. (Coords.). (2023). "Inovação, desenvolvimento e compliance num sector financeiro em mudança" - Innovation, development and compliance in a changing financial sector . Escolar Editora

Póta, Cserne Panka, and Patrícia Becsky-Nagy. "The impact of digitalization on the financial sector." Competitio 21, no. 1-2 (2022): 29-42.

PwC (2024) Future Ready Payments 2030 A dynamic, purposeful and united agenda for the UK. Retrieved on 17/05/2024 from https://www.pwc.co.uk/industries/financial-services/insights/future-ready-payments-2030.html

Raval, S. (2023). The Future Of Payment Systems: Harnessing Technology Trends for A Revolutionary Payment Ecosystem. Future, 21(02).

SADC. (2024). Member States. Retrieved June 5, 2024, from SADC website: https://www.sadc.int/member-states

Secmca. (2024). Sistema de Interconexión de Pagos. Retrieved June 5, 2024, from https://www.secmca.org/sipa/

Shafie, I. S. M., Yusof, Y. L. M., Mahmood, A. N., Ishar, N. I. M., Jamal, H. Z., & Kasim, N. H. A. A. (2020). Factors influencing the adoption of e-payment: an empirical study in Malaysia. Advances in Business Research International Journal, 4(2), 53-62.

Sharma, R. (2023) "Digital Payments in the UK: Empowering Convenience and Financial Inclusion" Retrieved on 08/06/2024 from https://www.linkedin.com/pulse/digital-payments-uk-empowering-convenience-financial-inclusion/

Shuib, M. S., Abd Muin, M. A., Mohamad Nor, M. N., Ishak, S., Mohamad, T. M., Mansor, N. H., … Mohd Assrudin, W. A. W. (2024). Digital Payment Transactions: Islamic Finance Perspective. Journal of Advanced Research in Applied Sciences and Engineering Technology, 36(2), 12–20. https://doi.org/10.37934/araset.36.2.1220

Siddiqui, K. (2020) "The Impact of Covid-19 on The Global Economy" The World Financial Review, June 24, 2020. Retrieved on 19/05/2024 from https://worldfinancialreview.com/the-impact-of-covid-19-on-the-global-economy/

Singh, S. (2018). Financial system in Malaysia. In Routledge Handbook of Banking and Finance in Asia (pp. 121-144). Routledge.

Soutter, Leigh and Ferguson, Kenzie and Neubert, Michael, Digital Payments: Impact Factors and Mass Adoption in Sub-Saharan Africa (July 2019). Technology Innovation Management Review July 2019 (Volume 9, Issue 7), Available at SSRN: https://ssrn.com/abstract=3418628

Statista Research Department (2023). “Most common digital payment methods in Malaysia 2022”, Statista, January 29, 2024. Retrieved on April 16, 2024 from https://www.statista.com/statistics/1367236/malaysia-leading-digital-payment-methods/

Statista. (2023a). Share of cash estimate at point of sale (POS) in the United Kingdom (UK) from 2000 to 2021 [Graph]. In Statista. Retrieved 11/05/2024 from https://www.statista.com/statistics/1094543/cash-use-in-the-united-kingdom/

Statista. (2023b). Mobile Proximity Payment Transaction Value in the United Kingdom (UK) from 2018 to 2022 (in Billion GBP). Retrieved from https://www.statista.com/statistics/810994/mobile-proximity-payment-transaction-value-in-the-uk/

Statista (2024a). “Internet penetration rate in Malaysia 2014-2029”, Retrieved 16 April 2024 from https://www.statista.com/statistics/975058/internet-penetration-rate-in-malaysia/

Statista (2024b). “Smartphone penetration rate as share of the population in Malaysia from 2010 to 2020 and a forecast up to 2025”, Retrieved 16 April 2024 from https://www.statista.com/statistics/625418/smartphone-user-penetration-in-malaysia/

Statista (2024c). “Malaysian Digital Payments Penetration Rate”. Retrieved on 16 April 2024 from www.statista.com/forecasts/1367672/malaysia-digital-payments-penetration-rate

Statista (2024d). “Digital Payments – Mozambique”. Retrieved 08 August 2024 from https://www.statista.com/outlook/dmo/fintech/digital-payments/mozambique.

Statista (2024e). “Share of adult population with a mobile money account in Mozambique from 2014 to 2021”. Retrieved 04 August 2024 from https://www.statista.com/statistics/1250411/share-of-adult-population-with-mobile-money-account-in-mozambique/.

Statista (2024f). Digital payments landscape in the United Kingdom (UK) - statistics & facts. In Statista. Retrieved 15/05/2024 from https://www.statista.com/topics/8946/payments-in-the-uk/#topicOverview

Study Smarter (2024) Economic Change in the UK. Retrieved on 18/05/2024 from https://www.studysmarter.co.uk/explanations/geography/changing-economic-world/economic-change-in-the-uk/

Sugarda, P., and Wicaksonoaba, R. (2023) "Enhancing the Competitiveness of Indonesia's Financial Services Sector in The Digital Era Through Open Banking: Lessons Learned from The UK's Experience" in Journal of Central Banking Law and Institutions, Vol. 2 No. 1, 2023, pp. 153 - 178

Teker, S., Teker, D., & Orman, I. (2022). Digital Payment Systems: A Future Outlook. Press Academia Procedia, 15(1), 175-176. Retrieved 15/05/2024 from https://doi.org/10.17261/Pressacademia.2022.1613

Tetlow, G. and Pope, T. (2020) "Brexit and coronavirus Economic impacts and policy response" Retrieved on 18/05/2024 from https://www.instituteforgovernment.org.uk/sites/default/files/publications/brexit-coronavirus-economic-impact.pdf

The Economist (2023) "As payments systems go digital, they are changing global finance", the Economist, Retrieved on 19/05/2024 from https://www.economist.com/special-report/2023/05/15/as-payments-systems-go-digital-they-are-changing-global-finance

Titov, Valery, Mafura Uandykova, Oleg Litvishko, Tatyana Kalmykova, Sergey Prosekov, and Tomonobu Senjyu. "Cryptocurrency open innovation payment system: Comparative analysis of existing cryptocurrencies." Journal of Open Innovation: Technology, Market, and Complexity 7, no. 1 (2021): 102.

Torgusson, C. (2021). "Concept Project Information Document (PID)-Mozambique Digital Acceleration Project-P176459".

Trade Finance Global. (2024). Digitalisation in Morocco: strategies, challenges, and future vision. https://www.tradefinanceglobal.com/posts/digitalisation-morocco-strategies-challenges-future-vision/

UK Finance. (2020). UK Payment Markets Summary 2020. Retrieved on 17/05/2024 from https://www.ukfinance.org.uk/sites/default/files/uploads/pdf/UK-Payment-Markets-Summary-2020.pdf

UK Finance. (2022). UK Payment Markets Report. Retrieved from https://www.ukfinance.org.uk/system/files/Payments%20regulation%20report%20FINAL.pdf

UK Finance. (2023). UK Payment Markets 2023. Retrieved 12/05/2024 from https://www.ukfinance.org.uk/system/files/UK-Payment-Markets-2023.pdf

UK Parliament. (2024). Digital Markets, Competition and Consumers Bill: Lords stages and amendments. Retrieved 18/05/2024 from https://commonslibrary.parliament.uk/research-briefings/cbp-10008/

United Nations (2021). "Global e-commerce jumps to $26.7 trillion, fuelled by COVID-19", *UN News*, 3 May 2021. Retrieved on 18 April 2024 from https://news.un.org/en/story/2021/05/1091182

Varea, M., & Arosteguiberry, A. (2010). Treasury Management Efficiency Indicators. In *Public Financial Management In Latin America*. Inter-American Development Bank.

World Bank. (2019). "Mozambique Digital Economy Diagnostic: Executive Summary Report." World Bank, Digital Economy for Africa (DE4A).

World Bank, (2021). "The Global Findex Database". Retrieved 11 April 2024 from https://data.worldbank.org/country/mozambique.

World Bank. (2022). World Development Indicators. Retrieved from World Bank DataBank website: https://databank.worldbank.org/source/world-development-indicators

World Economic Outlook Database, October 2023". IMF.org. International Monetary Fund. Retrieved 16 April 2024 from https://www.imf.org/en/Publications/WEO/weo-database/2023/October/weoreport?c=548,&s=NGDPD,PPPGDP,NGDPDPC,PPPPC,PCPIPCH,LUR,LP,GGXCNL_NGDP,GGXWDG_NGDP,BCA,&sy=2022&ey=2024&ssm=0&scsm=1&scc=0&ssd=1&ssc=0&sic=0&sort=country&ds=.&br=1.

World Intellectual Property Organization. (2023). Global Innovation Index 2023: Innovation in the face of uncertainty (16th ed.; S. Dutta, B. Lanvin, L. R. León, & S. Wunsch-Vincent, Eds.). Geneva. https://doi.org/10.34667/tind.48220

World Population Review, (2024). "Richest Countries in the World 2024". Retrieved 11 May 2024 from https://worldpopulationreview.com/country-rankings/richest-countries-in-the-world.

Yahoo Finance (2024) “Global Digital Payment Market Analysis Report 2024: A USD 361.3 Billion Market by 2030, Expanding at a CAGR of 21% During 2024-2030” Retrieved on 25/05/2024 from https://finance.yahoo.com/news/global-digital-payment-market-analysis-080200744.html

Yean, T. S., & Heng, L. W. (2011). Industrial deepening in Malaysia: policy lessons for developing countries. Asian Development Review, 28(02), 88-109.

Zhou, K., Ye, J. & Liu, (2023). Is cash perceived as more valuable than digital money? The mediating effect of psychological ownership and psychological distance. Retrieved on 25/05/2024 from https://rdcu.be/dIWrh