Edited by
Nafis Alam
Syed N. Ali

Fintech, Digital Currency and the Future of Islamic Finance

Strategic, Regulatory and Adoption Issues in the Gulf Cooperation Council

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Foreword

FinTech has garnered an increasing amount of interest in recent years. Banks and financial institutions are taking steps to catch up with the digital and FinTech wave. At the outset, the new trends that are emerging in financial communities, such as digital banking, have been challenging the hegemony of the incumbent banks whose business model has remained constant over several years despite the changing industry landscape. Simultaneously, AI (Artificial Intelligence) is key to the future of digital banking, and more importantly, ethics in AI application is a recurring theme in the literature. Likewise, microfinancing, through the use of FinTech technologies, has opened up the banking sector to an entirely neglected part of the business sector. Recently due to the COVID-19 pandemic, digital finance has garnered much support from the users in GCC and beyond and FinTech will further drive the digital transformation of the financial services industry.

Islamic finance institutions in GCC countries see much promise in this development because of its potential to promote financial inclusion through its various innovative solutions, for example, crowdfunding, blockchain, peer-to-peer lending, and so on. It is by and large aligned with the principles of *maqasid al-shari'ah* and *maslaha*. It has also attracted stakeholders from both theoretical and applied fields to study, analyse, and utilise this technology as in GCC is apparent where technology advancement always precedents over the others. As FinTech is rapidly expanding its footprints globally, both in academia and industry, many academic institutions are planning to introduce FinTech courses and training programmes in their course curriculum. This effort will help to meet the

challenge of building the human capital needed with the proper expertise to employ this technology efficiently.

In the State of Qatar, Qatari banks and financial institutions are taking steps to catch up with the digital and FinTech wave. Qatar Development Bank (QDB) has been appointed by Qatar Central Bank (QCB) to head the FinTech taskforce. They are in the process of launching a specialised Fintech Islamic Finance programme with Hamad Bin Khalifa University. Qatar Financial Centre (QFC) Authority is keen to promote the business aspect of it, where we are continuing to facilitate Fintechs on the QFC platform via a Fintech services provider licence to enable Fintechs' access to Qatar's lucrative market. Additionally, Qatar Fintech Hub has been designed as a central entity to mobilize and promote the FinTech ecosystem in Qatar, and this is being executed in collaboration with QCB, QFC, and QDB.

Furthermore, the Gulf Research Forum (GRM) engagements with this niche topic and its relevance to GCC are to be commended. The chapters included in this volume provided a special treatment that helps to form a knowledge nucleus on the subject. The chapters are written by experts dealing with cryptocurrencies, bitcoins, blockchains, smart contracts, and so on, and are all discussed within the framework of *shari'ah-compliant*. I believe this is the first written volume of its kind that provided special attention to the GCC region with regards to FinTech as a potential tool for financial institutions and will serve as a reference tool for those who are interested in FinTech.

I wish to congratulate the editors and all the contributors for their scholarly work and wish the readers a stimulating read.

Doha, Qatar — Yousuf Al-Jaida

Contents

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List of Figures

List of Tables

CHAPTER 1

Introduction: FinTech and Islamic Finance in the Gulf Cooperation Council (GCC)

Nafis Alam and Syed Nazim Ali

Introduction

Technology is changing the landscape of the financial sector by rapid changes in the way customers interact with financial service providers. Financial tasks once handled by humans across banking branches are now being completely transformed by technological innovation. Financial startups with innovative financial products and services are posing a threat to incumbent financial services institutions (FSIs) including Islamic financial institutions (IFIs). The business models of these startups which work on data-driven models and require very little capital and fixed assets are aiding them to disrupt traditional financial institutions and gain market share quickly.

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FinTech is a relatively recent term, and there is no specific definition for FinTech yet, but the online version of the Oxford dictionary defines FinTech as "computer programs and other technology used to support or enable banking and financial services". FinTech comprises of two words, Finance and Technology. In general, FinTech is the term assigned to financial service companies whose products or services are fabricated on technology, much resulting in highly innovative, disruptive and pioneering services. FinTech firms are trying to shift the finance industry's activities from physical premises to cloud-based services to make efficient financial services accessible and available to everyone. Many existing financial institutions are implementing FinTech solutions to improve and develop their services, as well as gaining an improved competitive stance. Another comprehensive definition for FinTech would be "FinTech is the new applications, processes, products, or business models in the financial services industry, composed of one or more complementary financial services and provided as an end-to-end process via the Internet" (Sanicola, 2017). These financial products and services could be categorized as lending, personal finance, retail and institutional investments, equity financing, consumer banking, and several others.

Traditional banks and financial institutions are getting disrupted and transformed by the emergence of FinTech startups (Alam et al. 2019). For instance, basic financial activities such as payment and remittance are getting felicitated by the advent of mobile apps that can facilitate financial transactions at almost negligible service charges giving traditional FIs run for their money. Fintech sector mostly is dominated by start-ups and financial accelerators who are emerging or transforming new technologies to change the way financial markets traditionally operate around the globe.

Fintech in the GCC

GCC nations are well-positioned to adopt FinTech in their financial services landscape as noted by S&P Global Ratings report (S&P global Ratings, 2019). The report noted that customer preference for digital banking, access to capital and public policy reforms are driving the growth of FinTech in GCC states.

FinTech ventures in the GCC helped to speed up payments, remittances and strengthen underlying monitoring systems that record such transactions. Remittances sector has been the biggest contributor to the growth of Fintech platform in the region due to its large expatriate

workforce which represents 37% of the total workforce in the GCC. The opportunities for remittance platform can be gauged from the fact expatriates in the GCC sent US$120 billion back home by the end of 2017 (S&P global Ratings, 2019).

GCC governments, particularly of the UAE, are building on the infrastructure and providing incentives to startups to encourage a region-wide FinTech adoption by connecting a multitude of different stakeholders to support financial innovation. For example, the Dubai International Financial Centre (DIFC) rolled out a US$100 million FinTech fund in 2017, to help get start-ups off the ground and help businesses grow. Likewise, Bahrain Development Bank and the Economic Development Board of Bahrain also launched two separate funds of US$100 m each to support FinTech in the region.

A report by Bloomberg Intelligence (Bloomberg Research arm) noted that Fintech startups in the Middle East & North Africa (MENA), which include GCC, are expected to expand from 96 startups in 2019 to 465 by 2020 and the venture capital investment in fintech sector will jump to US$2.28 billion by 2022 from US$287 million in 2019. The same report noted that the UAE with 67 tops the list of countries in the region with the highest number of Fintech startups to date. MENA Research Partners (https://www.mena-rp.com/), a leading research company in the region also noted that the UAE and Saudi Arabia are expected to play a key role in unlocking the GCC growth potential and shaping the MENA fintech sector. Both nations are contributing to fintech transformation in the region. For instance, the banks located in the UAE have already embarked on FinTech. One such example is the Emirates NBD which has stationed itself as the leader of the technology by releasing the Emirates NBD Future Lab. And along with this, they have also declared their commitment to invest AED 1 billion (USD 272 million) in the space.

Some other notable developments for Fintech in the GCC region include:

1. Central Bank of Bahrain (CBB) introduced the Fintech regulatory sandbox to enable foreign and domestic startups and financial institutions to test out technology-based products and services. The Sandbox application process is open to both existing CBB licensees and other companies which may include financial sector companies as well as technology and telecom companies intending to test an innovative product or service, professional service firms which partner with or

service financial institutions, or any other type of applicant working within the financial services industry deemed acceptable by the CBB (https://www.cbb.gov.bh/fintech/).

2. Many GCC Financial authorities such as CCB, Dubai Financial Services Authority (DFSA) and Abu Dhabi Global Market (ADGM) are part of the Global Financial Innovation Network (GFIN) (https://www.fca.org.uk/firms/innovation/global-financial-innovation-network). The GFIN, which is a global network of 28 global organizations including the UK's Financial Conduct Authority (FCA), is committed to supporting financial innovation in the interests of consumers. The GFIN seeks to provide a more efficient way for innovative firms to interact with regulators, helping them navigate between countries as they look to scale new ideas. This includes a pilot for firms wishing to test innovative products, services or business models across more than one jurisdiction. It also aims to create a new framework for co-operation between financial services regulators on innovation and sharing different experiences and approaches.
3. The Saudi Monetary Authority (SAMA) has launched an initiative, Fintech Saudi (www.fintechsaudi.com), to promote and develop the Fintech industry in the Kingdom. It acts as a catalyst for the development of the financial services technology industry in Saudi Arabia, to transform the Kingdom into a global Fintech hub. Through the initiative, SAMA aims to promote the small and medium enterprises sector, diversify the local economy, and create job opportunities. The initiative is aiming to achieve several objectives, like, launching the first version of the Kingdom's fintech system; educating individuals and inspiring them to develop their knowledge and skills in the fintech field; and supporting local banks, international fintech companies, and partners to establish diverse fintech activities in the Kingdom.
4. The UAE government has announced plans to utilize blockchain for 50 percent of federal government transactions by 2021. Dubai is showcasing increased focus on blockchain initiatives with the establishment of the Global Blockchain Council which has been launched by Dubai Future Foundation, a UAE government initiative (www.dubaifuture.gov.ae). The council consists of 46 members, all of which are potential key players in the Blockchain industry, and are shaping the market day by day. They include government entities, international companies, leading UAE banks, free zones, and international Blockchain technology firms, including Microsoft, Du, SAP, IBM, Cisco among others.

5. In line with its vision and aim to encourage and adopt innovation in FinTech, the Central Bank of Kuwait (CBK) (www.cbk.gov.kw) has issued the Regulatory Sandbox Framework which encourages both companies and individuals looking to provide innovative products and services in the financial services industry. The startups will be associated with the electronic payment of funds and that utilize new technology or existing technology innovatively, to test their innovations within a methodology that ensures the safety and soundness of the financial and banking sector.
6. Qatar Central Bank (QCB) is also taking a lead in developing Fintech strategy for the country. In late 2018, the QCB and the Qatar Development Bank (QDB) met with Swedish fintech institutions in Stockholm to discuss plans to open the Doha Fintech Hub. QDB has also launched Qatar Fintech Hub (https://fintech.qa) in 2018 as part of its fintech vision and ambitions. The Qatar Fintech Hub has been established as a global fintech hub with the purpose to support the development of the fintech industry in Qatar. It aims to facilitate collaboration among the participants and stakeholders of the fintech ecosystem and develop local and global relationships that will advance the bank's fintech vision.
7. The Central Bank of Oman (CBO) has constituted a task force to formulate a comprehensive strategy to support the growth and uptake of Fintech in the Sultanate. In this regard, the Central Bank of Oman has approved the request of Bank Muscat, the leading financial services provider in the Sultanate, to establish a $100 million (appr. OMR38.5 million) nationwide, strategic Fintech investment program.

Fintech and Islamic Finance in the GCC

Islamic finance is one segment of the finance industry which offers a lot of potential for digital transformation due to a tremendous amount of opportunities available for Islamic finance institutions (IFIs) to embark on to achieve multiple strategic objectives. With the help of digitalization, IFIs can achieve financial inclusion, offer customer-oriented financial services, operation excellence and gain a competitive advantage over their peers. Crowdfunding, peer-to-peer model and payment platforms, smart contracts and blockchain, cryptocurrencies, cybersecurity and so on are among a few emerging channels of digital transformation that could be utilized in

the Islamic finance industry. Even though Islamic banks are at par with their conventional counterpart when it comes to technological development, the Shariah aspect of the financial transaction can be a hurdle to digitalize the process. Knowhow about the blockchain or the permissibility of cryptocurrency can deter the adoption of Fintech within the Islamic finance industry.

In a recent survey of 103 global Islamic bank managers by the General Council for Islamic Banks and Financial Institutions (CIBAFI) found that 70% of the respondents' view digital transformation as an extremely important strategic area (CIBAFI, 2018). Many banks in the Middle East and Africa are launching technology departments and forming joint ventures with FinTech firms, with almost 45 per cent of respondents planning to increase or launch digital branches in the future.

According to Marmore's report on 'Fintech in GCC', one of the biggest potential impacts of Fintech will be on Islamic finance. Fintech could potentially increase the reach of Islamic financial services and provide more choices that suit individual needs at a competitive cost (Marmore, 2019). SMEs that find it hard to obtain sharia-compliant bank funding from IFIs could look to Fintech firms to fill that gap. Some of the Islamic finance players that have ventured into Fintech include Abu Dhabi Islamic Bank (ADIB), Dubai Islamic Bank (DIB), and National Bonds, a shariah-compliant savings and investment firm. ADIB has teamed up with IBM to build a digital studio that will work on digital innovation projects across the bank. Conventional Islamic banks seek to expand their presence in the Fintech space by adopting technology in their service offerings.

Developments in the GCC Islamic Fintech startup space can be classified into two categories: Fintech startups that obtained Shariah compliance and those which were developed with Shariah mindset from the inception stage. The first category of Islamic Fintech startups comprised of companies that obtained Shariah compliance to partner with IFIs, for example, Beehive P2P, Stellar and Ovamba. While in the second category, Fintech startups were conceptualized with Shariah mindset such as Wahed, Haseed and OneGram, and so on. New York-based Wahed is a Shariah-compliant Robo-advisor. Wahed Capital is an America-based Halal-focused investment firm which claims its Wahed Invest (www.wahedinvest.com) platform is the first Sharia-compliant Robo-advisor aimed toward Muslim investors. The platform allows users in over 130 countries to start investing with as little as US$100. Haseed is an Islamic Robo-advisor

coming out of Saudi Arabia and listed in DIFC Fintech Hive. Haseed (https://www.haseedinvest.com/), which is still in its testing stage, aims to provide investment experience with a fully automated digital financial advisor and will invest in Sharia-compliant assets Another example is the launch of UAE-based OneGram (https://onegram.org/) Shariah-compliant cryptocurrency backed by gold. Each OneGram unit is backed by physical gold stored in a vault, a feature that aims to address speculation and price volatility. The tokens are paired for trading against Bitcoin, and the company plans to add pairings to several hard currencies. OneGram has sold around $400 million worth of its gold-backed tokens over the past year.

It has to be noted that Fintech startups which are compatible with Islamic Finance principles in GCC should take advantage of the IFIs infrastructure, experience, regulatory relationships, customer and business networks, and databases. Complimenting the services of IFIs, Shariah-compliant Fintechs can offer their innovative technology and analytics to reach international markets and provide a better customer experience at lower operating costs. With a huge customer base for Islamic financial services, GCC countries can drive innovation and maintain healthy talent supply in Fintech within Islamic finance space by collaborating, creating tie-ups and organizing events that serve as a good platform for academia, training institutes, and industry practitioners.

Conclusion

Fintech firms have already made their presence felt across the globe, with innovations such as digital remittances, Robo-advisory, algorithmic trading, and P2P insurance and lending platforms. To realize the full potential of Fintech, financial services players including IFIs, both globally and in particular in GCC, should develop strategies to realize the full potential of FinTech and understand the financial risks and opportunities arising from it. In the GCC, where FinTech ecosystems are yet to realize their full potential, governments will have to play a more significant role than in established markets. GCC governments have to play an important role in estimating the financial benefits of establishing a conducive Fintech ecosystem and governance structure to promote Fintech development in the region. The regulators and policymakers should prioritize the type of startups the government wants to promote by setting up a zone of

development for an innovation hub and establish a set of criteria to guide the best use of the regulatory sandboxes and fintech hubs in the region.

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CHAPTER 2

A Critical Analysis of Bitcoin from an Islamic Legal Perspective

Farrukh Habib

Introduction

Crypto-asset is a form of digital or electronic asset, which was introduced with the inception of Bitcoin in 2009. The authors' own definition of crypto-asset is that "*it is a digital representation of value that uses cryptographic encryption technique*". Before delving into the main discussion, it is crucial to mention at the very beginning of this chapter that according to the author, the term 'cryptocurrency' is a misnomer, and a nomenclature which is used inappropriately. Neither all types of crypto-assets are 'currencies', nor 'cryptocurrencies' are the only type of crypto-assets. Actually, cryptocurrencies are a subset of crypto-assets, while there are many other types of crypto-assets. The only reason for the popularity of the term 'cryptocurrency' for all types of crypto-assets is that the first crypto-asset, Bitcoin, and other early-stage crypto-assets, Namecoin, Litecoin, Peercoin, and others were created as currency. Most of the crypto-assets are hybrid, because they have features of currency as well as other types of asset, hence it is difficult to draw a clear line of distinction

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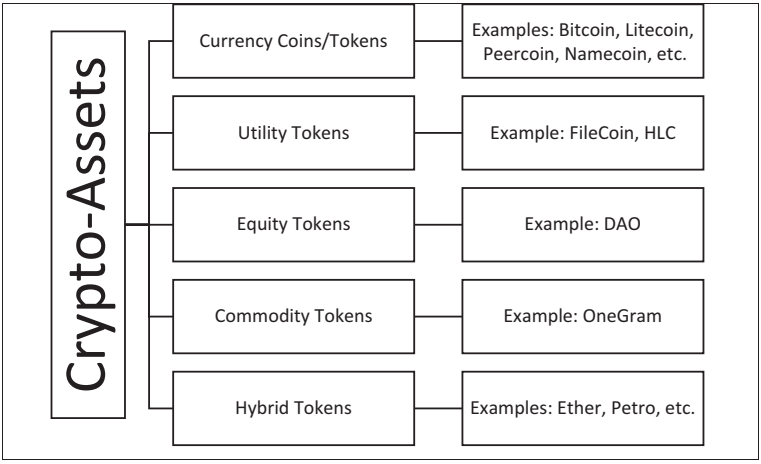

Fig. 2.1 Types of crypto-assets. (Source: Author's own)

among different classes of crypto-assets. However, the proposed classification is still useful in acquiring a better understanding and presenting the discussion in a less confusing manner. Therefore, a classification of crypto-assets, along with the Bitcoin, is given in Fig. 2.1 below.

Therefore, unlike the general trend, in this chapter, the term 'crypto-currency' is only used for the currency-tokens, and not for all types of crypto-assets. For the general class, the term 'crypto-assets' is preferred and used throughout the chapter, which is technically and logically more appropriate and less confusing for such type of asset class.

Generally, the introduction of internet, e-commerce, mobile network and smart devices has greatly contributed in changing the shape of monetary and financial services. However, the inception of Bitcoin, and other crypto-assets, has been among the greatest influencers and strongest catalyst for disruption. Although, the crypto-asset class, like Bitcoin, is still at its infancy stage; experts have already regarded its impact and effect as the beginning of a new technological revolution, particularly relevant to the financial services sector.

Money has a history of transformation through several items; shells, wheels, beads and even cows. Broadly, commodity money was made of a substance that had its own value such as gold and silver coins, unlike a representative money which is a certificate or a debt receipt. While fiat

currency does not have intrinsic usage or benefit and does not represent an underlying asset in a vault somewhere. Money has indeed already recorded a significant transformation. Today, digital money in the form of virtual-currency as represented by Bitcoin and other currency-tokens is another significant milestone in the transformation of money. While the value of fiat currency comes from being recognized as legal tender by the government of the issuing country which then leads to its acceptance by the people, Bitcoin's value emanates from the recognition of stakeholders in the participating community. In other words, it is derived from general people's trust in the system and the economic principle of demand and supply of Bitcoin.

Bitcoin has been mainstreaming gradually in the major financial discourse and multi-billion-dollar financial technology industry away from its obscure origin as a monetary experiment of a small group of Techno-Libertarians. It is being accepted in a growing number of online and offline stores as a form of payment. This increasing acceptability of Bitcoin has gravitated the interest of many financial stakeholders to this virtual currency. There is growing need and calls by and on policy makers for a well-analyzed and robust Shariah and regulatory positions for this billion-dollar industry. Islamic economists and finance practitioners are also expectedly concerned about the Shariah perspective of this new asset class. Thus, this chapter seeks to and presents a critical analysis of bitcoin from an Islamic legal perspective. While doing so, it hopes to offer a significant contribution in this direction.

Historical and Recent Developments

A crypto-asset is developed using cryptography, which is the technique of encrypting information for the sake of its secured exchange, and algorithms designed to solve difficult computational problems as the proof-of-work. The underlying technology of crypto-assets in general is referred to as Blockchain. It is the technology of digital distributed ledger, where information is saved in the form of blocks with the help of cryptographic security (Wyk, 2013).

There are presently over 4946 crypto-assets which could be broadly classified into Bitcoin and alternative coins, or altcoins in short (Coinmarketcap.com, 2019). According to this classification, every crypto-asset, other than Bitcoin, is called altcoin. As of December 2019,

there were over 18.1 million bitcoins in circulation with a total market value of USD 120.9 billion (Coinmarketcap.com, 2019).

Following the global financial crisis, in 2008, Satoshi Nakamoto (a pseudonym), introduced the idea of digital peer-to-peer (P2P) payment system in the form of Bitcoin and suggested reducing the intermediary role of financial institutions in the financial transactions. The system was introduced as an alternative to building trust among the parties of a transaction at a distributed network while maintaining their anonymity, and that too without having a third party to establish that trust (Nakamoto, 2008). After initiating the idea, Satoshi Nakamoto also developed the system and uploaded it as an open source program in 2009.

Altcoins are the alternative crypto-assets launched after the success of Bitcoin. They are projected as better substitutes to Bitcoin by trying to target any perceived limitations of Bitcoin and develop newer versions with competitive advantages. They include Litecoin (LTC, launched in 2011), Ethereum (ETH, launched in 2015), Zcash (ZEC, launched in 2016), Dash (originally known as Darkcoin, launched in 2014), Ripple (XRP, launched in 2012), and Monero (XMR, launched in 2014), and many others (Bajpai, 2017).

Policy decisions of nations toward Bitcoin are multifarious; while some are friendly such as Estonia, the United States, Denmark, Japan, Sweden, South Korea, the Netherlands, Finland, Canada, UK, and Australia (Scott, 2016), some have adopted ban on Bitcoin; which include Bangladesh, Bolivia, China, Ecuador, Iceland, India, Russia, Thailand, Vietnam (Smart, 2015). Others remain indecisive. Examples of such nations include Malaysia (De, 2017). In many of these states, the journey of their regulatory development on Bitcoin has been long and, in some cases, still continuous. Japan, for instance, approved a law regulating Virtual Currencies on May 25, 2016, which was promulgated on June 3, 2016. On September 30, 2017, the Financial Services Agency (FSA) of Japan granted its first licenses for digital currency exchanges to 11 companies. On April 1, 2017, it enacted a new law authorizing the use of digital currency as a method of payment, essentially granting it the same legal status as any other currency. The law follows months of debate which ultimately brought Bitcoin exchanges under anti-money laundering (AML) and know-your-customer (KYC) rules and resulted in the categorization of Bitcoin as a kind of payment instrument.

Bitcoin Explained

Crypto-assets got to financial lime light since 2008 just towards the end of the global financial crisis, and the first was Bitcoin in 2009 developed by Nakamoto. Bitcoin is a concept of an encrypted virtual currency using the Blockchain protocol to perform financial transactions. In the aftermath of the financial crises in 2008, Bitcoin was developed as an alternative to traditional currencies (Deloitte, 2015).

In a strict sense, the definition of Bitcoin can be given as:

> *Bitcoin is a collection of concepts and technologies that form the basis of a digital money ecosystem.* (Antonopoulos, 2015, p. 1)

Another definition is given as:

> *Bitcoin is a decentralized digital currency.* (Franco, 2015, p. 3)

The meaning of decentralized is that Bitcoin is neither controlled by central authority nor issued, endorsed, or regulated by any central bank or monetary authority. It also means that it is not tied to any country. Consequently, it is not under the control of any central bank, nor can it be minted by a centralized authority. Instead, bitcoins are created through a computational process known as mining. The blockchain technology behind it tracks and records data across a digital ledger, which is distributed on a network made up of participating parties, called nodes. The distributed ledger system means that instead of data being kept only by two counterparties or in a central repository, it is verified and stored across hundreds or thousands of computers across the globe (Deloitte, 2015).

In other words, Bitcoin, the system,[1] exists in the form of copies of a distributed digital ledger containing all the transactions of Bitcoin that is stored and updated through the nodes that communicate with each other over the internet. The copies—that are updated continuously—contain the record of every transaction that has been completed within the system since its inception, creating an immutable history (Nakamoto, 2008).

[1] Throughout this chapter, the term 'Bitcoin' with capital 'B' refers to the system or the underlying blockchain ledger itself, which is only one, hence, it is not correct to use this term in plural form with an 's'. On the other hand, the term with small 'b' or in plural form with an 's' is used for the currency units generated by the system in the form of digital tokens.

The feature of decentralization also means that it does not need any centralized clearing house or third party to verify money supply and transactions. Rather, it is built on a network of computers toward the singular purpose of validating and clearing transactions on the Bitcoin system. The distributed and decentralized network allows each individual user (miner) to verify the validity of individual transactions and the system through the cryptographic protocols. All this data is stored by each miner on a distributed ledger known as the Blockchain. Blockchain—a distributed ledger—is stored locally on the computer hard drive or any other storage device of every miner running a full version of the Bitcoin software (Kaye Scholer, 2016).

It is also important to understand the categorization of Bitcoin in the context of currency. Therefore, Fig. 2.2 below summarizes the taxonomy of Bitcoin as a currency.

According to Fig. 2.2 above, the currency or money can be divided into: (1) physical currency; and (2) digital currency. Physical currency is what is available in the form of paper notes or bills and coins issued by a national government as a legal tender. Examples of such currency are US dollar bill, a note of Malaysian ringgit, etc. On the other hand, digital currency does not have any physical form, because it is stored, seen and transferred through electronic system. This can be divided into: (1) electronic money; and (2) virtual currency. Electronic money is simply a digital representation of the physical currency. Therefore, it is centralized, issued by a government, has the status of legal tender, and pegged and represented in the same units as physical currency. The example of electronic money is the balance in a bank account shown in an online system. If someone has

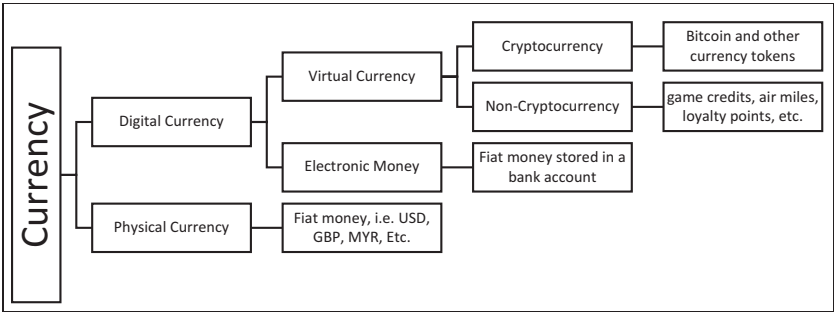

Fig. 2.2 Taxonomy of Bitcoin as a currency. (Source: Authors' own)

deposited USD 10,000 in a bank account, the same amount is represented in the online account system. If the depositor withdraws USD 3000 from the account, the online system will then show only USD 7000 as the account balance. This means that it is a simple digital reflection of the physical money.

The second form of digital currency is virtual currency which is, unlike electronic money, not issued by a government, hence it is not a legal tender. It may not be pegged or represented in the same unit as physical currency. This category can be further classified into: (1) non-cryptocurrency; and (2) cryptocurrency. Non-cryptocurrency, as the name suggests, does not use cryptographic technique for encryption; and they are not particularly created as a 'currency' in a strict sense. Their usage is limited to a certain organization, specific service or discount. Examples of such currency are credits of an online gaming community; loyalty points of a specific company which can be used for special discounts or to purchase special gifts; airmiles which are offered to a frequently flying member by an airline company; and many others.

Lastly, it is the cryptocurrencies which can be issued and used as a medium of exchange as well as a representation of certain type of digital asset.

Current Resolutions and Fatwas on Bitcoin: A Critical Analysis

Shariah opinions are diverse on Bitcoin. Some Islamic legal verdicts hold impermissibility of Bitcoin based on its volatility and intangibility among other reasons. Some scholars either consider it permissible while others are indecisive. Even among Shariah scholars holding the position of impermissibility, some isolate Bitcoin while others generalize it to encompass other crypto-assets. Few of these opinions are presented here.

Scholars Who Are against Bitcoin

1. Turkey's Directorate of Religious Affairs (Diyanet), which is the top state organization dealing with religious matters, has ruled that digital currency, Bitcoin, is not appropriate according to Islam. The directorate's head said: "*the purchase and selling of digital currencies is not appropriate according to [Islamic] religion at this point due to*

the fact that they are open to speculation in terms of value and they can easily be used mostly in illegal deeds such as money laundering. They are also far from state auditing and supervision" (Hurriyet Daily News, 2017).

2. Egypt's Dar Al Iftaa (the office of the Grand Mufti of Egypt) issued a Fatwa (Islamic ruling) that deems Bitcoin as forbidden by Islam. "*Bitcoin could be harmful to the country's social and economic security*", Dar Al Iftaa said, stressing that the currency could break through the national security and central financial system. The Egyptian Grand Mufti's Counsellor, Magdy Ashour, said that the currency "*is used directly to fund terrorists*" explaining that its transactions threaten major damage to the economy. Moreover, the system has no set rules, which is considered as a contract annulment in Islam, that is why it is forbidden, Ashour added (Middle East Monitor, 2018).
3. Dar al-Ifta, the Supreme Fatwa Council of Palestine, holds that Bitcoin is not a price because it is against the foundation of being a price. At the same time, it cannot be considered a commodity because bitcoin does not satisfy any desire in humans from consumption perspective. So, its essence can be explained as: it is an electronic program which is used as a tool to get rich. It sometimes takes the function of currency in some places and in some countries. Thus, the mining of bitcoins is also prohibited because it consists of grave uncertainty (*gharar*) and entails the essence of gambling (*qimar*). It is similarly not permissible to buy and sell bitcoins because until now it is a currency with unknown issuer with no guarantor. It is also too volatile and risky and prone to attack on its system. It similarly gives a great space to hardship, fraud and deception (Dar Al-Ifta'Al-Falasteeniyya, 2017).

A critical analysis of these fatwas reveals that most of them are based on misunderstanding, like the Palestinian fatwa mentioned that Bitcoin is merely a program serving as a short-cut to get rich, which is not the case. The Bitcoin program is a complete system of P2P payments; it is not an aimless program. Moreover, mining process requires huge amount of resources, which is not easy for an ordinary individual to establish, operate and maintain in an economically beneficial manner. Similarly, some of the fatwas are not based on juristic objectivity, and are biased towards unauthentic news and misconceptions. For instance, some fatwas express that

Bitcoin is only used in illegal activities, or it is used by money launderers. This argument is not based on correct facts.

Scholars Who Are in Favor of Bitcoin

Datuk Dr. Mohammad Daud Bakar, a prominent Shariah scholar in Malaysia, offers the following arguments in favor of bitcoin:

1. The presumption of Shariah on new issues and realities is permissibility until and unless there is sufficient evidence to prove otherwise. This permissibility should be extended to digital currencies (crypto-assets) such as bitcoin, Ethereum, etc.
2. Digital currencies, in their current forms are the most secured form of currencies, even much more than some printed monies in circulation. This is due to high-level algorithm coding and enhanced security which makes digital currencies non-hackable and non-comprisable.
3. Speculation constitutes a major pivot upon which many prohibit cryptocurrencies; however, this argument is questionable because mere existence of speculation may not provide sufficient ground for impermissibility, unless it is proved to be manipulative and unjust.
4. There should be a differentiation between *gharar* (uncertainty) and *khatar* (risk). While the former is prohibited element in the Islamic law, the latter is required to justify liability and profit. Both cannot be simply equated to each other. Hence, huge risk due to price volatility and fluctuation in value may not inevitably mean the presence of *gharar* in Bitcoin.
5. Due to the fact that Bitcoin is not a legal tender, this has become one of the main reasons of its impermissibility, according to various shariah scholars. However, this is an administrative issue, not a shariah issue. It may be a concern for a state or national government, but it is not a basic shariah requirement for a currency (Bakar, 2018).

In order to further clarify the nature, features and usage of Bitcoin to support its shariah ruling, it is crucial to objectively analyze it from purely Islamic jurisprudential perspective. In view of that, the next section discusses the topic in the light of principles of classical Islamic jurisprudence.

Islamic Legal Criterion for Mal and Bitcoin

Many scholars have criticized Bitcoin and other crypto-assets on the basis of their intangibility and express that due to their digital nature, they cannot become price in a transaction. It will be clarified later in the chapter. However, it is important to mention that if all the prohibitive elements are avoided, crypto-assets can become mal *mutaqawwam* (legit or valid asset). Similarly, being a type of crypto-asset, this can be also true for Bitcoin. However, it is pertinent to specifically discuss whether Bitcoin qualifies as mal *mutaqawwam* and whether it is a currency or commodity. Hence, the discussion also delves into the legal criterion of money and currency in shariah focusing on the nature of Bitcoin.

Is Bitcoin Mal?

According to the famous Arabic dictionary 'Lisan Al-Arab', the literal meanings of mal is something which can be possessed (Ibn Manzur, 1975). However, Islamic jurists differ in defining mal from the *fiqh* perspective. Hanafi scholars define mal in a different manner. Ibn Abidin (1992), a Hanafi scholar, states:

الْمُرَادُ بِالْمَالِ مَا يَمِيلُ إلَيْهِ الطَّبْعُ وَيُمْكِنُ ادِّخَارُهُ لِوَقْتِ الْحَاجَةِ، وَالْمَالِيَّةُ تَثْبُتُ بِتَمَوُّلِ النَّاسِ كَافَّةً أَوْ بَعْضِهِمْ، وَالتَّقَوُّمُ يَثْبُتُ بِهَا وَبِإِبَاحَةِ الِانْتِفَاعِ بِهِ شَرْعًا؛ فَمَا يُبَاحُ بِلَا تَمَوُّلٍ لَا يَكُونُ مَالًا كَحَبَّةِ حِنْطَةٍ وَمَا يُتَمَوَّلُ بِلَا إبَاحَةِ انْتِفَاعٍ لَا يَكُونُ مُتَقَوِّمًا كَالْخَمْرِ، وَإِذَا عُدِمَ الْأَمْرَانِ لَمْ يَثْبُتْ وَاحِدٌ مِنْهُمَا كَالدَّمِ

"*The meaning of 'mal' is [something which] the [human] nature inclines towards [due to its worth], and its [physical] storage is possible for the time of necessity. The worth [of something] is established by people's worth [by having them considering it as worthy] either all of them or few of them [consider its value]. Meanwhile legitimacy [of something] is established by its value and its permissibility to benefit from it in sharia. Hence, whatever is permissible [to benefit from in sharia] without any commercial value is not mal, e.g. a single grain of wheat; and whatever is valuable without permissibility of usage is not a legit asset, e.g. wine; if both the elements [commercial value and permissibility] are absent [in something], then both cannot be established [to prove it as mal], e.g. blood.*" (Ibn Abidin, 1992, vol. 4, p. 501)

The main features of mal are: (1) ownership can be established on it; (2) it can be possessed; (3) it can be stored; and (4) it can be used at the time of necessity. Contrary to the Hanafi jurists, the majority scholars opine that mal refers to everything which has value and be compensated if

it is destroyed (Al-Zuhayli, 2010). For example, Al-Suyuti (1983) quotes the definition of mal from Imam Shafi that mal refers to something which has value, is used as consideration in trade, must be compensated for if destroyed, and that people do not behave as if it is a valueless thing. For non-Hanafi scholars, there is no distinction between mal *mutaqawwam* or *ghayr-mutaqawwam*. For them, the permissibility of usage of something or benefitting from it is a fundamental element of value itself. If shariah does not allow to use something, it cannot be considered as mal at all.

It is clear from the earlier explanation of Bitcoin that a bitcoin can be easily stored in digital or electronic devices through special computer programs called 'e-wallet', 'bitcoin-wallet', or 'crypto-wallet'. Bitcoins exist in the form of unique and separate digital tokens or units on the blockchain; in this way, they are distinguishable among each other. Through the private key of the wallet, ownership can be established; additionally, they can be spent or transferred with private and public key at the time of necessity. Therefore, it can be said that all these main features of mal are present in Bitcoin.

In addition, it is also noticed that mal should have commercial value in order to be considered as worthy; and it should not fundamentally contain any impermissible element, in order to be *mutaqawwam* (legit asset). If these two conditions are met, it can be considered as mal by the non-Hanafi scholars, and mal *mutaqawwam* by Hanafi jurists.

From the above definition, it is observed that Hanafi jurists put a condition of being commercially valuable or worthy to be considered as mal. However, mal then can be divided into *mutaqawwam*, which means valid or legit asset from shariah perspective too. In other words, if shariah allows people to benefit from or use it then it is *mutaqawwam*. For example, a car, a house, an apple, and so on are types of mal *mutaqawwam*. On the contrary, if something has value among people, but shariah does not permit to use it or benefit from it, then it is called mal *ghayr-mutaqawwam* (invalid asset). For example, wine is a valuable asset; however, Muslims are not allowed to use it or benefit from it in any way, hence, it is mal *ghayr-mutaqawwam* for them.

Nevertheless, it is crucial to note that in sharia, mal *ghayr-mutaqawwam* is usually something which is intrinsically impermissible. In other words, that thing is either prohibited itself due to its nature, or fundamentally contains an element which is prohibited. However, something does not become mal *ghayr-mutaqawwam* due to external factors. For example, if someone steals an apple, it is not permissible for the thief to consume it,

not because the apple is mal *ghayr-mutaqawwam*, it is still mal *mutaqawwam*, but because it was acquired through illegal means by the thief.

To establish the commercial value of a bitcoin, its value in terms of fiat money can be considered. According to Coinmarketcap.com (2019), one bitcoin was worth USD 6664.50, on December 18, 2019. It means that people who demand it or suppliers (the buyers and the sellers) are ready to pay or accept USD 6664.50 as the price for a bitcoin. Moreover, currently bitcoin can be used to buy presents with gift cards, via Gyft or eGifter. It can be used to pay for flights and hotels, through Expedia, CheapAir and Surf Air. Microsoft accepts bitcoin in its app stores, where the products offered, like movies, games and app-based services, can be downloaded. Some musicians (Bjork, Imogen Heep) let their customers download their music in exchange for bitcoins. Additionally, Overstock was one of the first big retailers to start accepting bitcoin, back in 2014. Sharps Pixley, APMEX and JM Bullion let their customers exchange bitcoin for bullion gold. Some fast food restaurants, like KFC Canada, Subway, PizzaforCoins also accept bitcoin as a mode of payment. Several private and public universities in the USA as well as a couple of New York preschools accept bitcoin as tuition fee. Some legal and accounting firms also accept payment for their services in the bitcoin. Some charities or crowdfunding sites, such as BitHope, BitGive or Fidelity Charitable accept bitcoins for fund transfer (Acheson, 2018).

According to Spendbitcoins.com (2019), over 100,000 merchants around the world accepted bitcoin as a mode of payment as on December 18, 2019. Those merchants offered a huge and diverse set of goods and services in exchange of bitcoins. All this data demonstrate that bitcoins do have commercial value. With bitcoins one can buy valuable goods and services. However, one can still argue that only few people accept and perceive the commercial value of bitcoins, but this argument does not hold weight. Because as mentioned in the definition of Ibn Abidin (1992) earlier, even few people's acceptance is sufficient to establish commercial value of mal or asset. Similarly, it is sufficient for bitcoins to be considered as valuable asset.

As for the *taqawwum* or permissibility of usage and benefits, it can be said that bitcoins are unique digits generated through a computer program as a result of mining, which consists of validating and endorsing the transactions, and keeping the ledger secured and updated. The miners compete with each other in completing the blocks containing records of transactions first because whoever completes the block faster than others

gets the reward in the form of newly generated bitcoins as well as the fees of the transactions within that block. Once all the bitcoins are mined, the miners would still receive incentive in the form of transaction fee. Therefore, the main features of Bitcoin, the process of issuance and distribution, the blockchain platform, the equipment and resources required to mine bitcoins do not consist of any element which is fundamentally impermissible in sharia. One of the Islamic legal maxim supports this analogy as:

الْأَصْلُ فِي الْأَشْيَاءِ الْإِبَاحَةُ حَتَّى يَدُلَّ الدَّلِيلُ عَلَى التَّحْرِيمِ

"*The original principle in [shariah ruling of] things [or transactions] is permissibility, unless an evidence [from the shariah sources] proofs its impermissibility.*" (Al-Suyuti, 1983, p. 60)

Damad Affandi (n.d.), a Hanafi scholar, explains in his famous book, '*majma al-anhar*', the approach of Islamic jurists as:

وَاعْلَمْ أَنَّ الْأَصْلَ فِي الْأَشْيَاءِ كُلِّهَا سِوَى الْفُرُوجِ الْإِبَاحَةُ قَالَ اللَّهُ تَعَالَى {هُوَ الَّذِي خَلَقَ لَكُمْ مَا فِي الْأَرْضِ جَمِيعًا} [البقرة: 29] وَقَالَ {كُلُوا مِمَّا فِي الْأَرْضِ حَلَالا طَيِّبًا} [البقرة: 168] وَإِنَّمَا تَثْبُتُ الْحُرْمَةُ بِعَارِضِ نَصٍّ مُطْلَقٍ أَوْ خَبَرٍ مَرْوِيٍّ فَمَا لَمْ يُوجَدْ شَيْءٌ مِنْ الدَّلَائِلِ الْمُحَرِّمَةِ فَهِيَ عَلَى الْإِبَاحَةِ

"*Note that the original principle in all the things, except private parts, is permissibility, because Allah said: 'it is He who created for you all that the earth contains' (Al-Baqarah, 29); and he said: 'O people, eat permissible good things out of what lies in the earth' (Al-Baqarah, 168). And the impermissibility can only be established with either general textual evidence or narration. So, when proofs pointing towards impermissibility are not found, the things remain permissible.*" (Damad Affandi, n.d., vol. 3, p. 568)

Based on this discussion, it can be said that it is generally allowed to use and benefit from bitcoins as mal from shariah perspective. Hence, Bitcoin can be considered as mal *mutaqawwan* for Hanafi jurists, and simply mal for non-Hanafi jurists.

Is Intangibility a Shariah Issue for Bitcoin?

As mentioned earlier, bitcoins are a form of digital asset, they are intangible. They do not have corporeal form (*ayn*), therefore, one may argue that it is not shariah compliant due to non-existence. This argument is flawed, because there is a huge difference between non-existent thing and intangible thing. Electricity and mobile airtime are also an intangible form of assets, but it does not mean that they do not exist. Similarly, bitcoins do

exist on the blockchain platform. They can be created, stored, transferred, owned, possessed, spent and destroyed; that is why, it can be said that they have existence. However, the question is whether shariah recognizes intangible assets as valid or not. The answer is that shariah recognizes intangible assets as mal *mutaqawwam*. Internationally recognized contemporary shariah authorities, like Islamic Fiqh Academy of the Organisation of Islamic Cooperation (OIC) and Accounting and Auditing Organisation of Islamic Financial Institutions (AAOIFI), have also resolved that intangible or virtual assets are property of inherent monetary value that entitles them to legal protection and that any violations of property rights associated with them are punishable (IDB & IFA, 2000, Resolution No. 43 (5/5); AAOIFI, 2015, Article no 3/3/3/1). Subsequently, the exchange of electricity and airtime is valid. In the same vein, intangibility does not affect the ruling of bitcoins.

Islamic Legal Criteria of Money and Bitcoin

According to Investopedia.com (2018), money is an official legal tender issued by a state government which is circulated as medium of exchange. Generally, it consists of notes and coins. Consequently, upon this traditional concept, many economists have narrowed the perception of money to only the widely popular fiat money issued by national governments. Nevertheless, from shariah perspective, all these characteristics may not be required, making the perception about money wider.

From an economic perspective, money has three main functions: (1) store of value, it should provide stability to the value for future use; (2) medium of exchange, it should be widely accepted for easily exchanging goods and services; and (3) unit of account, it should serve as a measure of value of other goods and services. The third function as unit of account cannot be established for a money, unless it is a stable store of value and a widely used medium of exchange. In other words, the first two conditions are prerequisite for the third one.

In order to perform these three main functions, and to become a good money, money should have various characteristics. For example, it should be: (1) durable, so it is easily storable; (2) portable, so it can be easily transferred or transported anywhere; (3) divisible, so all types of transactions in small denomination can be easily performed; (4) uniform, so it can be easily replaceable with the same unit of money; (5) limited in supply, so it can avoid inflationary effect; (6) hard to counterfeit, so fraud can

be avoided; (7) valuable, so it can be exchanged for other valuable goods and services; (8) widely acceptable, so transactions can be performed with it anywhere; and (9) legal tender, so the counter-party can be forced to accept it which gives trust to the money.

In the case of Bitcoin, it is observed that it has all the attributes of a good money, except that it is not a legal tender, and it has not yet acquired wide acceptance by general people. Nevertheless, it is too early to expect that Bitcoin should acquire such level of wider acceptance.

Definition of Money in Islamic Law

According to Al-Mausuah Al-Fiqhiyyah (2007), in literal terms, money is a currency made of gold, silver or any other thing which is dealt in as currency. Technically, money can be anything which is used as a medium of exchange, whether it is gold, silver, petal, skin or paper and so on, if it gets general acceptability among people. According to Turkamani (1988), money refers to anything which is widely acceptable as a medium of exchange and store of value in sharia, it does not matter what is the nature and form of that thing. It goes without saying that the element used as medium of exchange should be shariah compliant. In other words, as a basic requirement, it has to be mal *mutaqawwam*.

Taqi Usmani (2015), a contemporary Hanafi jurist, says that money refers to something which has following three attributes:

1. Medium of exchange;
2. Unit of account; and
3. Store of value.

These definitions of Islamic scholars are similar to what economists say with regard to the definition of money and what common people understand. For instance, Merriam-Webster dictionary defines money as: "*something generally accepted as a medium of exchange, a measure of value, or a means of payment*" (Merriam-Webster, 2018). It may be summarized based on these definitions that money is something which has the following attributes:

1. Medium of exchange;
2. Accepted as a mean of payment;
3. Store of value; and
4. Unit of account.

Bitcoin, as stated earlier, has been created to be a medium of exchange or a mean of payment (Nakamoto, 2008). In fact, this is the only purpose or intrinsic usage or benefit of Bitcoin, as it cannot be used for any other purpose. It is understood from the discussion of classical scholars that a good form of money should not be used for any other purpose than to be used as a medium of exchange. This is actually the fundamental criteria for money. Ibn Taymiyyah (1995) writes about gold and silver coins:

وَالدَّرَاهِمُ وَالدَّنَانِيرُ لَا تُقْصَدُ لِنَفْسِهَا بَلْ هِيَ وَسِيلَةٌ إلَى التَّعَامُلِ بِهَا وَلِهَذَا كَانَتْ أَثْمَانًا؛ بِخِلَافِ سَائِرِ الْأَمْوَالِ فَإِنَّ الْمَقْصُودَ الِانْتِفَاعُ بِهَا نَفْسِهَا؛

"*Dirhams and dinars are not intended per se, they are a tool to acquire other things. That is why, they become price [or money, in an exchange transaction], unlike all other [types of] assets [like goods and services] as the purpose [of acquiring them] is to derive benefit from themselves.*" (Ibn Taymiyyah, 1995, vol. 19, p. 252)

Moreover, the exponential growth in the acceptance level of Bitcoin as a mode of payment by various market participants also supports this feature. As for the features of store of value and unit of account, it is too early to expect Bitcoin to have such attributes.

Differences Between Money and Commodity

It is pertinent to discuss the differences between money and commodity here because money is not equivalent to commodity according to sharia. Shariah emphasizes to treat money just for its basic purpose, that is, as a medium of exchange and measure of value. Ibn Taymiyyah (1995) explains that dirhams and dinars (gold and silver coins) have no intrinsic use and purpose, but they are created just to be used as a medium of exchange. The same explanation is given by Ibn Qayyim (1973) that money is not desired for itself, but rather it is created to facilitate the trade of goods. So, if money itself is treated as a good or commodity, this would lead to destruction because then there would be no reliable measure of value. Hence, money is subject to shariah rules of exchange (*sarf*) and interest (*riba*).

On the other hand, commodities or goods warrant a different set of shariah rules and criteria because they have intrinsic use and purpose. Usmani (2005) deliberates the differences between money and

commodity in a conclusive manner by explaining the following three fundamental differences between money and commodity:

1. Money has neither an intrinsic usage, nor it is capable of directly fulfilling needs of human beings, such as eating, drinking and wearing etc. On the contrary, the commodity has an intrinsic usage, and can be utilized directly without the need of exchanging it with something else.
2. The commodities may have different qualities and attributes. But money has no quality except it is a medium of exchange and measure of value. That is why, all the units of money have same value and equal to each other. There is no difference between dirty note of USD 100 and a new note of USD 100, both are equal in value.
3. A particular commodity can be specified in an exchange transaction by stipulation. For example, if someone purchases a particular car, the seller has to deliver that particular car; he cannot change it with another car. Contrary to this, money cannot be specified in a transaction of exchange by stipulation. For example, it does not matter if a buyer shows a particular note of USD 100 to the seller, and then pays with another note of USD 100; the transaction is still valid from shariah perspective.

With this understanding, it can be argued that Bitcoin seems to fulfil the criteria of money, rather than commodity. However, it is pivotal to understand that if Bitcoin is money or currency, which type of money it is?

Types of Money in Shariah

The Islamic jurists classify money into mainly two types: (1) natural money (*thaman haqiqi*); and (2) customary money (*thaman hukmi*).

Natural Money

According to the scholars, gold and silver are natural money, because these metals have served the purpose of being a medium of exchange throughout human history. Their monetary value is naturally understood by human beings. Therefore, it is perceived that their value has not been established through artificial means. In fact, many scholars hold that their value intrinsically exists regardless of their form. Due to such status, the famous jurist, Imam Ghazali (2004) says that Allah the Almighty created gold and silver to be circulated among people and become standards of

measurement for different assets or other goods and services. They are means to acquire all other assets. They are precious and valuable in the eyes of people, but not desired for their own sake; they are rather used as a means to obtaining other assets.

Customary Money

Customary money refers to the money which receives the status of money due to custom and acceptability of people. It is originally not meant to serve the purpose of money, but people accept it widely as a medium of exchange. Commodities other than gold and silver used as money are common forms of customary money. The customary money does not intrinsically have the quality of money (*thamaniyyah*), rather such feature is assigned to it through artificial factors. Customary money can be further divided into two types: (1) commodity money; and (2) fiat money.

Commodity money is used as a medium of exchange, but this feature is not natural. In other words, it does not have *thamaniyyah* by default. However, it has other intrinsic usage or benefits. Thus, it can be used for other purposes. Fiat money, on the other hand, refers to a currency that neither has *thamaniyyah* by default, nor it has any intrinsic usage or benefit. The reason for such money to have value is due to an artificial or external factor. For example, national currencies are backed by governments, and counter-parties are bound by law to accept such currencies in their specific jurisdictions by virtue of the status of legal tender. In this way, fiat currency derives its value.

With this understanding, it can be argued that Bitcoin is a customary money. It has some resemblance with the natural money in the sense that it can only be used as a medium of exchange, and it does not have any other benefit. But due to the fact that its value has been established by the custom of the people, unlike gold and silver, it is more appropriately a customary money. If people stop perceiving that bitcoins have value, they would become useless electronic numbers and mere digits stored on a blockchain platform.

Shariah Rulings for Dealing in Bitcoin

In general, it can be said that it is allowed to buy, sell and invest in bitcoins. However, based on the Shariah Standard of AAOIFI (2015) on trading in currencies, some most fundamental shariah rulings can be proposed as:

- When bitcoins are exchanged for fiat money, gold, silver or any other shariah compliant currency token, both parties must take possession of the counter-values before the end of exchange session.
- The possession of counter-values should be in full amount.
- Since bitcoins are in digital form, their possession cannot be in physical form. Therefore, their constructive possession is acceptable.
- When bitcoins are exchanged for bitcoins, they must be equal in amount. However, if bitcoins are exchanged for other types of currencies, then equality in amount is not required.
- When exchanging bitcoins for other types of currencies, there should be no stipulation of deferment regarding the delivery of any counter-value.
- Forward or futures contract for bitcoin exchange, either with bitcoins or with other types of currencies, is not allowed.

Conclusion

A famous Islamic legal maxim is stated as:

لا ينكر تغير الأحكام الاجتهادية بتغير الأزمان

"*Changes in ijtihad-based rulings due to changed circumstances should not be objected to.*" (Al-Ghazzi, 2003, vol. 8, p. 1100)

Latest advancements in technology have posed many challenges to Islamic scholars in seeking shariah opinions for unprecedented cases. Things get changed, due to different dynamics and unique circumstances; subsequently, their shariah rulings that are based on *ijtihad* also keep changing in order to accommodate their altered characteristics.

Riding on the same waves of evolution, money has transformed from gold, silver and commodities to digital money and cryptocurrencies. However, the most important thing is to analyze the exact nature and *fiqhi* characterization of cryptocurrencies without entertaining any confusion in the light of the fundamental shariah principles. This is the main key to understanding this advanced phenomenon and finding its shariah solutions.

Based on the discussion presented in this chapter, it can be argued that Bitcoin qualifies for *mal mutaqawwam* (valid asset) in the eyes of sharia. Furthermore, it can be categorized as customary money (*thaman hukmi*). Subsequently, in dealing with Bitcoin, shariah rules of currency exchange and interest (*riba*) should be strictly adhered to.

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CHAPTER 3

Combining Islamic Equity Portfolios and Digital Currencies: Evidence from Portfolio Diversification

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Introduction

Since its inception a few centuries ago, the fiat money based on a centralized banking system, relies on the political authority to maintain a certain confidence among the stakeholders in a specific country. The fiat currency's

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role is to serve as a medium of exchange, a unit of account and a storing value. The regulatory role of monetary policy guarantees the quantity of money in circulation through a specific policy in which debt and money creation are the core instruments in the heart of the system. Moreover, the currency was supposed to reflect the economic strength of a country based on the quality of its exportations using exchange rate value of the domestic currency against foreign currencies. Central banks intervene in the market to buy or sell their own currency to balance supply and demand at a certain value of the exchange rate.

With the help of computing, the emergence of advanced encryption and block-chain technologies applied to the finance industry have given birth to hundreds of virtual monies. This idea of digital crypto-currencies brings new challenges to the existing and well-established official currencies as the fiat money is still being manipulated by central banks in favour of big banks and financial institutions.

Used as a new medium of exchange for the settlement of purchased goods and services, digital currencies may be able to reduce transaction costs by avoiding mediation of financial intermediaries and becoming well accepted by a large population.

Research in terms of the impact of digital currencies on Islamic financial markets has become a subject of interest that needs an urgent examination by Muslim scholars. While conceptual discussions on the *Shaia'h* validity of digital currencies can be found easily in the literature, empirical studies seem to be limited.

Taking a quick glance on Islamic Finance principles, it is trivial to say that digital currencies could not be *Shari'ah* compliant since they are backed by no tangible asset. However, the virtual currency uses a highly technological encryption algorithm that needs a lot of effort and energy to be generated. The more its quantity increases the more the digital currency becomes costly to be generated until attaining the maximum quantity allowed by the issuer. Although the digital currency is fabricated with no real backing asset (Kahf, 2017), the security encryption effort and its complexity may offer a kind of intrinsic value to digital currency to become more acceptable as a recognized currency regarding the core principles of Shari'ah (Zainudin, 2016).

The main concern formulated by Kahf (2017) is that Bitcoin can be manipulated if it is being traded-in small quantities, as it may be subject to speculation. He advocated that virtual currencies could become

acceptable if a formal government handles and undertakes their issuance. However, he did not bring any empirical evidence to support this idea. Moreover, major digital currencies are traded on a daily basis and in large quantities. This may slightly reduce the speculation problem.

The debate on the Shari'ah compliance of digital currencies is still open and controversies still emerge with mixed positions on their Shari'ah validity.

In this study, we set aside the debate on the Shari'ah aspect. Our objective is to examine the potential impact of digital currencies in terms of volatility and return when they are added to Islamic portfolios. To the best of our knowledge, this is the first work to analyze the impact of three major digital currencies on portfolios' return and volatility of five important Islamic stock indices.

In this chapter, we examine three research questions: (1) to what extent do digital currencies increase volatility when added to Islamic portfolios?; (2) do they help Islamic portfolios to enhance their risk or return of Islamic portfolios?; and (3) how do they perform compared to those of Islamic portfolios?

To answer these questions: we examine the portfolios of Islamic stock indices during a period of five years: 2013–2018 in which we have added three major digital currencies. Portfolios have been classified into three categories (1) Dow Jones Islamic Indices portfolio (DIP); (2) Three major digital Currencies portfolio (DCP); and (3) the combined portfolio (DIP + DCP) based on the two previous ones. Based on daily prices, we compute weekly returns and volatility for the three portfolios. We apply the portfolio theory to optimize the utility of the studied portfolios. The results suggest that digital currencies may amplify the impact of uncertainty shocks in the stock markets. Specifically, only very small percentage of returns increases while total risk has more than doubled.

The rest of this chapter is organized as follows. Section 2 presents the literature review. In Sect. 3, we present the data collection, the methodology and descriptive statistic. We also define the portfolio evaluation and the European portfolio construction used in this study. In Sect. 4, we analyze the portfolio performance, in terms of returns and volatility, of the three proposed portfolios to examine changes in volatility when digital currencies are combined with Islamic portfolios. In Sect. 5, we compare the different policies related to portfolio evaluation. Finally, we present our conclusions and policy implications in Sect. 6.

Literature Review and Theoretical Background

In this section, we present the literature related to our topic. First, we discuss the digital currency and different opinions on its *Shari'ah* compliance and then we touch on the Islamic indices portfolio performance. Some of these studies are summarized below.

Digital Currencies in Conventional Stock Markets

Since their inception in 2008, digital currencies based on blockchain technology are rapidly thriving and continue to evolve. Their reliability is ensured through their decentralization and depends on the consensus of the majority to validate a transaction, thus having wider public acceptance (Watanabe, Fujimura, Nakadaira, & Miyazaki 2015).

In the absence of money tender, the issuer does not have to be a legal entity or central bank, the exchange is based on peer-to-peer technique and payment methods are decentralized and can be independent of any clearinghouse (Nakamoto & Bitcoin 2008), making it unregulated. Sorrell, General, and Genera (2016) noted that digital currencies are private and quite independent of having a good level of transparency in the sense that they can be watched and confirmed by any member of the system. When a new transaction is approved, it cannot be reverse engineered or tampered with.

Glaser, Zimmermann, Haferkorn, Weber, and Siering (2014) found that customers do use Bitcoin as a speculative investment instrument rather than a currency. In line with this result, Bouoiyour, Selmi, and Tiwari (2015) confirm the extremely speculative nature of Bitcoin by taking into consideration the Chinese market index. Besides the real usefulness of Bitcoin in terms of economic rationale, Kristoufek (2015) documented that Bitcoin is a unique instrument having both standard financial and speculative characteristics in the same market. Cheung, Roca, and Jen-Je (2015) show the volatility and rapid price increases for Bitcoin in the "Mt Gox" stock exchange (a Tokyo-based cryptocurrency exchange that operated between 2010 and 2014). The collapse of "Mt. Gox", in 2014, may have served to increase awareness among investors around Bitcoin and other cryptocurrencies.

The results in Dyhrberg (2016) have shown that Bitcoin is similar to gold and can be used as a hedging instrument against market risk in the case of the FTSE index (Financial Times Stock Exchange Index).

Digital Currencies in Islamic Stock Markets

A number of verdicts (*Fatawa*s) regarding bitcoins and digital currencies have been issued by scholars from across the world (Adam, 2019; Billah, 2019). Bergstra and Weijland (2014) classifying Bitcoin as a money-like informational commodity which contributes to the understanding of the concept of money. Additionally, digital currencies have some advantages such as efficiency in terms of payment across borders (Nguyen, de Bodisco, & Thaver, 2018) or for financial inclusion in Islamic Microfinance industry. For instance, in Indonesia, the Blossom Finance crowdfunding platform has adopted Bitcoin in the case of Mudarabah capital financing (Redman, 2015) as it may help to enhance financial inclusion.

It is worthy to explore the potential validity of digital currencies according to Islamic Finance perspective. In this regard, more attention should be given to them (Gassner & Lawrence, 2019). Zainudin (2016) asserted that those currencies should have an intrinsic value as advocated by Islamic Finance principles. Noordin (2018) then Dahir, Mahat, Bany-Ariffin, and Ab (2019) documented that the technical features of digital currencies are apparently satisfying the prerequisites of currency from *Shari'ah* perspective except for the legal tender status. Therefore, they can ensure the function of the medium of payment.

According to Kahf (2017), digital currency could be acceptable if a formal government insures its issuance. One of the main concerns is that Bitcoin can be manipulated when traded in small quantities. He imposed on digital currencies the same exchanging conditions in terms of the time of delivery and absence of speculation. In the same line, the regulator in Qatar prohibited any trading in Bitcoin (Al-Thani, 2018). Al-Mansouri (2018), governor of the UAE Central Bank, recommended that digital currencies should not be issued by private parties nor be used for trading at the general level and must be issued by a ruling authority that has legitimacy. Finally, Alzubaidi & Abdullah (2017) recommended introducing a *Shari'ah* compliant digital currency which would fulfil Islamic finance principles.

Till the time when fully *Shari'ah*-compliant cryptocurrencies will be available in the market, it is helpful to examine the financial behavior of the major existing digital currencies and their impact on a portfolio as a combination of the latter and Islamic Equity indices.

As we have presented above, there has been relatively little empirical work done to measure just how sensitive the risk-return profile of Islamic Equity portfolios are to changes in digital currencies when the latter are

combined in the same portfolio. It is interesting to bring a new point of view, based on portfolio theory, to the current debate on how sensitive the financial performance of Islamic Equity indices are to changes in digital currencies prices.

Data Methodology and Descriptive Statistics

In this section, we present the data collection and provide the necessary explanation of the methodology that has been used to obtain the empirical results which include the return and volatility for both the individual asset and a portfolio.

Data Collection

The data consists of three major digital currencies (Bitcoin in USD (BTC-USD), Litecoin (LTC) and VeChain (VEN)) and five Islamic stock indices for major regions: DJ Islamic GCC, DJ Islamic (Global), DJ Islamic US, DJ Islamic Europe, DJ Islamic Asia/Pacific. Therefore, we use closing prices that we obtained from the "coinmetrics" and "yahoo finance" databases. The Dow Jones Islamic Indices closing prices are obtained from Datastream database.

Data is obtained daily for the period from 26 April 2013 to 6 May 2018, enabling us to assess the contribution of the three major digital currencies in Islamic portfolio diversification during the last five years including few important financial shocks.

Methodology

- The return for an individual asset

The return for an asset series (stock index or digital currency) is expressed in logarithmic terms to reduce variance as follows:

$$r_{i,j} = Ln\left(P_{i,j}\right) - Ln\left(P_{i,(j-1)}\right) \tag{3.1}$$

Where:

i is the asset i and j is the day j.

$P_{i,j}$ is the price of the asset i and the day j

- The return for a portfolio

After calculating the return for every series, we compute the return of the portfolio. This provides us with a time series of the total return of each portfolio for the same period. The return of a portfolio p is $R_{p,i,j}$ for n assets and the day j is computed based on the following formula:

$$R_{p,j} = \sum_{i=1}^{n} w_i \, r_{i,j} \tag{3.2}$$

Where:

$r_{i,j}$ is the return of the asset i and j is the day j;
w_i is the weight of the asset i in the portfolio p.

The total weight of each portfolio is equal to 1 and determined by the following simple formula in which j is the day j and $w_{i,j}$ is the weight of each asset I within the portfolio: $\Sigma\, w_{i,j} = 1$

- The volatility for a portfolio

The standard deviation $\sigma_{p,j}$ of a portfolio p and for the day j is given as follows:

- $r_{i,j}$, $r_{k,j}$ are the returns of the assets i and k and for the day j
- w_i, w_k are the weight of the assets i and k.
- *cov* is the function covariance.

$$\sigma_{p,j}^{\,2} = \sum_{i=1}^{n} \cdot \sum_{k=1}^{n} w_i \, w_k \, \mathrm{cov}\left(r_{i,j}, r_{k,j} \right)$$

- The correlation between the two assets

The correlation ρ_{r_i, r_k} between the return of two assets i and k, according to Pearson product-moment, is calculated as follows:

$$\rho_{r_i,r_k} = \frac{\operatorname{cov}\left(r_i, r_k\right)}{\sigma_i \sigma_k}$$

The interaction between the assets constituting the portfolio is very important for the diversification concept. This interaction is determined through the correlation between all the portfolio's assets.

In our study, the portfolio's return and volatility change when we add (or remove) one digital currency to (from) the portfolio formed by only Islamic equity indices. This strategy is called active specific strategy. A portfolio with the maximum of the return and a minimum of risk is representing the optimal portfolio (maximum of Utility) for the investor.

Results and Interpretation

Descriptive Statistics

We report the descriptive statistics of Islamic stock returns and digital currencies in Fig. 3.1 and Fig. 3.2 (see also—Table 3.1 in Appendix 1). While plotting returns for both Islamic stock (for each region) and Digital currencies in Fig. 3.1, we noted two interesting results.

First, Islamic returns seem to be much less volatile than Digital currencies returns, suggesting that Islamic indices are more secure than the latter and therefore more appropriate for investors from a high-risk aversion

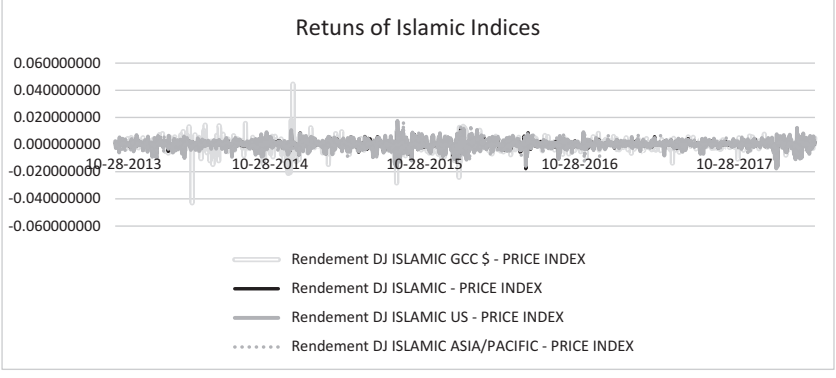

Fig. 3.1 Returns for DJ Islamic Indices from 2013 to 2018

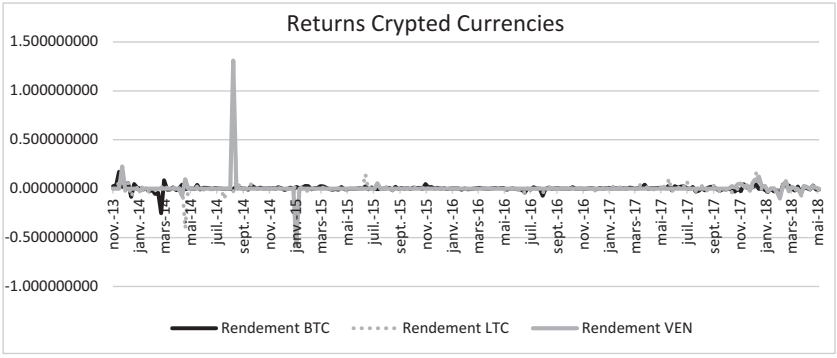

Fig. 3.2 Returns digital currencies from 2013 to 2018

perspective. This first result is in line with the literature as high volatility may be indicative of speculative behaviour regarding digital currencies compared to Islamic equity indices (Bouoiyour et al., 2015; Glaser et al., 2014; Kahf, 2017; Kristoufek, 2015).

In addition, even though the latter period is characterized by significant volatility, probably due to the instability of the stock market, the degree of volatility varies according to the region and is less marked for Asia-Pacific compared to the US and Europe. The correlation matrix has been built in order to investigate the linkages between Dow Jones Islamic GCC stock index and its regional counterparts (see Table 3.4 in Appendix 2).

In particular, these statistics show different behaviour for the three different periods during which digital currencies have known major shocks. Those three major identified Bitcoin long bubbles have been documented by Gerlach, Demos, and Sornette (2019). They occurred in three episodes between 2012 and 2018 and are given below:

Episode A. First Long Bubble: May 2012–April 2013
Episode B. Second Long Bubble: July 2013–December 2013
Episode C. Third Long Bubble: January 2016–December 2017

The three episodes under consideration will allow capturing the potential impact of three major shocks on Islamic portfolios. Our results also provide several interesting findings. As we are working with logarithmic differences, we can interpret these shocks as a proportional reaction to

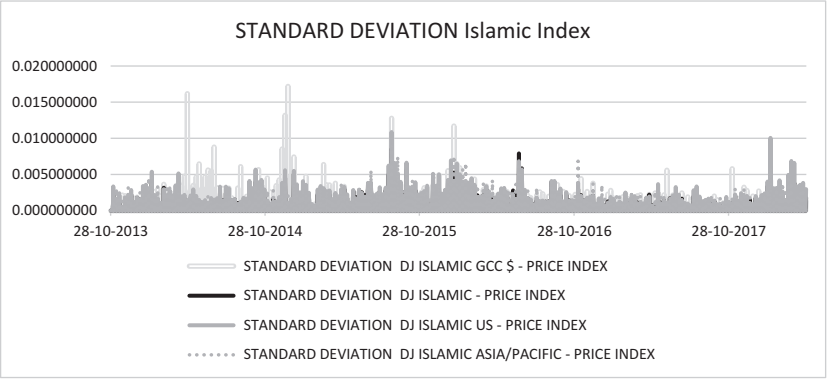

Fig. 3.3 Volatility for the Dow Jones Islamic indices from 2013 to 2018

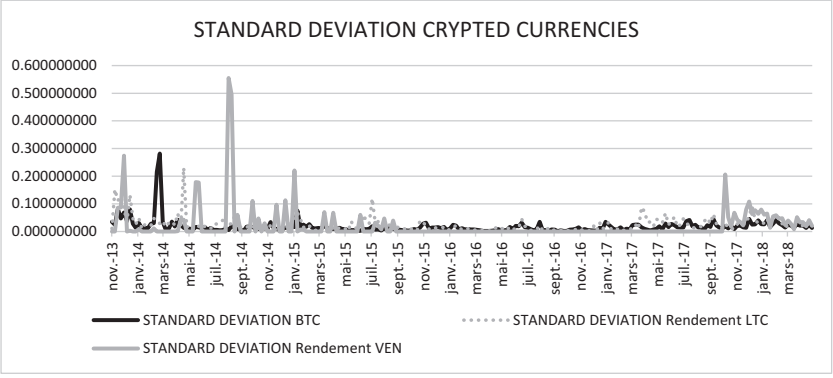

Fig. 3.4 Volatility for the three digital currencies from 2013 to 2018

Islamic indices and the digital currencies as the latter provides a unique environment for studying a purely speculative financial market.

The volatility for the Dow Jones Islamic Indices is given in Fig. 3.3.

The volatility for the digital currencies is given in Fig. 3.4.

The volatility for Islamic stock returns indices (Fig. 3.3) shows low values compared to that of digital currencies (Fig. 3.4), notably during the three episodes, A, B and C, indicating less risk for Islamic funds, particularly in Europe and the USA. This is in line with our previous intuition when analysing the dynamics of digital currencies and Islamic financial indices.

Moreover, the analysis of stock return averages shows that Islamic funds supplant digital currencies funds, particularly during shocks. However, negative signs for average stock returns for the three episodes A, B and C highlight the impact of the digital currencies shocks on Islamic investments.

Correlation Between GCC Index and Its Counterpart Indices and Digital Currencies

The analysis of the correlation matrix also provides interesting findings. First, we note strong linkages between Islamic finance indices happens only from one period week and may decrease significantly during a certain lapse of time, which can be due to the fact that they display several similarities during those specific periods as they rely on the same set of Sharia principles then they diverge in terms of correlations.

Second, we note a significant decrease in Islamic stock indices correlations with Dow Jones Islamic GCC index for another specified period. This may reflect the effect of the three episodes of shocks that led to considerable losses for digital currencies and could have a detrimental impact if they would have been combined to Dow Jones Islamic GCC fund.

Figure 3.5 shows a correlation between DJ Islamic GCC and its 4 counterparts. This weekly correlation is not stable and changing rapidly from one week to another. Figure 3.6 shows the correlation between the cryptocurrencies which shows a fluctuating relationship during the sample period.

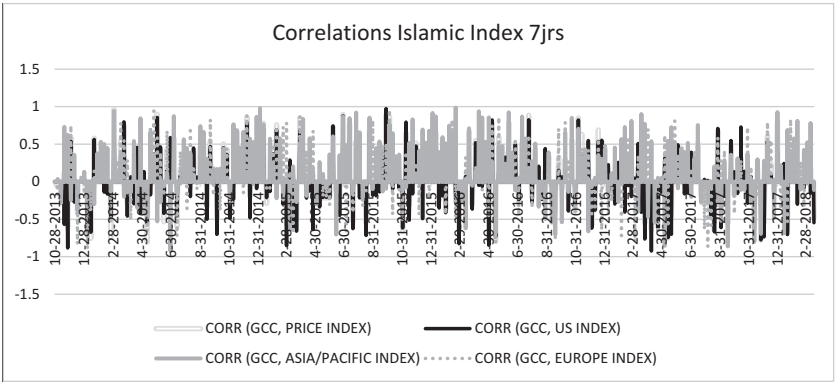

Fig. 3.5 Correlation between DJ Islamic GCC and its 4 counterparts from 2013 to 2018

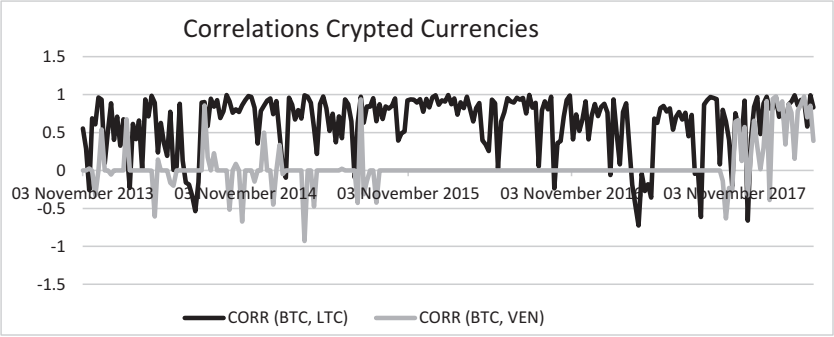

Fig. 3.6 Correlation between Bitcoin and its 2 counterparts from 2013 to 2018

In order to improve the investigation of the interaction dynamics between digital currencies and Islamic stock returns and check their linkages within the context of the three episodes of Bitcoin financial shocks, as well as explore the feedback effects between digital currencies and the Islamic finance industry, we modelled our data based on correlation computed for a horizon of one week from 2013 to 2018.

Computing Returns for the Three Portfolios; Islamic, Digital and the Combined

The three models of portfolios have been calibrated as pure Islamic equity indices, pure digital currencies portfolio and combined portfolio solved and then simulated in Matlab to determine their returns illustrated respectively in Fig. 3.7. In particular, the variance-covariance matrix for digital currencies is provided in Table 3.2. Subsequently, Table 3.3 is presenting the Excess average returns for Islamic stock indices (daily and annual).

We show two key results. Our first key result is the high finance uncertainty related to the pure digital currencies portfolio. The second is that this uncertainty decrease in the presence of Islamic equity indices. Moreover, the results further indicate that during shocks and financial frictions uncertainty can be particularly damaging for Islamic equity portfolios.

The returns of the three portfolios: Islamic, Digital currencies and the combined portfolios are presented in Fig. 3.7. High negative returns can be observed in different periods for the Islamic and Digital portfolios and particularly respectively in November 2016 and along 2017 for the Islamic portfolio, and during November 2013 and November 2017 for the Digital

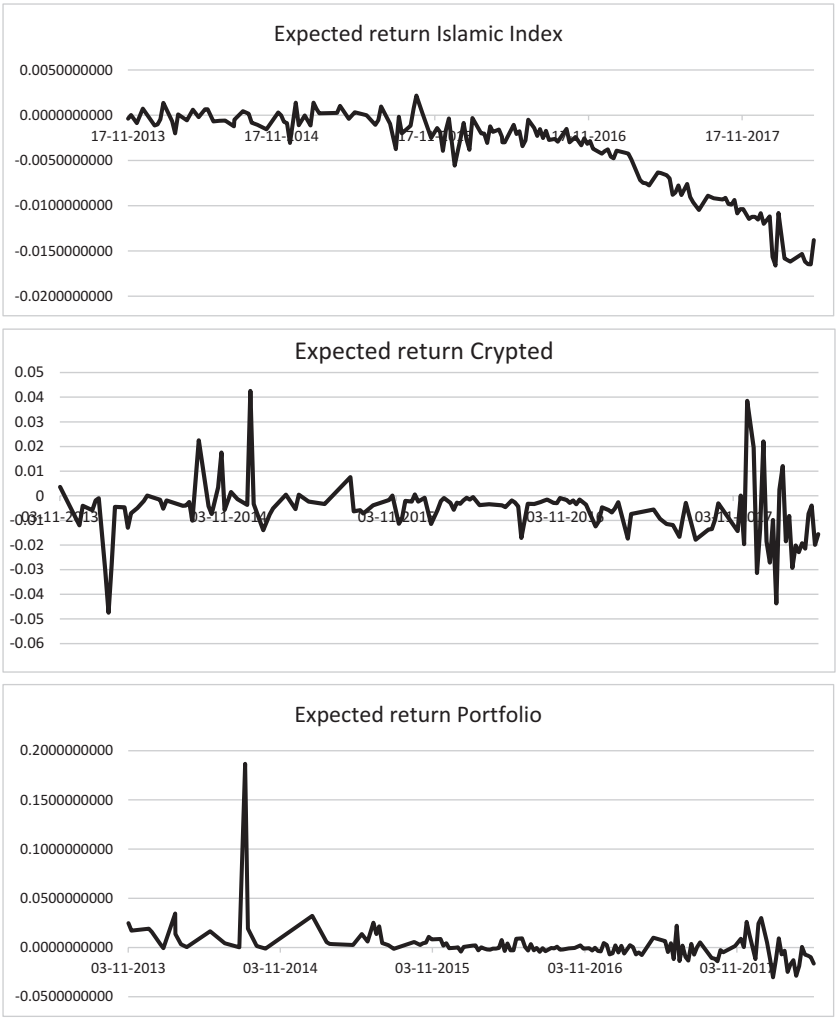

Fig. 3.7 (**a**) Returns for the Dow Jones Islamic indices portfolio from 2013 to 2018; (**b**) Returns for the digital currencies portfolio from 2013 to 2018; (**c**) Returns for the combined portfolio from 2013 to 2018 from 2013 to 2018

currencies portfolio. The combined portfolio shows positive and particular values of returns in the whole period except during very short moments in November 2017 when the Islamic portfolio was registering high losses. This shows the positive effect of the diversification in terms of returns.

Computing Volatility for the Three Portfolios: Islamic, Digital and the Combined

Figure 3.8 present the volatility of the three portfolios. The ups of the two first portfolios are absorbed in the combined portfolio. This shows the diversification benefit towards both Islamic and Digital currencies to reduce market shocks.

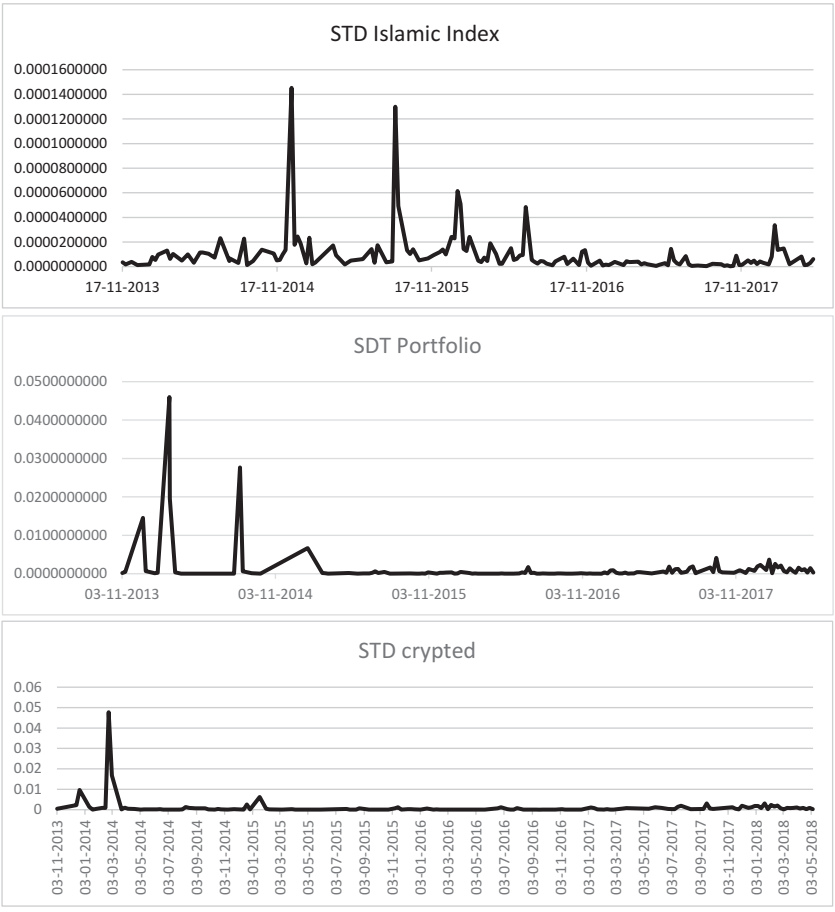

Fig. 3.8 (**a**) Volatility for the Dow Jones Islamic indices portfolio from 2013 to 2018; (**b**) Volatility for the digital currencies portfolio from 2013 to 2018; (**c**) Volatility for the combined portfolio from 2013 to 2018 from 2013 to 2018

In summary, our analysis highlights the negative impact of volatility shocks for individual portfolios while the combination of digital currencies with Islamic equity indices portfolios is beneficial for both of them. This means that the inclusion of digital currencies in Islamic portfolios can increase return outside the period of cryptocurrency shocks and improve resource allocation (Elfakhani and Kabir, 2005; Raphie, 2006; Fikriyah et al., 2007; Abderrezak, 2008). However, when a shock happens, this brings a detrimental negative effect in terms of volatility.

Conclusion

This study has examined the effect of adding digital currency on the return and the volatility of Islamic portfolios with a particular focus on the major cryptocurrencies. More than 15 big digital currencies have been considered of which only three have been chosen based on a comprehensive available data. The three main research questions have been addressed (1) to what extent do digital currencies increase volatility when added to Islamic portfolios? (2) do they help Islamic portfolios to enhance their risk or return? and; (3) how do they perform compared to those of Islamic portfolios?

The consideration of the Islamic equity indices from different regions and the estimated return and volatility, when combined with digital currencies, has led to solid and meaningful findings, particularly, connecting further Bitcoin to speculation, during the three different periods during which digital currencies have known major shocks as documented by Gerlach et al. (2018).

Our results reveal that digital currencies promote in most cases more instability to the Islamic equity portfolios. More precisely. Moreover, the digital currencies movements have a direct impact on the Islamic stock indices portfolios. Specifically, a shock to digital currencies prices has a larger impact on Islamic stock indices portfolios prices when both of them are combined in the same portfolio. The inclusion of digital currencies in Islamic portfolios can increase return outside the period of cryptocurrency shocks and improve resource allocation. These results should be of use to investors, managers and policymakers: the digital currencies should be avoided by the investors even if they may enhance returns for some specific periods of time (Oziev & Yandiev, 2018).

Appendix 1

Table 3.1 Excess average returns for digital currencies (daily and annual)

	BTC	*LTC*	*VEN*
Daily return (%)	−0.0026504573	−0.0026041252	−0.0026184560
Annually return (%)	−0.0096276517	−0.0094601495	−0.0095119619
Variance for daily return (%)	0.000891634	0.001239548	0.003933767
Variance for annually return (%)	0.017034645	0.023681532	0.075154508

Table 3.2 Variance covariance matrix for digital currencies

	BTC	*LTC*	*VEN*
BTC	0.0008734501	0.0003499651	0.0000297909
LTC	0.0003499651	0.0003499651	0.0000297909
VEN	0.0000297909	0.0001023751	0.0039263989

Table 3.3 Excess average returns for Islamic stock indices (daily and annual)

	DJ IS GCC	*DJ IS*	*DJ IS US*	*DJ IS ASIA/ PACIFIC*	*DJ IS EUROPE*
Daily (%)	−0.003677593	−0.00356353	−0.00353817	−0.003557348	−0.00361905
Annually (%)	−0.01333377	−0.01292289	−0.01283151	−0.012900615	−0.01312289
Daily(%)	3.34244E-05	2.6769E-05	2.9878E-05	2.8007E-05	3.0831E-05
Annually (%)	0.000538952	0.00043164	0.00048177	0.000451599	0.00049714

Table 3.4 Variance covariance matrix for Islamic stock indices

	DJIS GCC	*DJIS*	*DJIS US*	*DJIS ASIA/PAC*	*DJIS EUROPE*
DJIS GCC	1.226E-05	1.75E-06	1.18E-06	2.91E-06	2.30E-06
DJIS	1.756E-06	5.89E-06	6.70E-06	3.21E-06	5.69E-06
DJIS US	1.182E-06	6.70E-06	8.80E-06	1.86E-06	4.62E-06
DJIS ASIA/PAC	2.91E-06	3.21E-06	1.86E-06	7.39E-06	3.72E-06
DJIS EUROPE	2.304E-06	5.69E-06	4.62E-06	3.7206E-06	1.01E-05

Appendix 2

Table 3.5 Optimal portfolio return and risk for Islamic indices and digital currencies

	Islamic Indices		*Digital currencies*	
	Retun	σ	*Retun*	σ
Equal weights	−0.01302	0.00212	−0.00953	0.02591
Optimal simplex	−0.01333	0.00350	−0.00963	0.02955

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CHAPTER 4

The Potential of Smart Contracts for Murabahah Home Financing: Towards an Integrated Model

Mohamed Cherif El Amri, Mustafa Omar Mohammed, and Ruslan Sabirzyanov

Introduction

Financial technology (FinTech) is touted as a game-changer. It embodies a new wave of companies changing the way people pay, send money, borrow, lend, and invest. Unlike conventional finance, Islamic finance is a late

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starter in the FinTech revolution. It has made headway in the FinTech ecosystem and business models in terms of payment, wealth management, crowdfunding, capital market, financing business, insurance, Robo-advisory, and sandbox. Overall, there have been selective developments of FinTech in a few Muslim countries and organizations. According to IFNFINTECH (2020), there are around 140 Islamic FinTech firms and Muslim-friendly FinTech solutions worldwide. The top five countries with the highest numbers of Islamic FinTech firms and start-ups are Indonesia, USA, UAE, UK, and Malaysia (DinarStandard, 2018).

At the top spot of these countries is Indonesia with 31 Islamic FinTech start-ups (DinarStandard, 2018). Overall, FinTechs focus on providing such services as Robo-advisory, insurance and peer-to-peer (P2P) financing, big data analytics, money transfers, e-wallets, among others.

Although the Islamic finance industry has witnessed an increasing interest in the FinTech wave and made humble progress compared to their conventional counterpart, the applications of Islamic finance FinTech business models have been in isolation. They lack the depth of using the power of FinTech to harness their relationships. There is an absence of integrated business models in the form of a smart contract. There is hardly any work that has discussed in detail or proposed an integrated smart contract business model. Rather, the few studies on Islamic FinTech have been descriptive, conceptual, and suggestive. Few of them have discussed the potentials, challenges, issues, and Shari'ah compliance of Islamic FinTech.

As stated, the few studies on Islamic FinTech are descriptive, conceptual, and suggestive. For example, Ghonaim (2017) proposes multiagent smart e-market design to facilitate and solve issues related to commodity *Murabahah* transactions, a model similar to the one already in place in Bursa Suq al-Sil'a in Malaysia. Hamid and Allaymoun (2019) proposed an electronic system for the management of *Mudarabah* accounts. However, the system is focused only on one type of contract and lacks comprehensiveness and practical detail for Islamic financial institutions to adopt in managing their assets and liabilities. The other work that has close relevance to the present study is the one undertaken by Antova and Tayachi (2019). The two authors have used the case of Murabahah contract for introducing Blockchain and smart contracts as a risk management tool for Islamic finance. The study is descriptive in nature and the authors have strongly suggested that the implementation of Blockchain and smart contracts would drastically improve credit processes of the banking industry.

Nevertheless, the study does not provide any practical and specific example for the use of smart contracts.

There are few descriptive publications that have discussed the potentials and benefits of artificial intelligence, smart contracts, and Blockchain applications in the area of finance in general and Islamic finance in particular. Bulatova, Potapova, Fathutdinova, and Yandiev (2019) provided evidence of the economic growth of Muslim and non-Muslim majority countries as well as an increase of assets among financial providers due to the implementation of FinTech. Mat Rahim, Mohamad, Abu Bakar, Mohsin, and Md Isa (2018) have argued that the implementation of AI and smart contracts have the potential to reshape the banking industry. They have predicted that customers would be able to fulfill their rising expectations and get better services once these stated FinTech ecosystems are implemented. In a similar note, Cong and He (2018) discussed the advantages of Blockchain and smart contracts in different spheres of human life including the financial sector. They concluded how smart contracts can mitigate information asymmetry and deliver higher social welfare. Peredaryenko (2019) is another author who discussed the potential of FinTech in the context of Islamic finance. She also deliberated on the current Malaysian Islamic FinTech landscape and its future prospects.

The other group of literature has discussed the challenges and prospects of Islamic FinTech. For example, Mohamed and Ali (2019) listed in their book several challenges and prospects of Islamic FinTech including Blockchain. However, the book does not provide detailed discussions on the subject of smart contract models for Islamic financial institutions. Meanwhile, Firmansyah and Anwar (2019) opine that one of the main challenges facing the Islamic FinTech firms is regulations, which vary with different jurisdictions. Some jurisdictions lack regulations specific and in others such regulations are inadequate. Meanwhile, Rahim, Bakri, and Yahaya (2019) discussed the compliance of smart contracts with Shari'ah principles. They conclude that although Islamic law is vital for the validity of Islamic FinTech, such discussion among scholars especially in relation to smart contracts remains insufficient. In the same vein, Elasrag (2019) emphasized the potential of Blockchain-based applications for Islamic finance. The author discussed various utilizations of Blockchain that are advantageous to Islamic finance. The author also highlighted the challenges Islamic finance could face in applying the Blockchain technology. Another study by Fisol and Saad (2019) discussed the low level of awareness among consumers of the Islamic FinTech adoption. The authors are

of the opinion that many consumers in several countries are not aware of the various types of products and firms that offer Islamic FinTech. Alam, Gupta, and Zameni (2019) have also added in a chapter on smart contract and Islamic finance where it can be implemented, and the multiple challenges that could be faced in the implementation such as technical challenges and legal challenges.

Similarly, Nienhaus (2017) discussed the legal and Shari'ah issues that could arise from the applications of a smart contract. He discussed those issues in the case of combining smart contracts that allow the creation of Decentralized Autonomous Organizations that can behave like corporations without a human executive board and a legal personality in the traditional sense and can enter into contracts that have built-in conditionalities with other parties. The only research that has proposed a smart contract model in the Islamic finance transactions was by Safina and Oseni (2019) for Islamic trade finance. According to the authors, the model will overcome the issue of trust, transparency between the importers and exporters, as well as reduce the need for heavy intermediation process conducted by banks, which will result in reducing the cost of trading as well as solving Shari'ah issues related to the products offered by the Islamic banks for traders.

It is evident from the survey of the literature mentioned that there is a spike in the number of published articles and books in recent years related to Islamic FinTech. Yet only a few descriptive works have suggested a need for a smart contract for Islamic FinTech. There is hardly any literature that has developed an integrated business model in the form of a smart contract for Islamic FinTech. This chapter fills in this research gap through an explorative study. It has developed for the Islamic banking FinTech industry a seminal model of smart contract, intended to stimulate discussion and solicit feedbacks.

The chapter is structured into seven sections. The subsequent section discusses Islamic banking and the potential of FinTech. Section "The Existing Islamic Banking Contract Models" examines the existing Islamic banking contract models. The fourth section focuses on the development of the smart contract model for the Islamic banking FinTech industry. The fifth section dwells on the methodology adopted in the study. Section "Results" presents and discusses the qualitative results of validating the model. Section "Conclusion" concludes the chapter.

Islamic Banking and the Potential of FinTech

The first formal commercial Islamic bank, the Dubai Islamic Bank, was established in 1975. Since then, the Islamic banking and finance industry has witnessed innovations in several traditional institutions, products, and services to support its growth. There have been volumes of literature documenting the remarkable progress Islamic banking has achieved in traditional banking over the years, yet the pace of works of Islamic banking vis-à-vis the FinTech revolution has been quite slow. The visible works are in the form of news reports and bulletins. In fact, there are few studies on the subject. Even those available are largely descriptive and disjointed. For example, the only study on al-Maqasid (the objectives of Shari'ah) and FinTech by Achsien and Purnamasari (2016: 3) focused on the conventional application of crowdfunding, and the authors mentioned in passing how Islamic finance must conform to Maqasid al-Shari'ah. There is no serious deliberation relating this FinTech business model to al-Maqasid. Yet there is hardly any study relating smart contracts to Islamic FinTech. Therefore, this chapter, to the best knowledge of the authors, is so far the only one that has dedicated an in-depth study on smart contracts for the Islamic banking FinTech industry.

The Existing Islamic Banking Contract Models

Contracts are very essential for structuring Islamic banking products. No Islamic banking product or service can be called Islamic without a Shari'ah-compliant contract. The existing Islamic banking contract structures and products remain largely traditional at the various levels of the Islamic banking sector: retail, corporate, and treasury.

According to the scholars of Islamic law, a valid contract is based on three essential elements, namely, (a) the offer and acceptance, (b) the subject matter, and (c) the contracting parties. These essential elements must be completely fulfilled for the contract to have valid prescribed Shari'ah effects such as the transfer of ownership and conferment of the right to option.

Contracts in Islamic law are divided into several categories with regard to the purpose for which the contracts are entered into. Each category differs from another mainly in relation to the purpose intended by the Lawgiver resulting in different Shari'ah effects of the contracts, such as the transfer of ownership, risk-taking, and profit distribution. In fact, the basic

conditions and requirements of the contracts also differ from one another due to differences in the purpose and nature of the contracts. Hence, these classifications are significant when determining the rules and conditions that must be completely met to make the contracts valid and enforceable, and in turn, allow all the Shari'ah effects of the contract to take place. The contracts applied in the Islamic banking and finance industry can be mainly classified as follows: exchange-based contracts, contracts of partnership, agency contracts, charitable contracts, contracts of security, and supporting contracts and instruments.

The Exchange-Based Contracts (Uqūd al-Muʿāwaḍāt)

Exchange-based contracts are contracts that are entered into by two transacting parties to acquire ownership of an asset or commodity leading to the transfer of ownership of the exchanged counter values. The exchanged counter values can either be usufruct in a lease contract or a corporeal thing as in a currency exchange, forward sale, and manufacturing contract. Exchange-based contracts, however, are founded upon the principle of justice, in the sense that the rights of both parties are to be fulfilled at a minimum or obligatory level. If the seller earns a profit from a forward sale that he entered into, the buyer also gets the contracted commodity at the stipulated time. This category consists of two types of contracts, namely, the sale-based and lease-based contracts.

Sale-Based Contracts

(a) *Bayʿ al-Murābaḥah* (Mark-up Sale): defined by AAOIFI Shari'ah Standard no. 8 as selling a commodity as per the purchasing price with a defined and agreed-upon profit mark-up. It may be contracted either on a cash basis or a deferred payment basis. (AAOIFI, 2015)

Murabahah and *Murabahah* to the Purchase Orderer has been widely used as a mode of financing by many Islamic banks and financial institutions in various financing facilities such as home financing, motor vehicle financing, personal financing, and trade financing. (ISRA, 2016)

(b) *Bayʿ al-Salam* (Forward Sale): defined by AAOIFI Shari'ah Standard no. 10 as the purchase of a commodity for deferred delivery in exchange for immediate payment. (AAOIFI, 2015).

A *salam* contract is typically used in short-term financing, but could also be employed for longer-term financing. The *salam* and parallel *salam* are among the most effective financing tools available for Islamic finance industries (IFIs), particularly in providing micro-financing services for small and needy farmers. It is an appropriate mode of financing for seasonal agricultural production in which lies the benefit for both contracting parties: the bank and the farmer (seller). (ISRA, 2016)

(c) *Bayʿ al-Istiṣnāʿ* (Manufacturing Sale): defined by AAOIFI Shari'ah Standard no. 11 as a contract of sale of specified items to be manufactured or constructed, with an obligation on the part of the manufacturer or builder (contractor) to deliver them to the customer upon completion. (AAOIFI, 2015)

The *Istisna* contract in contemporary Islamic finance is applicable to various industrial products that can be commissioned and manufactured to specification. For example, it can be employed in housing construction and advanced technology industries, or in the manufacture of equipment such as aircraft, automobiles, ships, and factory equipment (ISRA, 2016). Also, it is used together with *ijarah* for financing houses under construction.

(d) *Bayʿ al-Dayn* (Sale of Debt): is a sale of debt that can be either against a debt or other than a debt, to the debtor or other than the debtor, on a cash basis or on a deferred payment basis. *Bay' al-dayn* has been mainly used in Malaysia as one of the underlying Shari'ah contracts in structuring various Islamic finance facilities including Islamic money market instruments, Islamic treasury bills, Islamic negotiable instruments, Islamic accepted bills and *sukuk*. (ISRA, 2016)

(e) *Bayʿ al-Ṣarf* (Sale of Currency): is a sale of money-for-money such as the sale of gold-for-gold or silver-for-silver. *Bay' al-ṣarf* is applicable to modern spot Forex (foreign exchange). (ISRA, 2016)

(f) *Bayʿ al-ʿĪnah* (Sell and Buy-Back): *Inah* according to AAOIFI Shari'ah Standard no. 30 refers to the process of purchasing the commodity for a deferred price and selling it for a lower spot price to the same party from whom the commodity was purchased. (AAOIFI, 2015)

Malaysia and Brunei are the only countries applying *inah* in their banking system. It is used for financing, liquidity management

and debt restructuring, governance and corporate *sukuk*, and risk management and hedging purposes (ISRA, 2016).

(g) *Bayʿ al-Tawarruq (Monetization/Cash Financing/Cash Procurement)*: monetization according to AAOIFI Shari'ah Standard no. 30 refers to the process of purchasing a commodity for a deferred price determined through *Musawamah* (Bargaining) or *Murabahah* (Mark-up Sale) and selling it to a third party for a spot price so as to obtain cash. (AAOIFI, 2015)

Tawarruq, or commodity *Murabahah*, is one of the popularly used principles to structure various Islamic financial instruments such as financing, liquidity management and debt restructuring, governance and corporate *sukuk*, and risk management and hedging purposes. (ISRA, 2016)

Lease-Based Contracts

Ijārah (Lease): defined by AAOIFI Shari'ah Standard no. 9 as the leasing of property pursuant to a contract under which a specified permissible benefit in the form of a usufruct is obtained for a specified period in return for a specified permissible consideration (AAOIFI, 2015). *Ijarah* is incorporated in various Islamic financial instruments.

The Partnership Contracts

Partnership contracts refer to contracts that are entered into for the purpose of having a partnership in management and share of profit. It is founded upon the spirit of cooperation and partnership in the sense that profits are shared by the partners based on a mutually agreed-upon profit ratio, and losses are borne by both parties according to their respective capital contributions. The commonly applied contracts in the Islamic finance industry under this category are:

(a) *Mushārakah* (Partnership): defined by AAOIFI Shari'ah Standard no. 12 as an agreement between two or more parties to merge their assets or to combine their services, obligations, and liabilities with the aim of making a profit. (AAOIFI, 2015)

Musharakah is normally used as the underlying contract for project financing, asset financing, syndicated financing, working

capital financing, trade financing, contract financing, and *sukuk*. (ISRA, 2016)

(b) *Muḍārabah:* defined by AAOIFI Shari'ah Standard no. 13 as a partnership in profit whereby one party provides capital (*Rab al-Mal*) and the other party provides labor (*Mudarib*). (AAOIFI, 2015)

Mudarabah is commonly utilized as the underlying contract for the restricted *mudarabah* investment account, unrestricted *mudarabah* investment account, corporate financing, working capital financing and securitization-based product such as *mudarabah sukuk*. It is also used in interbank money market products. (ISRA, 2016)

(c) *Muzāraʿah* (Sharecropping): defined by AAOIFI Shari'ah Standard no. 12 as a partnership in crops in which one party presents land to another for cultivation and maintenance in consideration for a common defined share in the crop.

(d) *Musāqāh* (Irrigating partnership): defined by AAOIFI Shari'ah Standard no. 12 as a partnership that depends on one party presenting designated plants/trees that produce edible fruits to another in order to work on their irrigation in consideration for a common defined share in the fruits.

Presently, the *Muzara'ah* (Sharecropping) and *Musaqah* (Irrigating partnership) contracts are uncommon in the Islamic finance industry.

The Agency Contract

(a) *Wakālah* (Agency)*:* defined by AAOIFI Shari'ah Standard no. 23 as the act of one party delegating the other to act on its behalf in what can be a subject matter of delegation and it is, thus, permissible. (AAOIFI, 2015)

In contemporary application, a *wakalah* contract is widely used in structuring various Islamic banking products (such as investment account, private banking investment, letter of credit, and interbank money market products), *takaful* fee-based products and capital market products (such as *sukuk*). *Wakalah* is also commonly used to facilitate commodity *murabahah* transactions (ISRA, 2016).

The Charitable Contracts

Charity-based contracts are contracts effected by someone on the basis of benevolence and do not require the exchange of something for another. Therefore, asset ownership in this regard is acquired without any counter value. This category consists of the following contracts:

(a) *Hibah:* A voluntary contract that results in uncompensated ownership transfer between living individuals. (Ibn Qudāmah, 1388 AH)

Some IFIs grant unconditional *hibah* as a token of appreciation to the depositors by crediting some amount into their account. There are also instances where the IFIs award incentive to their customers of Al-Ijarah Thumma al-Bay' (AITAB) financing who make the monthly instalments according to the prescribed schedule. In the family *takaful* product, *hibah* is also applied whereby the *takaful* participants assign their nominees as recipients of the *hibah,* that is, the *takaful* benefit. (ISRA, 2016)

(b) *Qarḍ* (Loan)*:* defined by AAOIFI Shari'ah Standard no. 19 as the transfer of ownership in fungible wealth to a person on whom it is binding to return wealth similar to it. (AAOIFI, 2015)

The *Qarḍ* contract is commonly used in Islamic banking products: the current deposit account and saving deposit account. (ISRA, 2016)

The Security Contracts

(a) *Kafālah:* "a conjoining of the guarantor's liability to the liability of the guaranteed" (Ibn Qudama, 1997). *Kafalah* contract is commonly used in a number of products such as the shipping guarantee and the bank guarantee that includes financial guarantee and performance guarantee. (ISRA, 2016)

(b) *Rahn* (Mortgage): defined by AAOIFI Shari'ah Standard no. 39 as to make a financial asset or so tied to debt so that the asset or its value is used for settlement of the debt in case of default. (AAOIFI, 2015)

Rahn in its contemporary application may take either the form of papers such as property documents, vehicle papers, *sukuk* and shares, or objects like ornaments, jewelry, and other valuables. (ISRA, 2016)

The Supporting Contracts and Instruments

(a) *Ḥawālah*: defined by AAOIFI Shari'ah Standard no. 7 as the transfer of a debt liability from the transferor to the payer (i.e. it is a process of changing debtors and creditors) (AAOIFI, 2015). *Ḥawalah* is commonly used in revolving credit (pre and post), trade payable, and remittances. For instance, a customer who is indebted to a vendor requests a bank to settle his debt. The customer, therefore, assigns the debt that is evidenced by the invoice to the bank. Then, the bank pays the vendor on behalf of the customer. Upon maturity, the customer shall pay the full amount to the bank. (ISRA, 2016)

(b) *Maqāṣṣah* (Set-Off): defined by AAOIFI Shari'ah Standard no. 4 is to extinguish a debt receivable by a debt payable. It is divided into two main forms: mandatory set-off and contractual set-off. (AAOIFI, 2015)

(c) *Ibrā'*: According to AAOIFI Shari'ah Standard no. 4 it is an act by a person to discharge another person from a liability (owed by the latter to the former). (AAOIFI, 2015)

Under the current practice, a bank as the financier may grant *ibra* to a customer who makes a prepayment or performs early settlement before the end of the tenure. *Ibra* may also be given by the bank upon the termination of the contract due to a breach (default in payment). Normally, the bank may give *ibra* on unearned profit charged by the bank. In the case of multitiered financing, it may happen that the bank gives *ibra* by reducing the unearned income of the bank. (ISRA, 2016).

(d) *Waʿd* (Promise or undertaking): *wa'd* is a promise that connotes an expression of commitment given by a promisor to another party to carry out specified actions in the future.

Wa'd is widely used in various Islamic financial products based on the commodity *murābaḥah, mushārakah mutanāqiṣah*, *ijārah muntahiyah bi al-tamlīk* and *ijārah thumma al-bayʿ*. *For instance, in ijārah muntahiyah bi al-tamlīk* financing, the bank promises to transfer the ownership of the asset to the customer after the expiry of the lease period and full settlement is made. It is also commonly used in Islamic derivatives that include FX forward based on a unilateral promise, FX forward based on *waʿdān* (two unilateral promises) and Islamic profit-rate swap based on *wa'd* (ISRA, 2016).

Smart Contract Model for the Islamic Banking FinTech Industry

From the discussion in Section "The Existing Islamic Banking Contract Models", contracts in the Islamic banking industry have largely remained traditional. At the same time, the efforts in the industry in embracing the FinTech wave have largely been disjointed with no significant results in integrating the FinTech ecosystem into a viable smart contract model by making good use of the Blockchain technology.

Swift developments in the emerging field of Blockchain technology have facilitated the birth of "smart contracts": computerized transaction protocols that autonomously and automatically execute the terms of a contract (Giancaspro, 2017). The terms of smart contracts are recorded in a computer language instead of legal language. Smart contracts can be automatically executed by a computing system, such as a suitable distributed ledger system (Walport, 2016). A smart contract refers to a self-executing contract with the terms of the agreement among the contracting parties directly written into lines of code. The code and the agreements contained therein exist across a distributed, decentralized Blockchain network. The smart contract using the Blockchain technology would allow transactions and agreements to be executed among the contracting parties in the ecosystem without the need for a central authority, legal system, or external enforcement mechanism. Also, it will make the transactions traceable and transparent.

Blockchain is a digitized, decentralized, public ledger. In the case of smart contract, it will allow the contracting parties within the Islamic banking FinTech ecosystem to keep track of digital transactions without central recordkeeping. The technology is primarily used to verify transactions, code and insert practically any document into the Blockchain. The record's authenticity can be verified by the entire contracting parties using the Blockchain instead of a single centralized authority. The benefits of Blockchain technology include: efficiency in terms of cost and time savings; cheaper to maintain as it is an electronic ledger; fully automated it results in fewer errors; beneficial in cross-border transactions; and uses smart contracts. As stated earlier, there is hardly any literature on the applications of smart contract and Blockchain in the Islamic banking FinTech industry. However, there are cases of smart contracts being applied in the conventional financial service industry. Nienhaus (2017),

citing Capgemini (2016, 9), relates cases of Structured Finance such as syndicated loans and leveraged loans; mortgage lending; and automated claims processing in motor insurance, crop insurance, etc.

Traditional Islamic Home Financing Product

The common contracts used in the Islamic banking industry for home financing are *Murabahah, Ijarah*, and *Musharakah*. These contracts are used to structure home financing products such as *al-Bay' Bithaman Ajil*—BBA/*al-Murabahah* (cost plus sale), *Tawarruq* (Commodity *Murabahah*), *Inah* Sale, *Ijarah muntahiyah bi al-tamlik*, *Musharakah Mutanaqisah*—DP (Diminishing Partnership), and *al-Murabahah lil Amir Bishiraa* (*Murabahah* to the Purchase Orderer—MTPO). In BBA/*al-Murabahah* and MTPO contracts, the Islamic bank, in theory, purchases the house from developers and sells to the customer at cost plus a profit margin. BBA is mostly used in the South East Asian markets while *al-Murabahah* and to a large extent *al-Ijarah* are commonly used in the Middle East (Shahwan, Mohammad, & Rahman, 2013). The MTPO is discussed in the AAOIFI Shari'ah Standard no. 8 (2017). MTPO is considered less controversial. The authors in this chapter will use it as a basis for developing the smart contract.

Meanwhile, *Tawarruq* and *Inah* sale contracts are considered contentious. They are basically financing contracts. It is a sale in form but loan in substance. The commodities used in this transaction as subject matter are superficial, meant technically to validate the contract. The contracting parties have no recourse to them in case of liabilities. The DP (AAOIFI Shari'ah Standard no. 12, 2017) has four separate contractual steps: the customer and the bank jointly purchase the asset, the bank leases its equity in the asset to the customer in a separate contract, the bank sells its portion of its equity to the customer, and the customer redeems and owns the asset at maturity. In the process of the lease and purchase, the bank's equity diminishes gradually matching a gradual increase to the customer's equity.

Based on AAOIFI Shari'ah Standard no. 8, 2017, MTPO has the following four steps as shown in Fig. 4.1: (1b) Signing binding letter of undertaking, (2a and 2b) purchase and ownership of the asset, (3) sale of the asset, and follow-up on the instalment payment.

From Fig. 4.1, the following are the operational steps of MTPO:

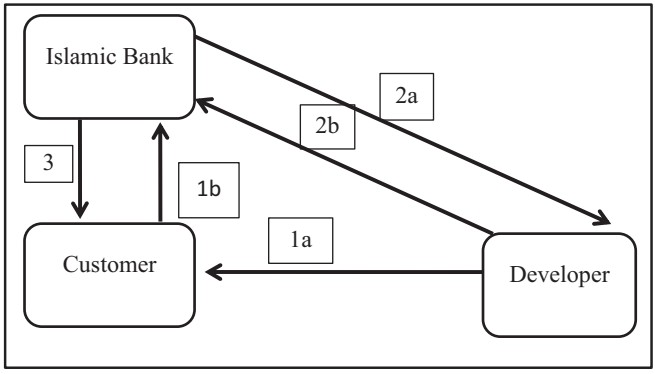

Fig. 4.1 *Murabahah* to the purchase orderer home financing contracts

1. The customer obtains price quotation and specifications of the house from the developer (1a) and submits the quotation and the house specifications to the Islamic bank (1b) and signs a binding letter of undertaking that he will purchase the house should the bank buy it from the developer.
2. The Islamic bank pays the price of purchasing the house (2a) to the developer and owns it (2b).
3. The Islamic bank sells the house to the customer based on *al-Murabahah* sale and then monitors the deferred payment by the customer.

Proposed Smart Contract for Islamic Home Financing

Based on the traditional contract explained earlier the authors have constructed the smart contract for the Islamic banking FinTech taking home financing as a case. Nienhaus (2017), citing Evry (2016, 10), provides five steps that involve the use of Blockchain technology for the smart contract: (1) transaction definition, (2) transaction authentication, (3) block creation, (4) block validation, and (5) block chaining. These five steps are depicted in Fig. 4.2.

In the first step, contracting parties create messages that contain valuable information related to the nature of the contract, the asset involved, the address of the sender and the terms and conditions including the price

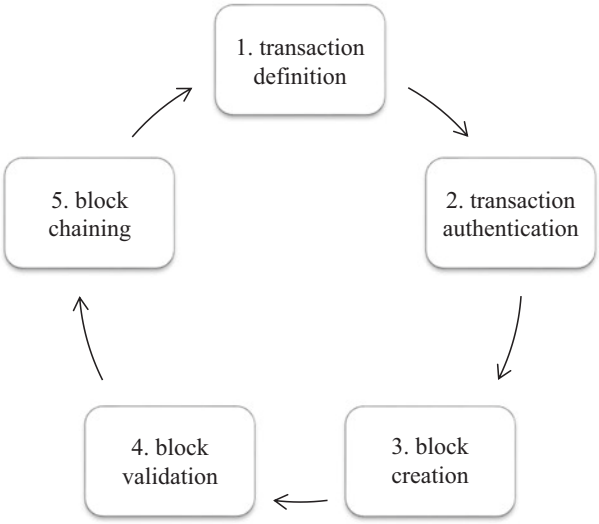

Fig. 4.2 The general process of Blockchain technology

and mode of payment. Messages are communicated to the contracting parties through the Blockchain network. Contracting parties enter into a computerized transaction protocol that automatically executes a contract once the predetermined conditions are met. In step 2, transaction authentication, the transactions of the contracting parties are validated after the messages are received by nodes or connected computer networks. Here, the information regarding the parties—who they really are, the ownership of the asset and money, to whom they really belong—is checked and confirmed. The third step is concerned with block creation. This is where expected transactions are combined by one node into a block, which would continue to update the ledger for any new or pending transactions. The fourth step is block validation where one of the nodes will act as a validator to ensure the transaction is not only correct but also transparent and free from negative elements such as riba, gharar, etc. A standard must be set for the validation process known to all the participants in the transaction. Such a standard should be reviewed by a group of reputable Shari'ah scholars or it should be in line with already existing and recognized Shari'ah standards. In the fifth step of block chaining, a new block is added when all the transactions are validated. The new block and the ledger that

is updated are then communicated to the participants in the network. Hereby, all the participants in the network get to know about the changes in the ownership over the asset and update their copies of the ledger.

Furthermore, it is understood that in the case of *Murabahah*, it is necessary to have ownership over an asset (intended subject matter of *Murabahah* sale) in order to conclude a *Murabahah* contract. An asset can be owned by the seller or it can be bought before the *Murabahah* deal, while the latter is called *Murabahah* to the purchase order (MTPO) and it is the most widely used among Islamic financial institutions (IFIs). The sequence is of the essence, especially when it comes to buy and sale cases. In each case, the ownership over an asset will be recorded in the Blockchain with the details how it actually was transferred to the current owner. It is important to keep in mind that although undertaking given by a customer is binding, an IFI cannot force the customer to buy the asset, rather an IFI has right to indemnify itself for actual loss (difference between purchase and sale price of the asset in case the customer refuses to conclude *Murabahah* contract) using security amount or from customer's account as the case might be. Therefore, the whole *Murabahah* deal (including the steps of acquiring the asset and then selling it to the final customer) will be executed in two separate blocks. The former block will contain information of acquisition of the asset, while the latter will contain details of the sale. Nevertheless, both blocks' parameters will be similar.

Figure 4.3 shows the proposed smart contract model for the Islamic banking FinTech, the case of home financing.

Figure 4.3 below represents a revised model, with slight changes from the original model. In the revised model above, as suggested by P7 (section "Suggestions of Experts for Enhancing the Model") below, the Blockchain chains all the four parties: the Islamic bank (IB), the customers, the developer and the third party. In the original model, which is also a viable alternative, the Blockchain chains the IB and the customers. The relationship between the two follows the steps shown in Fig. 4.2. Meanwhile the housing developer relates to IB through an artificial intelligence (AI) application in terms of big data in order to gather the data on potential customers. However, when it comes to purchase of the house and transfer of the ownership of the house from the housing developer to IB, all of it is directly recorded in the Blockchain. The IB is also connected to a third party using AI. The third party could be a group of companies which not only provide data source for IB but also act as an arbitrator in case of disputes. Otherwise, it can be a government entity that regulates

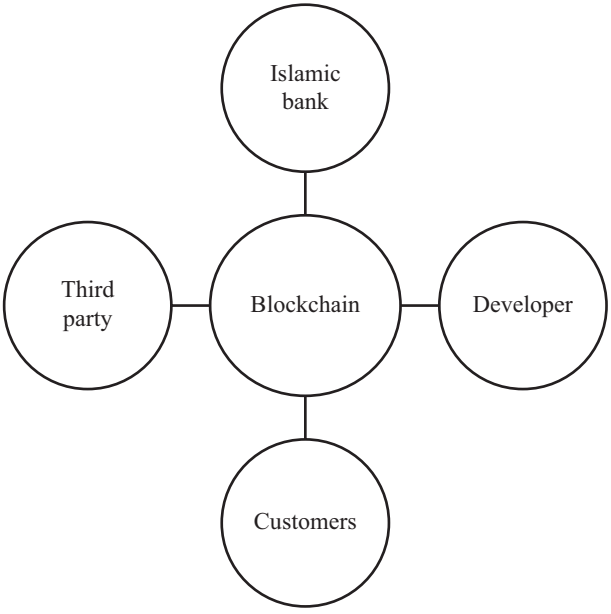

Fig. 4.3 Proposed smart contract model for the Islamic banking FinTech

the banking activities in a particular jurisdiction where IB operates. It is important to mention that only certain information is stored and recorded in the Blockchain, like property details, ownership, and so on. Other details, like market analysis, data on clients and so forth are auxiliary, that is, not part of a transaction. Therefore, such details should not be stored in the Blockchain in order to not overload it with unnecessary data.

Methodology

This study has adopted a qualitative method in the form of a semi-structured interview to validate the smart contract model. According to Morse and Lyn Richards (2002), the use of semi-structured interviews is appropriate when the researcher knows about the study topics to frame the needed discussion in advance. An interview is useful when one needs to supplement, validate, explain, or reinterpret qualitative data obtained from the same setting (Miles & Huberman, 1994). This study has used

the exploratory research design since the authors have little understanding of the many issues regarding the smart contract for the Islamic banking FinTech industry. Robson and McCartan (2016) state that exploratory studies are used to "find out what is happening, particularly in little-understood situations, seek new insights, ask questions, assess phenomena in a new light, and generate ideas and hypotheses for future research". This design is best suited for this study because "qualitative approaches are more responsive to the insiders' views and definition of the situation" (Quinn Patton, 2002). Exploratory research can rely on one or more data collection techniques such as informal discussions with participants, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies, or pilot studies (Robson & McCartan, 2016).

The target population for this study was experts in FinTech and Islamic banking and finance. The selection of the participants was based on purposive sampling, meaning that the people are selected because they are considered to be good sources of information for the study. They were chosen for their knowledge and ability to describe the events or some part of the events under study (Sandelowski, 2000). The participants are treated as experts and assumed to have an accurate and unique perspective on the subject matter. The sample size is not a concern, as Robson and McCartan (2016) noted that there is no set number of interviews needed for a flexible design study. Miles, Huberman, and Saldana (2013) state that in a qualitative study, researchers work with a small sample size that they study in-depth. Twelve experts of varied backgrounds were selected to participate as interviewees for the study. This sample size is assumed to be sufficient for achieving the objective of validating the model.

The interview questionnaire consisted of mainly open-ended questions, which are considered appropriate as they give more freedom to the respondents to express their thoughts and views freely (Stein & Mankowski, 2004). The interview questionnaire comprised specific issues regarding the validity and implementation of the developed model. Table 4.1 shows the interview questionnaire.

The data were collected through semi-structured face-to-face interview method. Each selected interviewee or expert was contacted via telephone to arrange for the time and place of the interview. The authors identified two research assistants and briefed them about the interview processes and approaches. The two research assistants conducted in-depth interviews that lasted for a maximum of 40 minutes on average for each expert. The experts interviewed were shown the smart contract model developed and

Table 4.1 The interview questions

No	*Interview questions*
1	To what extent has the Islamic banking and finance (IBF) industry embraced the FinTech revolution?
2	Why is Islamic banking (IB) not in a position to develop smart contract to-date?
3	Is there a need for IB to develop smart contract?
4	What is your opinion on the IB smart contract model developed in terms of its validity, viability, and acceptability?
5	What are the challenges that IB would possibly face in implementing this smart contract model
6	What suggestions do you provide to enhance the features of the model?

the research assistants used the first 10 minutes to explain the objectives of the interview and the structure of the model. This was necessary to enhance the experts' understanding of the model and the issues that were to be asked. The interviews were recorded. At the end of the interview session, the research assistants sought the consent of the interviewees to sign "Interview Request Form" as a testimony of their participation in the interview. All the interviewees willingly signed the forms.

All data collected were later coded, in addition to the notes taken during the interview. The qualitative data collected were then thematically analyzed in order to code the common themes that represented the views of the experts on issues pertaining to the smart contract model developed. A six-step thematic content analysis method, as suggested by Braun and Clarke (2006), was used.

Results

This section presents the overall findings and analysis of the qualitative data collected for validating the smart contract model developed for the Islamic banking FinTech industry. The section is divided into two subsections. Section "Profile of the Experts" focuses on the profile of the experts and Section "Results and Analysis of the Qualitative Data" discusses the qualitative data obtained from the responses of the experts. The data are related to the pertinent issues raised in the interview sessions.

Table 4.2 Profile of the experts

Experts	*Position*	*Organization*
E1	Head of Islamic banking	Ak bars Bank, Russia
E2	Senior research fellow and executive secretary	HSE-Skolkovo Institute for law and development and executive secretary, Russian Association of Experts in Islamic finance
E3	Head	Head of the Russian Center of Islamic Economics and Finance
E4	Shari'ah advisor	Documentation and investment products officer, Shari'ah division, Abu Dhabi Islamic Bank
E5	Lecturer and shari'ah advisor	Lecturer at emirates Institute for Banking and Financial Studies, UAE and practitioner in UAE Islamic banks.
E6	Shari'ah advisor	Lead shari'ah advisor, Shari'ah division, Noor Bank, UAE
E7	Blockchain professional	Founder of Blockchain consultancy firm
E8	IT expert	Ziraat participation Bank
E9	PhD student	International Islamic university, Malaysia
E10	PhD student	International Islamic university, Malaysia
E11	Lecturer	International Islamic university, Malaysia
E12	IT officer	Albaraka Bank

Profile of the Experts

The general backgrounds of the interviewed experts are presented in Table 4.2. The table provides information regarding their gender, marital status, positions, and organization. The 12 participants are named Expert 1 (E1), Expert 2 (E2), Expert 3 (E3), and so on, up to Expert 12 (E12).

From Table 4.1 it can be seen that the experts have a mixed and varied background. They comprise 11 males and 1 female. In terms of professional expertise, they vary from banking practitioners to Shari'ah advisor of Islamic bank, PhD students and academicians, and an IT and Blockchain professionals. The informants are considered a good source of information as they are highly knowledgeable and experienced, thus providing great input for the study. The subsequent subsection presents findings and analysis of the qualitative data.

Table 4.3 Main themes and interview questions

Main themes	*Interview questions*
IBF and FinTech	To what extent has the Islamic banking and finance (IBF) industry embraced the FinTech revolution?
IB and smart contract	Why is Islamic banking (IB) not in a position to develop smart contract to-date?
IB and smart contract model	Is there a need for IB to develop smart contract?
The validity of the model structure	What is your opinion on the IB smart contract model developed in terms of its validity, viability and acceptability?
Challenges of implementing the smart contract model developed	What are the challenges that IB would possibly face in implementing this smart contract model
Expert suggestions	What suggestions do you provide to enhance the features of the model?

Results and Analysis of the Qualitative Data

After thematically analyzing the interview transcripts, six main themes were identified corresponding to each question asked. These themes are IBF and FinTech, IB and Smart Contract, IB and Smart Contract model, the validity of the model structure, challenges of implementing the smart contract model developed, and expert suggestions. The themes identified are presented in Table 4.3 above.

IBF and FinTech

The interviewers solicited the opinions of the experts on the extent to which the Islamic banking and finance (IBF) industry has embraced the FinTech revolution. The majority of the experts ($n = 11$) believe that IBF is still in its infancy with regard to embracing the FinTech wave. One of the experts (E10) stated that the FinTech in IBF is limited to transaction automation and analytics. While another (E12) mentioned that FinTech in IBF sector is predominantly presented by non-banking institutions like crowdfunding, consultancies, and advisory.

IB and Smart Contract

The opinions of the experts were sought on why Islamic banking (IB), not in a position to develop smart contract to-date. The experts ($n = 12$) have unanimously agreed that to-date there has not been any significant

development in this aspect. They vary, though, on the underlying reasons that have slowed down efforts toward developing a smart contract for the industry. Impediments to the smart contract development include traditional and dualistic mindset, the role of Shari'ah advisors, lack of wide range of data source, the increasing role of Islamic social finance, lack of legal framework, infrastructure and expertise, among others. For example, experts (E3 and E6) believe that the mindset of many leading Islamic banking managers is still traditional and dualistic. They can easily relate the normative aspects of Islamic banking such as the prohibition of interest, uncertainties, gambling, etc. But they cannot see how a Shari'ah compliant smart contract is feasible especially when Islamic banking still operates on conventional rules, regulation and infrastructure. Another expert (E2) says the slow pace in developing smart contract model could be the way Islamic banking market is concerned about the role of Shari'ah advisors if smart contracts were developed especially when there are emerging issues that would require face to face meetings. Meanwhile, experts (E4, E7 and E10) opine that the FinTech growth in Islamic finance is predominantly impeded by lack of awareness and knowledge on different aspects of new technologies among practitioners. In addition to that, (E4) and (E5) see the absence of a proper legal framework and recognition of smart contracts as real contracts by authorities in many jurisdictions as another major obstacle in adopting smart contracts by not only Islamic banks but also their conventional counterparts.

IB and the Need for Smart Contract Model

The interviewers solicited the perceptions of the experts on whether there is a need for IB to develop Smart Contract for the Islamic banking and finance (IBF) industry. The vast majority of the experts ($n = 10$) agree that there is a need for such a contract. They have substantiated their opinions with the view that such contracts are viable for responding to the sophisticated customer demand, embrace the universal banking concept, remain competitive, and invest in technology, among others. According to other experts (E3, E5, E10, and E12), the banking sector is now moving toward universal banking, which is mainly due to mergers and acquisitions happening in the developed world. It is becoming rare today to see banks still doing the same traditional activities. Today, many banks are moving toward non-banking and non-financing activities such as insurance, social finance, equity market, joint ventures, syndications, etc. Therefore, smart

contract may no longer be a choice but is slowly becoming a norm. Expert (E4) expressed his view as follows:

> *Obviously, there is a need because that is a new trend. Especially, if it is easier for the people to execute their agreements on such platform and it is online, people will opt for it. For example, in case of home financing people will not need to physically engage like going to the bank, going to the municipality or other relevant authority to register their transactions, because it is done automatically. Moreover, if there is a platform that can bring people together and get things done in a short period of time that will be of benefit to all parties, therefore, there is a need for such developments.*

The Validity of the Model Structure

The experts were asked their opinions on the IB Smart Contract Model developed in terms of its validity, viability, and acceptability. Although the majority of the experts ($n = 7$) believe the model is viable, all of them feel it is still basic and few other features need to be incorporated in the future. The majority of the experts have provided few comments at this stage. Expert (E6) is of the opinion that the use of artificial intelligence is useful in the credit assessment process and suggests linking it with customer current and prospective business conditions. Big data not only can help assess the customer but can also be useful to predict the future macro- and microeconomic situations, which then can be used while funding the customer. The other expert (E2) sees smart contract as an opportunity to cut costs while Expert (E4) expressed his view regarding the acceptability of the model as follows:

> *I believe lack of information among the customers, i.e., laymen, who do not actually know how to deal with Blockchain and smart ways of conducting transactions nowadays may affect the acceptability of such development. Therefore, people need to be aware, they need to know what is going to happen, what this new change will bring and what it will affect.*
>
> *The acceptability may not be positive as of now based on the fact that acceptability of all these Blockchain platforms has not gained a global scale, especially among ordinary people. Also, the acceptability from regulators like the Central Bank of UAE is uncertain. Have they recognized such platforms and new ways of doing things? Has there been any proper legal framework that guides the conduct of people on these platforms? Is the new system well prepared to be accepted by people?*

These are the questions that need to be answered before we talk about acceptability.

Challenges of Implementing the Model

The opinions of the experts were solicited on the possible challenges that IB would face in implementing the Smart Contract Model for the Islamic banking and finance (IBF) industry. All the experts unanimously acknowledge that there are pending challenges, which include human resource development, educating customers, security features, the difficulty of having a generic model, and role of the third party. Expert (E3) argues that the present quality of human resource and the banking sector were not trained to handle disruptive technologies, so they will need to be trained to keep abreast of the developments in the FinTech revolution. This will provide them with the ability to handle the model. Another expert (E4) says there is a need to educate the bank customers about the new product. Generally, bank customers are conservative, but when they see something new that is simple to understand and cost-effective they will quickly accept it and adopt it. Therefore, there has to be a lot of campaign and advertisements about the features of the new product especially its benefits to the customers compared to their existing product. Customers will have the incentives to migrate quickly to the new product. Experts (E9 and E10) collectively expressed concern about security features. Both concurred although the technology promotes transparency recently there are reported cases of fraud even in the case of cryptocurrency that uses Blockchain technology. They are also concerned about the need for third-party involvement, especially that contracts through smart contract model are normally irrevocable. So the role of third-party arbitration becomes paramount. Meanwhile, (E5) opines that some of the most important challenges are technical scalability, trust in business innovation, encrypted money (encrypted coin) network, and regulatory requirements. Experts (E2, E5, and E8) say that the main challenge will be to connect all the relevant parties including authorities to transact over the Blockchain. E2 states:

For example, it is a huge challenge to connect the municipality to the Blockchain platform so that the registrations of transfer of ownership over the real estate assets is done automatically over the Blockchain.

While E5 adds:

> *other relevant parties should be also connected through Blockchain like accounts, property registry and* etc. *so that the sale is done on Blockchain is automatically recognized by other parties* i.e. *the property is properly registered under the buyer's name and the money he or she paid should be reflected in his or her accounts with the bank.*

Suggestions of Experts for Enhancing the Model

The experts were asked to provide suggestions for enhancing the features of the model toward developing viable smart contract models in the future. Their suggestions include the creation of a new generation of managers, an increase of investments on technology, and changing the traditional mindset. One of the experts (E3) is of the opinion that many of the existing managers in the Islamic banking industry, particularly the old generation, are largely comfortable with the way they do things now. There is a need to recruit more staff from the new generation who are IT savvy and have ambitions to make changes. The other expert (E6) suggests a change of mindset among practitioners in order to stop merely mimicking conventional practices. Few experts (E4, E7, E9 and E10) raised their concerns on confidentiality, security, and data protection. They suggested elaborate discussion of these issues in the process of further developing the model. Expert E7 proposed some suggestions to the model which were integrated into the revised model (Fig. 4.3). In the original model the relationship between the Islamic Bank and the housing developer as well as a third party was proposed through AI. While E7 acknowledged that the arrangements in the original model were viable, he proposed that preferably the whole process could also be performed through Blockchain.

Conclusion

The Islamic finance industry has witnessed an increasing interest in the FinTech wave. While progress has relatively been made in the areas of Robo-advisory, sandbox, payment system and investment, among others, the applications of these Islamic finance FinTech business models have been in isolation. They lack the depth of using the power of FinTech to harness their relationships. There is an absence of integrated business models. This chapter has developed a Smart Contract model for the

Islamic banking FinTech industry, taking home financing as a case. The model has been validated through interviews involving 12 experts of varied backgrounds. The major findings from the experts' opinions show the model is viable and acceptable, and has huge potential in the future. The experts expressed their concerns on the major challenges Islamic banking is likely to face in implementing the model. These challenges include security, quality of human resource and capacity building, the traditional mindset, and inadequate infrastructure. The experts have suggested that the model needs to be enhanced with technical details, creation of a new generation of managers, an increase of investments on technology, among others. The novelty of the study lies in setting a new research direction for integrated FinTech models that can be instrumental in further enhancing the efficiency of the Islamic banking and finance industry.

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CHAPTER 5

The Application of Fintech in *Microtakaful* as a Means of Digital Financial Inclusion: Insights from the GCC

Muhammad Ashfaq and Najeeb Zada

Introduction

Islamic finance has made tremendous progress during the last four decades. A double-digit compound annual growth rate has been witnessed by the industry, which is remarkable since conventional finance has been faced with tremendous losses because of one of the worst crises in its history. According to the Global Islamic Finance Report (2019), the size of Islamic finance assets crossed the US$ 2 trillion mark, which is almost 2% of the global financial assets. Today, Islamic financial institutions have penetrated the heart of predominantly non-Muslim majority jurisdictions.

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Its products are not only appealing to Muslims because of their religious beliefs; they are equally sought after by non-Muslims due to their compatibility. The success story of the industry during the last years has attracted many conventional players, and now conglomerate conventional financial institutions are offering Islamic products.

Despite this excellent performance in recent years, Islamic finance has not been able to make ground-breaking impact on the general masses of society, especially those living in the Muslim majority countries and belonging to the low-income class. It has been lamented by many circles within the industry itself that currently, there is too much focus on mimicking conventional banking products. This has led to a focus on financing household consumers and corporates by both Islamic banks and *takaful*. Since this group of customers, that is, household consumers and corporates, is only a small part of the population, the impact of Islamic financial institutions has not yet reached a critical mass level. On the contrary, it has been observed that Islamic microfinance has had a better effect in changing the lives of the common masses. There are many successful examples of Islamic microfinance within and outside the Muslim majority countries where the lives of the poor have been transformed. This has eventually led the stakeholders and concerned parties to call for a paradigm shift in the industry's priorities. As a supplementary of Islamic microfinance, *microtakaful* has the potential to realize the dream of financial inclusion by bringing masses into the financial system and changing their lives positively. This is especially likely in the wake of recent advancements in the field of information technology that is fast changing the world into a global village, nay a global room. It is now far more comfortable to reach these masses than ever before and transform their lives with the help of modern technology, a phenomenon known as digital financial inclusion.

The present research is an attempt to explore the possibilities and potential that *microtakaful* has in transforming the idea of financial inclusion into a reality with the help of modern technology. The generic term used for this purpose is Fintech, which stands for the use of technology in finance. For this purpose, the chapter is divided into three main sections. Section I is a general background to the issue of financial inclusion in Islam and the status of financial inclusion in OIC countries, including the Gulf Cooperation Council (GCC) region, as well as the potential of *microtakaful* in this connection. Also, this section explains the concept of *microtakaful* and its main characteristics. The interesting question of which countries can be the leaders in *microtakaful* is also discussed. Section II

introduces the idea of digital financial inclusion and its key elements. This section then explains in detail the advantages offered by the unification of Fintech and *microtakaful.* The possible application and utilization of Fintech in *microtakaful* are also explained in this section with real and hypothetical examples. Section III is a brief analysis of the challenges and risks of digital financial inclusion. These challenges are divided into general challenges, and regulatory concerns and both are highlighted accordingly. The approach adopted by the International Association of Insurance Supervisors toward some of these risks is also analyzed. The conclusion ends the topic and summarizes the main findings of the research.

Section I: Financial Inclusion in Islam—The Current Status in OIC Countries and the Potential of *Microtakaful*

Many researchers have authenticated that most low income and poor do not have financial protection in mitigating their financial losses. Therefore, the main idea behind the establishment of *microtakaful* is to allow people to be financially self-sustaining. *Microtakaful* is one of the mechanisms to fulfill the needs of the lower-income population, with the concept of providing affordable protection to the poor (Rom & Rahman, 2012). Such a scheme is more acceptable to and has a higher potential to reach a significant number of the low-income group as it is in line with their religious beliefs. Such low-income masses are predominantly located in Africa and Asia, where Muslim majority countries are predominant. For instance, the following figure gives a snapshot of the prevailing situation in Muslim majority countries.

The majority of the low-income countries, with US$ 1045 or less income per capita per annum, are located in Africa, and the location of many Muslim majority countries in the African subcontinent is well known. Similarly, the lower-middle-income countries include those situated in Asia where, once again, Muslim majority countries are located in a good number. In other words, a significant number of Muslims living in these countries earn between US$ 1046 and US$ 4125. This is in contrast to OECD member countries, where the annual per capita income is many times more, that is, US$ 12, 735 and above.

Apart from the issue of low income, the Muslim majority countries also suffer from a severe form of financial exclusion. In fact, the introduction

of Islamic banking and finance was initially perceived to change this situation. However, it did not happen. Many studies have been conducted in this connection. One prominent research has been published as an IMF working paper, and the summary of the findings of this research is as follows:

> *At first pass, it seemed to be the case that OIC countries are less financially inclusive than the rest of the world, in part because of religious self-exclusion. It also appeared that Islamic banking might be playing an important role, presumably by reducing religious self-exclusion and therefore creating conditions for greater use of financial services. Once country income per capita was accounted for, however, financial inclusion for OIC countries remained significantly lower, but it was no longer the case that the Islamic banking subgroup outperformed the other OIC countries. Delving further, the regression analysis went beyond simple country classifications to show that indicators of Islamic banking presence and activity within the OIC countries are associated with greater use of bank credit by households and by firms as a means to finance investment. However, there was no significant effect on other indicators of credit use, such as the share of all or small firms using bank credit, or the share of firms identifying lack of access as a binding constraint.* (Naceur, Barajas, & Massara, 2015, pp. 18–19)

Thus, even Islamic banks have not been very successful in remedying the situation. Therefore, despite many efforts to bridge the gap between these groups and bring the masses into the formal financial system, still about 70% of the adult population in emerging economies have no access to essential financial services. It is also a bitter fact that the majority of this financially excluded population comes from predominantly Muslim majority countries (Mohieldin & Iqbal 2012). This leaves room for other areas like Islamic microfinance and *takaful/microtakaful* to come forward and play their role to address the challenges of financial exclusivity in OIC countries.

Due to the concept of equality in Islam, it is required that all classes of society have sufficient resources to live a life of honour, though with simplicity. Therefore, including all societal classes in the mainstream economic channel is one of the five sublime objectives that Shariah wants to achieve by its commandments. This is commonly referred to as *Maqasid al-Shariah* or the objectives of Shariah. According to this concept, Shariah wants to make sure that the life, wealth, faith/belief, progeny, and intellect of each individual are protected. All divine injunctions of Shariah revolve around

the protection of these five pillars. The financial inclusion of the lower-income class fits well into this chain. If some classes of the society are, for example, excluded from the main economic activities and are forced to live a life of misery, it will lead to their being unable to utilize their full mental capacities (loss of intellectual capabilities), unable to perform their religious duties like *zakat/sadaqat* (unable to follow and protect all religious injunctions), unable to live the average life of other classes in society (deprivation from life protection), unable to bring up and educate their offspring in a better way (loss of progeny), and become beggars ultimately (loss of their own and others' wealth). However, if all classes of society, especially the lower-income class, participate in the economic activities and get their proper reward after contributing to the well-being of the nation, the five pillars can be protected and the objectives achieved.

Thus, social justice, inclusion, and sharing of resources between those who have and those who do not are a distinctive norm of the Islamic economic system. The issue of financial inclusion is generally addressed by Islamic finance from two directions—first, through promoting risk-sharing tools and contracts that provide a workable alternative to conventional financing that is based on debt, and second through specific instruments of wealth redistribution among the members of society. Both these aspects, that is, risk-sharing financing instruments and redistributive instruments like *zakat*, *sadaqat*, *waqf*, and *qard-al-hasan* complement each other and offer a comprehensive approach to eradicating poverty and build a prosperous and healthy economy via financial inclusion of all classes of society. These instruments have strong historical roots as they have been applied throughout history in different Muslim societies. In the context of modern Islamic finance, there are additions to this list whereby the same classical contracts and modes are utilized in contemporary forms and terminologies like microfinance and *microtakaful*. We argue that if *microtakaful* is embedded with modern technological tools/equipment, it has the potential to play an extraordinary role in financial inclusion.

Microtakaful is an essential segment of the Islamic finance industry in general and *takaful* in particular. Though it does not have a significant market share yet, the potential is substantial just as the need for it is tremendous. Currently, the majority of the Muslim countries are at the bottom of the low-income states. Similarly, financial exclusion is too dominant in these countries, and access to finance has been denied to the masses. There are different factors responsible for this situation. However, it is expected that Islamic finance will contribute to bringing the financially

excluded into the mainstream economy. Islamic microfinance and *microtakaful* have great potential in realizing this dream.

The main characteristic of *microtakaful*, like Islamic microfinance, is to fulfil the financial needs of a low-income household. This feature is embedded in the very definition of *microtakaful*. For instance, Khan (2006) defines *microtakaful* as a mechanism to provide Shariah-based protection to the blue-collared, underprivileged individuals at affordable costs. Hence, *microtakaful* is the *takaful* scheme for low-income people. BNM (2016a) defines *microtakaful* and its main attributes as thus: *A microtakaful product is takaful product that is designed to respond to the financial protection needs of low-income households.* As this definition reveals, there are two differentiating characteristics of *microtakaful*:

- "Financial protection," which means being able to access timely and adequate financial resources to:
  - Cope with major expenses; or
  - Provide temporary or partial relief from financial difficulties arising from unexpected adverse events; and
- "Low-income households," which refers to poor, vulnerable, or lower-middle-income households, particularly groups that have been previously excluded from access to *takaful*. (BNM 2016a, p. 5)

By its very nature and since *microtakaful* is offered to the low-income household, the following are some characteristics that are inbuilt in *microtakaful* products (Table 5.1).

The definition of *microtakaful* and its characteristics reveal that it is the most suitable instrument, along with Islamic microfinance, that can solve the problem of financial exclusion mostly. Its simplicity makes it appealing to low-income masses who avoid complicated instruments and documents. Similarly, efficiency makes it appealing to them as it is in their reach and economic resources, which are already scarce. Since such masses usually live in remote and hard-to-access areas, accessibility (primarily via digital technology, which will be discussed later) will make it within their reach. Likewise, low-income poor are concerned with the fulfillment of their essential needs, and they seldom bother about the fulfillment of wants and desires. These features are mainly missing in Islamic banking products, which are targeted to customers who already have some

Table 5.1 Characteristics of *microtakaful* products

Simple	Products are offered and serviced in a manner that is easily understood by the target group. Product features are self-explanatory, such that minimal advice from intermediaries is needed. Benefits, terms, and conditions are straightforward, with minimal exclusions and restrictions. All disclosures, marketing materials, and languages used to respond to the target group's level of financial literacy.
Protection Needs-driven	The proportion of premium/*takaful* contributions allocated to financial protection is maximized. The protection provided is relevant and meaningful in that it should not intentionally cover risks that the target group does not need.
Accessible	Premium/*takaful* contribution is affordable for the target group. The distribution channel is accessible and approachable for the target group. Product features and processes suit the target group's circumstances. All processes, including premium/*takaful* contribution payment, policy/*takaful* certificate renewal, claims, and inquiries, are easily accomplished by the policy owner/*takaful* participant.
Efficient	All processes are expedient and timely, with a particular focus on minimizing time to claims pay-out. Back-office administration is simplified, streamlined, and automated as much as possible.

Source: Authors Own—Adapted from BNM (2016a, p. 6)

resources. It is a well-known anecdotal irony that banks provide financing only to those customers who have some form of security. This is where *microtakaful* fits well into this picture.

An important question may be asked at this point. Islamic finance, especially in the form of Islamic banks, *sukuk*, and *takaful*, which dominate the industry share today, have already been there for a few decades, but the financial inclusion issue has not been resolved by these institutions significantly. In this scenario, can *microtakaful* (and also Islamic microfinance) make any difference? In other words, is there a link between Islamic banks and *takaful* and between Islamic microfinance and *microtakaful*? If yes, what is that particular link, and how can it contribute to the dilemma of financial inclusion in OIC countries in particular?

This is a critical issue, and the stakeholders need to be clear on this crucial distinction. As we referred to one research conducted by IMF, the role of Islamic banks has not been very promising in financial inclusion, although it has been able to attract a good number of Muslims who were

previously excluded from the financial system due to religious concerns. However, it is a fact that the lower-income Muslim population has not been attracted and targeted by Islamic banks yet, and it is logical in that this group is riskier than other classes. Thus, Islamic banks have been mainly concerned with corporates and salaried households who can provide security to these banks against the financing they receive. Since low-income and poverty-stricken masses do not pass the security criteria of the banks, they are not the target of Islamic banks; in other words, Islamic banks are not concerned with financial inclusion per se. *Takaful* is following the footsteps of Islamic banks in this connection.

However, this is in contrast to Islamic microfinance and *microtakaful*. The logic behind these two segments is to target such people who do not have security and are excluded from the financial system. Thus, we find that Islamic (or even conventional) microfinance providers are better able to access a vast majority of masses previously deprived of access to finance. Since *microtakaful*, which, though falls under *takaful*, targets these very people after Islamic microfinance, it is logical to expect that *microtakaful* will have broader application in terms of the target population and will be appealing to a vast majority of financial excluded.

This distinction brings us to another critical issue. We currently find different segments of Islamic finance at different levels of development in different jurisdictions. Thus, we find Malaysia and some GCC countries to be well established and well developed in Islamic banking, *takaful*, and *sukuk*. However, we find Islamic microfinance to be more prevalent in countries like Indonesia and Bangladesh as compared to Malaysia and GCC countries. This is logical in the sense that the majority population of both Bangladesh and Indonesia belong to low-income groups, and annual per capita income in these countries is quite low. This is in contrast to Malaysia and the GCC region. Therefore, it is the middle-income class that dominates these two regions, but it is a low-income group that dominates Bangladesh and Indonesia, as well as other countries like these. Consequently, the ground for Islamic microfinance and *microtakaful* is fertile for Bangladesh and Indonesia, while the other group of countries, that is, Malaysia and the GCC region, are more suitable for Islamic banks, *takaful*, and *sukuk* that fulfill the needs of affluent people.

The above sequencing is essential in many ways. First, a country wanting to promote *microtakaful* perhaps needs to promote Islamic microfinance. Second, countries well advanced and leading in Islamic banking, *takaful*, or *sukuk* (like Malaysia and some GCC countries) need not be the

leaders in *microtakaful* too. Instead, those jurisdictions that are advanced in Islamic microfinance have a better chance to lead in the sphere of *microtakaful*. Third, although the development of *takaful* is an indication of the development of Islamic banking and finance in general and is not necessarily an indication of the potential for the development of *microtakaful*, it can still be so because *microtakaful* is the offspring of *takaful* itself. Thus, we find an exciting situation looking at this scenario.

On the one hand, countries where Islamic microfinance is well established are in a position to lead the *microtakaful* market. However, *takaful* may not be well established in such countries that may hinder such a possibility. On the other hand, countries leading the *takaful* market currently have the base for leading in the *microtakaful* sector as well. However, they are constrained due to the low level of development of Islamic microfinance. Therefore, the situation is set off in one way or the other. Perhaps time will tell which group of countries will take the lead in *microtakaful*.

To conclude, the stakeholders in general and the regulators in particular should be aware of these relationships and the propositions in terms of developing *microtakaful* products. One shoe does not fit all, and in contrast to banking or *takaful*/insurance products where the products are more or less similar, the product basket of *microtakaful* logically needs to be varied from jurisdiction to jurisdiction. Such products may be varied within a jurisdiction where the needs of the consumers differ due to geographical and other characteristics. Logically, people living nearby rivers would need a flood *microtakaful* product, whereas small vendors who can shift their carts/business stuff quickly from one place to another would not need such a product.

Section II: *Microtakaful* and Fintech—The Way Toward Digital Financial Inclusion

The word "Fintech" is coined from two separate words: finance and technology. In simple words, Fintech is the use of modern technology in providing financial services to customers. According to Bank Negara Malaysia's (BNM) discussion paper on *Regulatory Sandbox* (2016b), Fintech refers to technological innovation applied in the provision of financial services. In its broader sense, Fintech stands for the application of technology within the financial industry that covers a wide range of activities, including financing, payments and infrastructure, operation and risk

management, data security and monetization, and customer interface. More specifically, Fintech is applied to the segment of a technology start-up that is disrupting sectors such as mobile payments, money transfers, loans, fund-raising, and asset management. The main types of Fintech services include peer-to-peer (P2P) lending, crowdfunding, money transfer, mobile payments, and trading platforms, wealth management, and insurance. By the end of 2017, the size of global investments in the Fintech sector was over US$ 14.2 billion (GIFR, 2019). By the end of 2018, more than 130 Fintech start-ups have been reported in the Gulf Cooperation Council (GCC), and in fact, the UAE is driving the Fintech surge in the region. It is expected that Fintech start-ups will reach up to 260 by the end of 2021, and investment in the Fintech sector in GCC will be over US$ 2 billion in the next decade (Gulf News, 2018).

While the use of technology has been in vogue in the finance industry for long, the term Fintech is relatively new. Due to tremendous technological advancement from the beginning of this century, especially the innovation and development in mobile phone technology, the world of finance has been transformed drastically. Thus, the use of the latest innovative technology in finance has led to the coinage of the term Fintech.

Fintech can revolutionize *microtakaful* and achieve digital financial inclusion. The amalgamation of *microtakaful* with modern information technology would result in a unique form of financial inclusion, which is far better than the simple financial inclusion model. Digital financial inclusion broadly refers to the use of digital financial services to advance financial inclusion. It involves the deployment of digital means to reach financially excluded and underserved populations with a range of formal financial services suited to their needs delivered responsibly at a cost affordable to customers and sustainable for providers (GPFI, 2016). Box 5.1 explains the key pillars of the digital financial inclusion model.

Islamic finance has not been immune to the positive disruptions of Fintech. However, the impact is currently at the infancy stage, with a small number of participants. It is also restricted to a few prominent Fintech companies in the arena of P2P lending and crowdfunding. Thus,

Box 5.1: Key Elements of Digital Financial Inclusion Model

A digital financial inclusion model aimed at offering financially excluded and underserved customers a range of financial services involves four key elements:

- *A digital device:* either a mobile phone or a payment card plus a POS device that transmits and receives transaction data
- *Agents:* individuals, retail stores or outlets, or automated teller machines where customers can put cash in (that is, convert cash into digitally stored value or make a digital payment or transfer) and take cash out (e.g., withdrawing from a digital stored-value account or receiving a digital remittance or other transfer or payment)
- *A digital transactional platform:* which (i) enables payments, transfers, and value storage through the use of the digital device and (ii) connects to an account with a bank or nonbank permitted to store electronic value
- The *offer of additional financial products and services* through the combination of banks and nonbanks (including potentially nonfinancial institutions), leveraging digital transactional platforms

Source: Adapted from GPFI (2016, p. 46).

Shariah-compliant financial solutions are offered by Dubai-based Beehive, Jakarta-based Blossom Finance, and Singapore-based Kapital Boost and Club Ethics. Despite its infancy, the potential cannot be underestimated.

In April 2016, a cluster of eight Islamic crowdfunding platforms, including Ethis Crowd, Funding Lab, Kapital Boost, Narwi, Easi Up, Blossom Finance, Launch Good, and Skola Fund joined powers to set up and make an Islamic Fintech Alliance (IFT). The primary objectives of this big alliance are to foster significant safety and develop trust by promoting, and implementing, shared standards for Islamic Fintech; secondly, to broaden the access of Islamic Fintech and its social impact by ensuring the support and assistance of an extensive network of innovators and eventually establishing and developing a sustainable, and global environment or ecosystem of Islamic Fintech with required support from regulators and stakeholders.

Microtakaful would be revolutionized because of its merger with Fintech in many ways. Some aspects of this revolution are explained in the following.

A: Innovation and Outreach

In recent years, advancement in information technology has had a tremendous impact on both developing and developed countries. This impact is more in the case of developing countries due to unexploited opportunities in technology adoption. In 2009, *The Economist* conducted a Mobile Money Survey that concluded that new uses for mobile phones could launch another wave of development. Similarly, the same report added that mobile phones are the most effective tool for development, whereby it is facilitating businesses, and it may replace costly travels; text messages will provide weather forecasts to farmers, and information about markets is passed on quickly with phones.

Looking at the potential of mobile phones in developing countries, their subscription in developing countries has multiplied drastically. In less than two decades, the world has undergone an unbelievable transformation, and by the end of 2019, 40% of the human population has access to smartphones (GIFR, 2019). Compared to other GCC countries, UAE has the highest mobile penetration rate of 173%, and it is expected that by the end of 2022, the market share of mobile wallets will be US$ 2.3 billion (GIFR, 2019). Figure 5.1 shows the number of mobile phone users during the past few years, and it predicts the trend for the coming years.

One should expect that such widespread use of mobile would be significant for microinsurance (and *microtakaful*) providers, and this technology would be utilized fully. However, reality and practice are contrary to this expectation. Figure 5.2 demonstrates the use of mobile in microinsurance processes.

Nevertheless, there are a few examples that show that innovative technology can be intelligently utilized to achieve many targets simultaneously. For example, some microinsurance providers in Oceania and Asia, mostly located in the Philippines, Bangladesh, Indonesia, and Papua New Guinea, use mobile phones to process their microinsurance offering. The use of mobile phones mainly concerns customer service, marketing, and sales while only a few percent use the technology for premium collection (Oza et al., 2013).

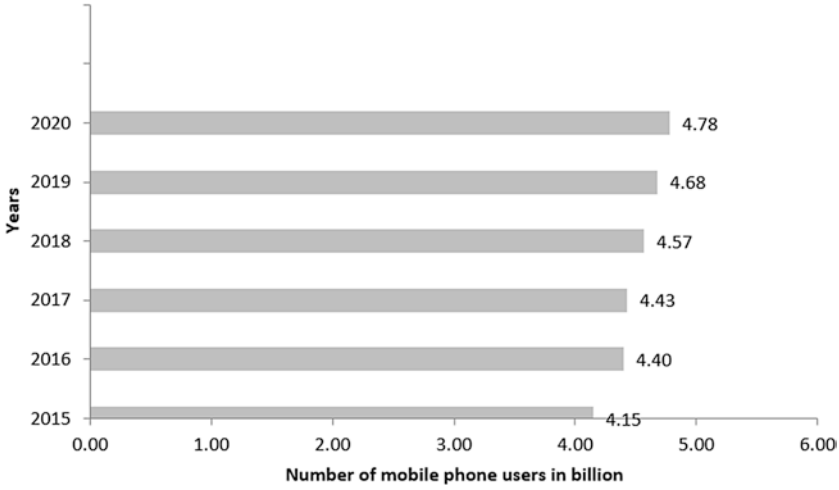

Fig. 5.1 Number of mobile phone users worldwide from 2015 to 2020 (in billions). (Source: Authors own. Adapted from Statista (2019))

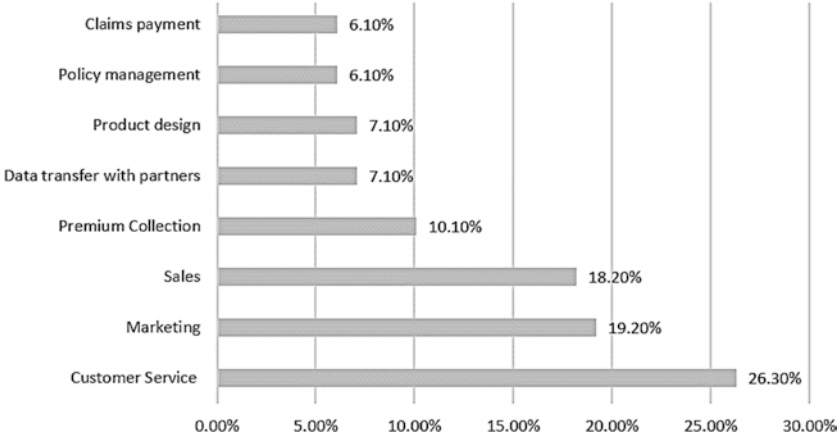

Fig. 5.2 Use of mobile phones in microinsurance processes. (Source: Adapted from Oza, Mukherjee, and Ruchismita (2013))

Similarly, one insurer in Eastern Europe is developing SMS-based fast claims handling procedure in health insurance, which works as follows: a doctor who verifies a claim sends a text message to a server, with codes for the patient and the necessary treatment. The automated response to the physician includes an authorization to withdraw the insurance payment from an ATM. This system ensures the fast provision of cash to the patient in the case of an emergency, where the paperwork is handled later. Likewise, Tata AIG in India already provides online information, application forms, and premium calculators for its microinsurance products while Microcare in Uganda provides online client registration and application forms. These examples demonstrate the efficient use of mobile technology that offers the following benefits:

> *A significant benefit in the move from paper-based to electronic processing is the quick generation of detailed data, which allows for better mortality and morbidity studies, better pricing, and broader understanding of the risk within a particular market. If used effectively, it offers the potential to create products that are better fitted for a market.* (Micro Insurance Center, 2018, p. 30)

Some attempts to use modern technology in *microtakaful* have already been made. In this connection, a mobile phone has been considered as a potential *microtakaful* distribution channel in Indonesia. Telkomsel, which is a communication company, has already tested the market for this purpose. It has offered a short-term personal accident *takaful* product called *Takaful* Safari that can be purchased through SMS. A similar approach could be adopted for *microtakaful* in the future (AFC Consultants International, 2014, p. 12). It shows that *microtakaful* providers are aware of the global trends and are willing to experiment with different ways of exploiting Fintech in *microtakaful* offerings.

B: Formalization of the Economy

Shadow or informal economy has attracted attention in the wake of the recent global financial crisis. Since this part of the economy is not documented, it hinders the effective implementation of policy decisions. In fact, it also affects a good decision-making process as the data on the basis of which policy is formulated is not accurate. Additionally, it also decreases the level of national revenue due to nonpayment of taxes and other contributions. Money supply and labor conditions are

also adversely affected by the informal economy. Currently, the shadow economy consists of 20–30% of the total economy for different countries around the globe. The informal economy is an issue in most OIC countries too. In this connection, the OIC Standing Committee for Economic and Commercial Cooperation (COMCEC) in its seventh meeting held on February 11th, 2016 in Ankara, identified "informality" is one of the main challenges faced by OIC members. The committee further argued that in many OIC economies, informality is predominant, and because of the high informal sector, there is a lack of social insurance policies and social safety net. In order to shift informal businesses and labor into the formal sector, the creation of a regulatory environment, business development opportunities, and employment opportunities are needed in the formal sector.

In the context of the informal portion of the economy, especially in the OIC member countries, it can be argued that *microtakaful* can play a decisive role in achieving this objective. Usually, the masses that are not a part of the formal economy are left out from being calculated as a part of the economy. Once such masses are brought into the system through *microtakaful*, their contribution to the economy, though very small, can be counted and adjusted in the system accordingly. Additionally, by bringing the informal economy into the mainstream system, the relevant issue of money laundering and terrorist financing can also be addressed to a certain level. Currently, many conflicts are going on in Muslim majority countries. One issued face by many stakeholders fighting against this situation is terrorism financing as well as money laundering. Both these factors have contributed significantly to the overall security and economic concerns of these nations. However, once the economy is digitalized via Fintech into the form of *microtakaful* it can amend this situation substantially. After the low-income people who constitute a significant portion of the population are brought into the formal system, the flow of money in the system and the parties sending/receiving money can be detected. This will block the way to many illegal practices that are currently posing a threat to the majority of the Muslim countries.

C: Efficiency

The transaction value of *microtakaful* is usually shallow. Therefore, the associated costs need to be minimized as much as possible in order to make the whole process economically viable. This requires that the

processes should be efficient. Modern technological innovations can be implemented in such a way that makes it possible:

> *"A number of creative microinsurance innovations demonstrate that technology may be a key mechanism through which administrative costs can be reduced. Cell phones, for instance, have been used to issue policies, pay premiums, maintain health status information, and, ultimately, make claim reimbursements. Innovative distribution channels have been key to successful expansion of the microinsurance market (i.e., reaching a larger percentage of the target population."* (Biener, Eling, & Schmit, 2014, p. 12)

The same is true about *microtakaful* because:

> *The insurance industry, in general, is fast becoming a technology business, so Takaful operators should embrace technology in all operational, sales and marketing strategies. Operators could achieve cost efficiency and improve productivity through the building of technology capabilities to tap into new markets and increase revenue … There is a need for improved operational processes and controls to accommodate new regulatory changes and enhance compliance practice and business excellence. New methods for distribution channels and embracing technology will help reduce product costs and improve sales efficiency and marketing.* (Deloitte, 2013, p. 7)

The efficient use of technology in *microtakaful* business would result in financial gains in the form of low costs. However, efficiency has another dimension too. Reliance on paper-dependent processes is time-consuming, which ultimately leads to customer dissatisfaction. This runs contrary to contemporary competitive markets. Therefore, the timely processing of claims can make a real difference for *microtakaful* providers. Likewise, if all contracts are signed electronically, it will minimize the possibility of misrepresentation, undue influence, fraud, and deception.

D: Enhanced Consumer Protection

Apart from cost saving related to cash transactions and easier access discussed above, digital financial inclusion also offers additional benefits. These benefits are related to reduced customers' risk in the following forms:

- "*Lowered risk of loss from carrying cash or storing it insecurely;*
- *Potentially greater confidentiality in obtaining loans and other financial services if underwritten remotely and delivered directly to a customer's digitally accessed account;*
- *Potential to automate POS disclosure (reducing or eliminating risk that required disclosures will not be given);*
- *Recourse mechanisms relying on the same digital communication channels by which services are delivered and are therefore potentially more convenient and accessible;*
- *Innovations that improve security and identification measures, such as biometric ID, creation of unique financial IDs, cards with chips instead of magnetic stripes, which reduces ID theft risks; and*
- *Graphic and aural user interfaces with the potential to reduce barriers for illiterate customers (especially promising with increasing penetration of ever less-expensive smartphones)*" (GPFI, 2016, p. 55)

E: Removal of Barriers to Financial Inclusion

Customers often live geographically far from where insurance services are available and may migrate seasonally in search of work. This makes sales and servicing challenging (IAIS, 2012). The use of Fintech in *microtakaful* will enable *takaful* institutions to reach customers living in remote and hard-to-reach areas. People living in such areas are mostly excluded from the financial system, and their number is substantially large. Fintech can help *microtakaful* target and reach these masses. There is an additional benefit too. In many traditional Muslim societies, females usually remain in their houses, and it is not acceptable if they go out and mix/deal with their male counterparts. This makes them a passive part of society, and their contribution to the economy is almost nonexistent. However, they can be made a part of the system through the skillful use of Fintech in *microtakaful*; they do not need to go to a bank, for instance, minimizing contact with other people. By giving them the necessary awareness about using modern technology like phones, etc., they can work from home. They do not need to go outside their homes or meet people to receive cash or to make payments—it is just one touch away.

In addition to the above, simplicity is another feature that is associated with the use of technology. The literacy ratio of low-income masses is not usually high. The terms and conditions as well as processes of a contract need to be explained in plain and simple language. Technology can help achieve this goal by providing a further explanation in the form of a

graphical representation of the contract processes. This does not cost anything and adds clarity to the product/contract.

F: Leveraging Twofold Infrastructure

Digital financial inclusion through the combination of Fintech and *microtakaful* has two-way advantages. On the one hand, there is an opportunity to leverage new technology and delivery channels, such as payments by mobile phone and other forms of branchless delivery, to expand the outreach of *microtakaful* through Islamic microfinance providers. As mentioned earlier, there are many jurisdictions where Islamic microfinance is well developed and has access to critical mass. The same platform can be used to increase the scope of *microtakaful.* On the other hand, the use of modern technology is spreading very fast, as explained earlier. Utilizing this technology infrastructure, *microtakaful* can be better promoted with both time and cost-efficiency. Thus, *microtakaful* can make a rapid penetration and reach the low-income masses with the help of this two-way leveraging process.

In Fig. 5.3 we present an idea of how the marriage between Fintech and *microtakaful* can enhance the experience of consumers (assuming that the customers are Muslims). We suppose that the potential consumer is a farmer who wants to be protected against any losses to his or her crops. The information can be made available in the form of a specific mobile application or an online portal provided to the customers by *microtakaful* institutions.

Thus, by going beyond the basic crop protection need of the farmer, the *microtakaful* provider can enhance the experience of its consumer. The few possibilities mentioned earlier are a handful of examples of what the human mind is capable of achieving in this regard. The religious aspect is especially worth consideration because it is well documented in the literature that poor people are more religiously inclined. Furthermore, it is also in line with the higher objectives of Shariah, whereby the protection of one's faith/belief is one of the sole concerns of Shariah. Furthermore, the personal/health aspect of the consumer is also noteworthy because the low-income masses are often exposed to health risk, and by providing such facilities, the *microtakaful* provider can contribute to the well-being of the masses in society.

Smart contracts will prove to be very helpful for *the takaful* industry in its march toward digital financial inclusion. The smart contracts are an

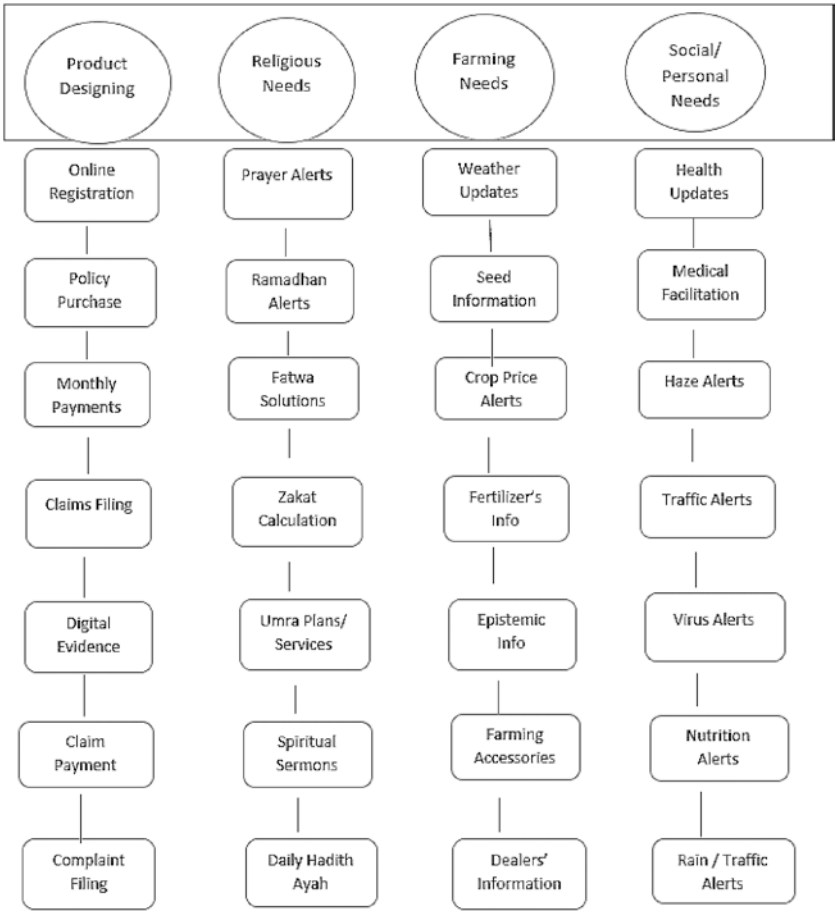

Fig. 5.3 Potential use of Fintech in *microtakaful*: enhancing consumer experience. (Source: Authors' own compilation)

automated computer program. By deploying this technology, the operating cost can be decreased, the speed of execution can be increased, and claims can be processed with greater efficiency and transparency. A (micro) *takaful* institution can benefit from distributed ledger technology (DLT) by providing access to authorized persons only. By using smart contracts, the workload of *takaful* operators can be reduced or completely

diminished, and manual processing errors can also be controlled. The (micro) *takaful* participants can send their claims instantly, and within distributed ledgers, the claims would be covered in real time (Khan, 2017).

The *takaful* industry can benefit from the data generated from smart homes and cars via telematics to offer customized premiums to customers based on the amount of risk or loss they can encounter derived from their usage statistics. This would also enable the *takaful* operator to be better prepared for money that would be needed by a certain individual in the future. A particular person is irresponsible and can face frequent losses while another might not be so, and there is less likelihood of him suffering a significant loss utilizing an accident at home or a car accident. So home insurers or car insurers would be aware of the amount of damage a particular person could encounter and have funds accordingly so that they are prepared in case more than one individual suffers a loss at the same time. This would also promote a sense of justice and harmony between customers (Khan, 2016).

Figure 5.4 summarizes the payment and claim processing in (micro) *takaful* via smart contracts, followed by a brief description of the steps involved in the process:

1. Loss information is submitted by the *Takaful* participant/Policyholder or smart asset (via sensors or external data sources if the asset is technologically capable), triggering an automated claim application.
2. For policies issued via a smart contract, *Takaful* participant/Policyholder receive feedback regarding initial coverage in real time.
3. Claim due diligence is automated via codified business and Shariah rules within the smart contract, using the information submitted by the *Takaful* participant/policyholder.
4. DLT automatically utilizes secondary data sources to assess the claim and calculate the loss amount.
5. Depending on the *Takaful* policy or agreement, a smart contract can automate the liability calculation for each carrier where a syndicate (or *Takaful* operators or re*takaful* operators) exists.
6. In predetermined situations, the smart contract can trigger an additional assessment of the claim in order to reach a final decision/calculation.
7. If the claim is approved, payment to the *takaful* participant/Policyholder is initiated via a smart contract.

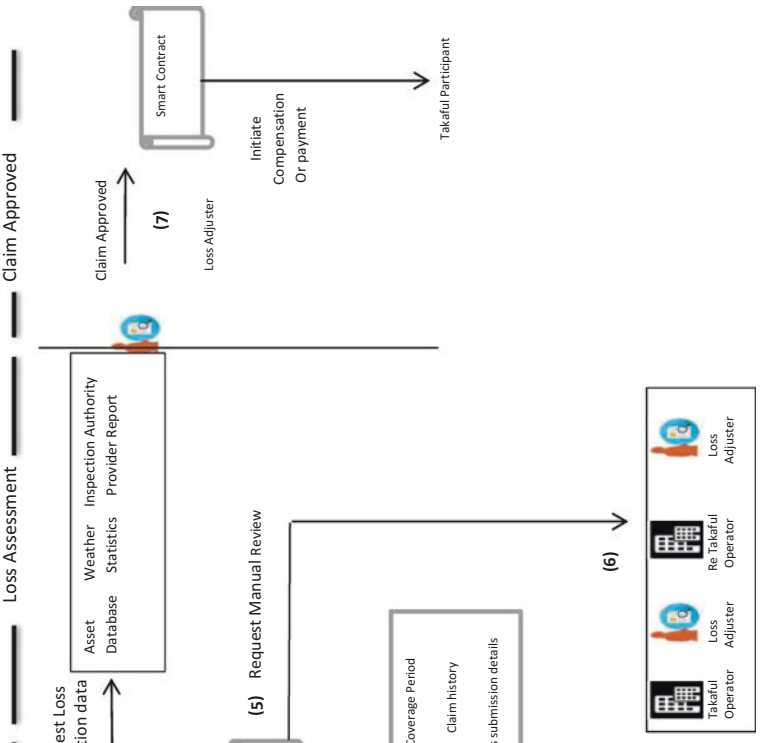

Fig. 5.4 Payments and claim processing in *takaful* on blockchain via smart contracts. (Source: Authors own. Adapted from World Economic Forum (2016))

Thus, by thinking "out of the box" and utilizing Fintech to its full potential, *microtakaful* providers can come up with novel solutions to the needs of their customers. Due to increasing competition in the market, the traditional way of offering a single product covering some basic financial needs may not be sufficient to satisfy customers in the near future. Therefore, *microtakaful* providers will need to bundle benefits that go beyond the financial needs and consist of personal, social, and even spiritual needs of the customers.

Section III: Challenges in Digital Financial Inclusion Via *Microtakaful*

The above prospects, though promising, are not free from challenges. These challenges can be divided into two types. The first are general types of issues related to privacy, customer protection, and low level of awareness. The second list includes regulatory challenges. Table 5.2 briefly summarizes the first group of challenges, though the list is not exhaustive.

Apart from the general concerns listed above, there are unique regulatory challenges in the way of digital financial inclusion. If technology is to be used in *microtakaful* for financial inclusion purposes, regulators must pay attention to these challenges. In fact, these challenges would either impede the realization of the goal of digital financial inclusion or, if adequately addressed, would result in the successful outcome of the whole process. The challenges are briefly elaborated in Fig. 5.5.

The International Association of Insurance Supervisors (IAIS) has also highlighted several challenges and risks that Fintech can create for the business of insurance (and *takaful* by default). These risks include the following:

- Operational risk
  - Cyber-attacks on insurance companies—business interruption, insurance fraud.
  - New financial technology not working correctly; for example, if telematics or smart contracts or new technologies are widely applied and then do not function properly (for whatever reason), this could cause a sizeable operational disturbance.

Table 5.2 General challenges in digital financial inclusion via *microtakaful*

Challenge	*Brief explanation*
Lack of awareness	As discussed previously, the awareness about *microtakaful* is low even in jurisdictions like Malaysia. This will hinder the dream of bringing low-income masses into the financial system
Fraud/scams	Currently, online scams and fraud are a real threat to the transactions performed electronically, and it will keep customers away or at least cautious about using modern technology for financial transactions
Shariah concerns	There are strict Shariah rules about contract formation. Since the parties in financial transactions are not present in the same session, it may create unique challenges from the Shariah legitimacy perspective
Technology risk	After too much dependence on technology, any disruption in the system can cause unimaginable damages in economic terms
Focusing needs	Since *microtakaful* is directed toward low-income groups, it must target the fulfillment of needs and cannot start with wants or demands, thereby restricting product-offering choice
Multiparty involvement	A simple contract via a mobile phone involved more than two parties; a customer, a cellular company, a mobile phone company, and a financial institution. The nature of the relationship among these parties is a challenge in itself
Inexperienced customers	The low-income population is not highly literate, and their proper use of modern devices is not guaranteed, which can fail the digital financial inclusion concept
Consumer protection	The privacy of consumers is a real concern these days, especially in the wake of WikiLeaks, whereby people are worried about their data protection

Source: Authors' own

  - These are not the typical information technology risk management issues but are instead risk management issues affecting the whole financial institution.

- Data protection
  - Consumer confidential data or private data protection could be compromised due to a cyber-attack. Fintech would allow access to a significant amount of personal data.
  - The data ownership framework is not developed globally—who owns which data?

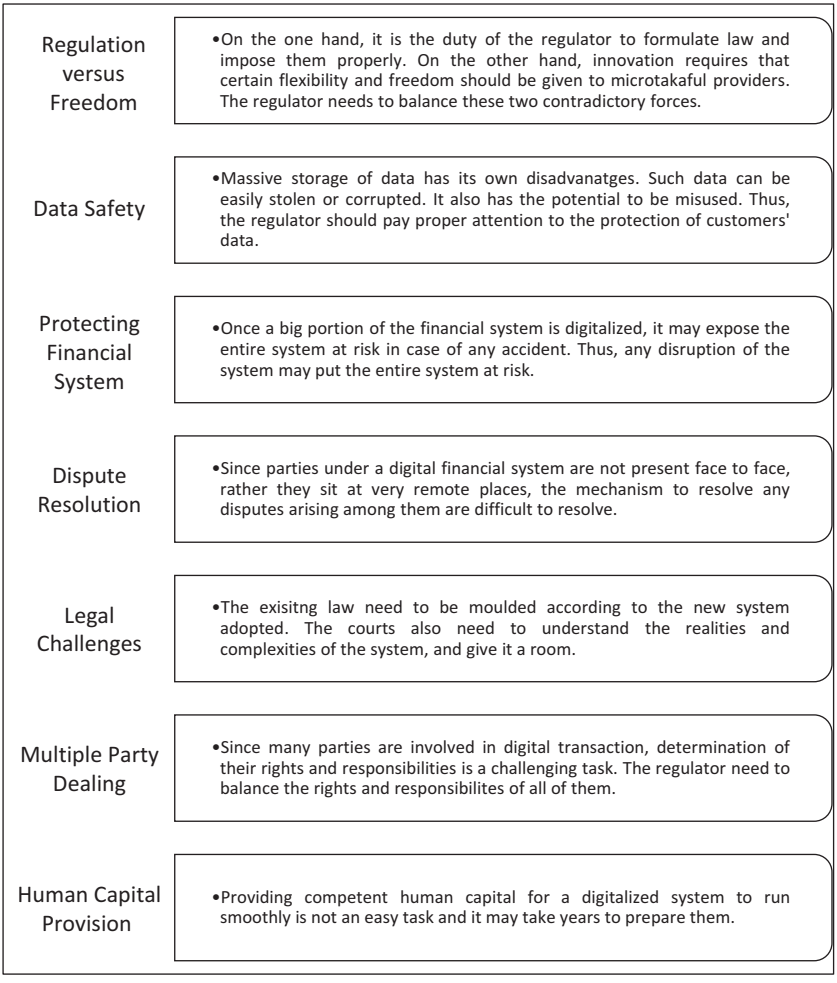

Fig. 5.5 Digital financial inclusion: some regulatory Concerns. (Source: Authors' own)

  - How is private data protected? Those that hold private and confidential consumer data should follow robust measures to protect the data.
  - Regulation in this area is still not established and not globally harmonized.

- Consumer protection
  - Fintech could impact on a significant number of consumers in a short period. Therefore, supervisors should pay due attention to it. (IAIS, 2016, p. 3)

It is evident from the above approaches that the regulators have a significant role to play in mitigating the risks associated with Fintech. It seems logical in that regulators are the party that guides and allows innovation to take place in the market. Such permission should be accompanied with proper deliberation and understanding of the risks involved therein. Additionally, the guidelines above also highlight the need for coordination among different stakeholders.

Moving forward, these challenges need to be addressed by regulators if the model of digital financial inclusion if to be implemented successfully. One example, of data security and consumer protection, from the above list of concerns, should suffice to explain the point under discussion. In January 2017, the national database authority of Pakistan came to an agreement with Mastercard. Under the agreement, the database authority was to share the customers' data, who were Pakistani nationals, with Mastercard. However, severe criticism was leveled against the agreement because it violated the data protection and safety of the customers. In fact, the criticism against this deed was so severe that the interior ministry of Pakistan had to intervene within hours and the agreement was cancelled immediately. What this example demonstrates is that customers' data protection is a real concern, just as the other issues in the list above are seriously important. Therefore, the regulator would need to coordinate with other local and even international authorities/bodies to ensure that no compromise is made on these aspects. This concern is not difficult to understand, especially in the wake of most recent information provided by WikiLeaks, whereby consumers are subject to spying by different agencies, a factor that can result in the consumers' loss of trust in and avoidance of the digital financial platform.

Conclusion

Microtakaful has not yet developed as per its full potential. It can bring revolution in the lives of millions and even billions of people. This is specifically plausible in the wake of contemporary innovations in information technology. It is well known that the majority of Muslim countries are currently faced with many challenges that are related to economy, security, and unity. Remedying the situation on all these fronts needs revolutionary thinking and a practical approach. On the economic and financial front, the exclusion of the Muslim masses from the formal financial system is a big challenge that brings with it further miseries. Since Islamic banking and *takaful* have not been as successful as they were expected to be in expanding the boundaries of financial inclusion within Muslim countries, an alternative approach is required to be tested now. In the current landscape, it is only the *microtakaful* that can shoulder with Islamic microfinance and push the boundaries of financial inclusion further. This will be far easier and more effective if modern technology is brought and utilized in this procedure, which will result in digital financial inclusion.

This study also concludes that the GCC has all the elements that are considered essential for the Fintech ecosystem. There is an excellent opportunity for the region to become a hub for Fintech and focus on innovation and creativity. GCC is also an attractive place for the Islamic Finance industry due to its Muslim majority population. The regulators and Islamic financial institutions aim to prepare the region for next-generation Islamic finance by bridging the gap with the combination and match of Fintech and Islamic finance in the GCC.

The benefits of digital financial inclusion for OIC Muslim countries in general and for GCC in particular are manifold. It is a means of innovation. It also removes barriers to financial inclusion. It is both time and cost-efficient. Its outreach is vast, and it eliminates the challenge of the shadow economy. The risks faced by customers as a result of weak law-and-order situation that is currently found in many Muslim majority countries can also be minimized and even eliminated via digital financial inclusion. However, digital financial inclusion has its own challenges too. For instance, there are now more threats related to cybercrimes, scams, and frauds than before.

Similarly, data protection and consumer privacy concerns are also eminent, especially in current times, due to the involvement of multiple parties. If a dispute arises, it is challenging that the parties are always physically

far from each other. Another concern is the introduction and implementation of new laws related to digital financial inclusion. These laws need to be very comprehensive as there are multiple parties, and the role and responsibilities of each party need to be distinguished in clear terms. To sum up, although the benefits of digital financial inclusion are many, its challenges are not few.

Moving forward, a comprehensive framework is required to further disseminate the notion of digital financial inclusion, especially in the context of *microtakaful*. It cannot be denied that the world is changing fast, and we need to keep up with its pace. Very soon, microinsurance will transform itself into a completely digitalized form. Since it is a cost-efficient structure, the customers will welcome it. This will increase pressure on *microtakaful* providers to reduce their costs and be efficient.

All the stakeholders of (micro) *takaful* industry need to respond to these new challenges and opportunities. Opportunities are always accompanied by challenges. There is a need to be proactive today more than ever before. The stakeholders, therefore, need to respond to the situation in time rather than being forced to respond to it by other forces at a later stage. Those who stand first to accept the challenges of digital financial inclusion will be rewarded accordingly; those who are late will pay the price for it. The regulators, in specific, need to be alert and react to the situation with proper insight and vision. There is a great need for collaboration and communication among all the parties, and this can be made possible by regulators if they are aware of this situation. The challenges are, in fact, so many and of such a diverse nature that they can only be tackled with teamwork; it is the task of regulators to lead and guide the team in the right direction. One source of guidance regarding proper guidelines can be bodies like IAIS who are already responding to this situation and have provided specific guidelines. These guidelines can be molded slightly to cater to the needs and nature of *microtakaful*, while specific guidelines will be needed in case of absence in the regulations of other bodies. Thus, innovation and adoption will pave the way for digital financial inclusion across Muslim countries. Finally, it seems realistic that the Fintech start-ups in the GCC region gain further momentum and play a key role based on the infrastructure and proactive regulatory support.

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CHAPTER 6

Gharar-Free ReBittance: Powered by Blockchain

Lokesh Gupta

Introduction to Remittance

Remittance, which is about transferring of money across domestic or international borders by immigrants to their families residing in their native countries, has risen hugely over recent years. At a micro level, it plays an important role in the growth and livelihood of immigrants' families. The funds received by beneficiaries are largely spent on food, education, health, consumer goods and establishing small businesses. However, at a macro level, it is a major contributor towards economic growth, external financing and it also acts as a major contributor to the GDP of developing countries. The major drive behind the growth of cross-border global remittance is the increase in the immigrant population globally. Remittance referred to here is the Peer-to-Peer (P2P) enabling payments to friends or family, which could be either domestic or cross-border and is relatively low value and recurring in nature.

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The statistics published by the World Bank estimated that remittances to developing countries were expected to grow by 4.8% to $450 billion for 2017. Global remittances, which include flows to high-income countries, were projected to grow by 3.9% to $596 billion. Remittances to low- and middle-income countries were expected to grow modestly by 3.5% in 2018, to $466 billion. Global remittances would grow by 3.4% to $616 billion in 2018. For the Middle East and North Africa (MENA) region, remittance was expected to grow by 4.6% to $51 billion in 2017, largely driven by strong flows to Egypt, the region's largest recipient, in response to the devaluation of the Egyptian pound. The growth outlook for GCC is impacted due to volatility in crude oil price. It was estimated that remittance to the region would grow by 2.9% to $53 billion in 2018 (World Bank, 2017).

The conventional model of remittance, which is largely practised to date, is cash-based, that is, where cash is collected at the point of sale and cash is paid out to the receiver (cash pickup) in the recipient's country or credited to the beneficiary's bank account (bank credit) or even crediting to prepaid cards (card payments). Traditional Remittance Service Providers (RSPs) are money transfer operators (MTOs), Banks, Postal Network (Remittance via Money Order) regulated by Central Bank or respective regulatory bodies of the Country. Western Union, MoneyGram, and Ria are the leading remittance companies that have dominated the remittance market for many years based on the brick-and-mortar model, operating a combined 1.1 million retail locations across 200 countries to facilitate cash pickups (Baker, 2015).

However, with the evolving of technology, the mode of remittance and modus operandi is changing from traditional brick-and-mortar to digital-based; that is, embracing omnichannel such as online or mobile-based to perform remittance instead of visiting the branch or outlet in person. This is a new experience to which remitter is getting hooked due to convenience and ease of access to overcome the restriction of timing to visit the branch to perform remittance. Digital transformation presents an opportunity for traditional RSPs to improve the overall remittance experience for the remitter to send money.

There has always been a challenge that migrants experience, primarily as a result of heavy charges that banks and money transfer operators charge for offering remittance services. For migrant workers, this has a direct impact on money that the beneficiary will receive post deduction of charges. Refer to the World Bank (2017) recently published statistics:

globally sending remittances costs an average of 7.13% of the amount sent, which is less than compared with the figure in Q1 2017, that is, 7.45% of the remittance amount. As per the report, South Asia remains the cheapest with an average cost of 5.21% and Saudi Arabia remains at 5.71%. Banks were found to be the most expensive type of service provider, with an average transaction cost of 10.44% (Christopher Gomez, 2018). In addition to the sending cost, there are margins on the exchange rate, which again adds on to the cost of money that is being sent by the remitter.

The expectation from the remitter is to obtain remittance with a low transaction fee, better exchange rate, transparency on charges and process, and speedy processing of the transaction, that is, real-time crediting to beneficiary's account or collecting cash from the designated agent in the recipient country. This is the gap which was identified by FinTech companies and start gaining a foothold in the remittance industry by introducing digital remittance, using technology as a tool instead of relying on physical branch and agent network. The disruption is from providing affordable services to migrant workers, by lowering the cost of operation with minimal reliance on brick-and-mortar establishments. The Digital Remittance model is based on mobile and online channels to send money, bypassing costly agent or branch-dominated networks. Technology is heavily used for compliance with AMLA (Anti Money Laundering) guidelines, rather than performing manual screening of transactions.

Traditional Brick-and-Mortar-Based Remittance Models

The Traditional Remittance model for P2P remittance is largely processed through Money Transfer Operators (MTO) such as Western Union, MoneyGram, Ria, etc., which provide a global remittance service involving a worldwide network of agents, ATMs, and electronic channels to credit or disburse the funds. Irrespective of the mode of remittance, the process occurs in three phases: funds capture phase, funds disbursement phase, and the communications and settlement phase. The first stage is fund capture, that is, remitter provides funds to an agent of MTO to initiate fund transfer to an overseas country. The second stage is disbursement, that is, fund pays out to beneficiary through MTO agent network or electronic mode of payments. The final stage is settlement, that is, exchange of funds amongst local agent, MTO, and overseas agent, which is

generally done via Nostro accounts held in Banks and all remittance transactions are pre-funded to expedite the processing. There are a number of methods, which may differ based on MTOs; however, the overall structure for an end-to-end chain is that remitter gives the money to a local agent who transfers the money to an overseas agent, who then delivers or credits the money to the beneficiary based on the mode of remittance.

Cash Pickup

The cash pickup or cash-to-cash service is the most popular and the most traditional remittance method used internationally. It allows the remitter to visit the MTO agent, deposit funds with the local agent, and for the receiver to collect cash from the overseas agent in the beneficiary country. This is a very straightforward remittance and doesn't require much prerequisites except that both remitter and beneficiary should have a valid identification credential. The flow for cash-to-cash service is illustrated in Fig. 6.1.

Direct Credit to Bank Account

This mode of remittance is primarily aimed at banked customers and has its limitation, where the pre-requisite is that the beneficiary should have a bank account. It is observed that not all beneficiaries have an account in the developing country, although the situation is changing due to financial inclusion initiatives by regulatory bodies in ensuring banking for all by removing the pre-requisite of minimum bank balance to be maintained in the account.

- *Direct Credit to Bank Account* via *MTO:* The process is no different, as illustrated under 'Cash Pick Up: Remittance Transaction Flow'; the difference is only the pay-out mechanism whereby instead of cash disbursement, the funds are directly credited into the beneficiary's account. The generic transaction flow is illustrated in Fig. 6.2; however, it may differ based on MTO:
- *Direct Credit to Bank Account* via *SWIFT:* This is a traditional and popular remittance service carried out by Banks/Financial Institutions using The Society for Worldwide Interbank Financial Telecommunication (SWIFT). It provides a secured and reliable network that enables financial institutions globally to send and receive

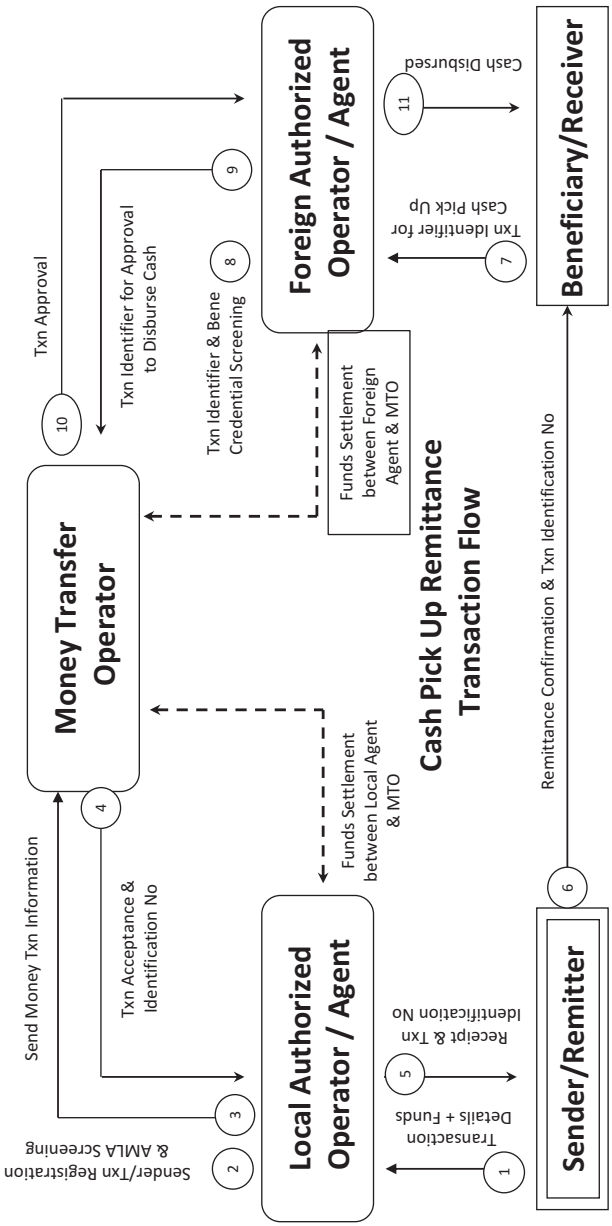

Fig. 6.1 The flow for cash-to-cash service. (Source: Author own)

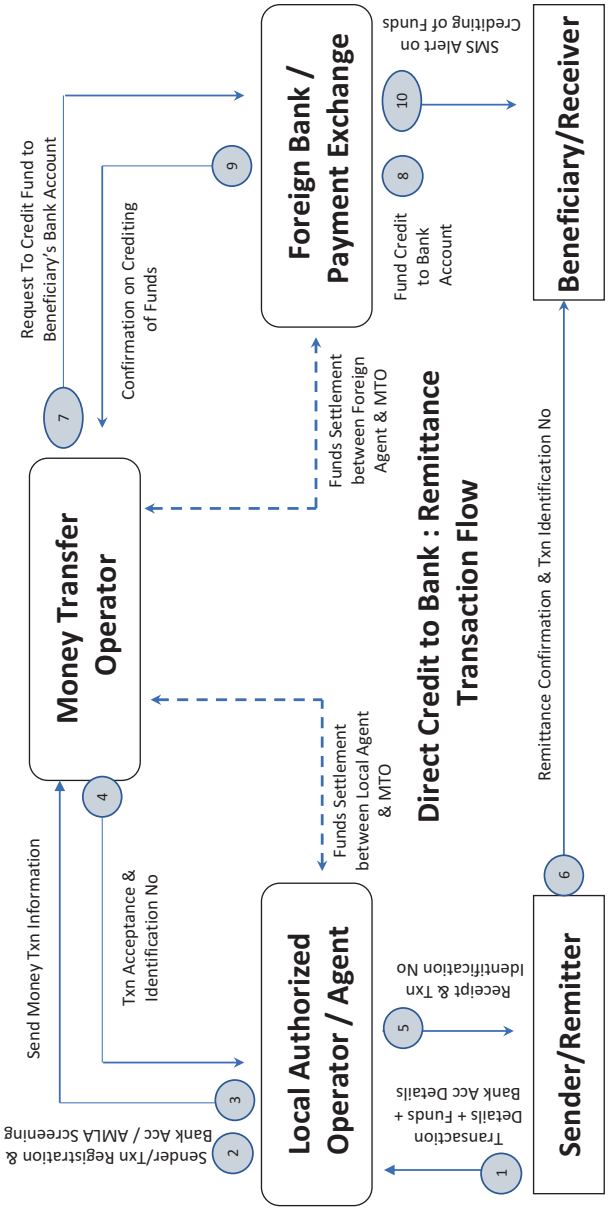

Fig. 6.2 The Flow of Direct Credit to Bank Account via MTO. (Source: Author own)

financial transactions. It is important to know that SWIFT does not facilitate funds transfer; but SWIFT sends information payment orders, the fund payment is settled by using correspondent accounts or Intermediaries. SWIFT network provides convenience for money transfer for Individual and corporates; however, it has its limitation where it is pricey, especially remittance for low transaction value and the timing in crediting of funds, which can range to a few days depends on the number of intermediary banks. In the event the SWIFT transaction must go through multiple intermediary banks, each of them normally will levy their own fee and it will make it expensive for remitter. Irrespective of the limitation, Banks use SWIFT for processing global payments as it is highly secured and globally accepted across all Financial Institutions. The generic and simplified transaction flow is illustrated in Fig. 6.3 for easier understanding.

Banks are also now connecting directly with the correspondent banks in an overseas country to expedite the remittance directly and without using SWIFT network as it provides cost advantages and speed in crediting of funds into beneficiary account.

Direct Credit to Wallet or Prepaid Cards

This mode of remittance is becoming popular whereby beneficiary holds an account with Electronic Wallet or Prepaid Card service provider. This kind of remittance is largely practised through MTO, whereby MTO relates to Electronic Wallet or Prepaid Card service provider. There is no change in flow; it is like the flow as illustrated under 'Direct Credit to Bank Account via MTO' in Fig. 6.3. The only difference is that instead of crediting to bank account, the funds are credited to an electric wallet account or prepaid card. The prepaid card can be used at any bank to withdraw the cash and even an electronic wallet account allows collecting of cash at any of the authorized agents of the Wallet service provider.

Click-and-Portal-Based Digital Remittance Models

In the traditional remittance models, there were some gaps between the remitters' experience and expectations. The expectation from remitter is low transaction cost, convenience, no landing charges or no deduction from beneficiary's receiving amount and speed in the end-to-end

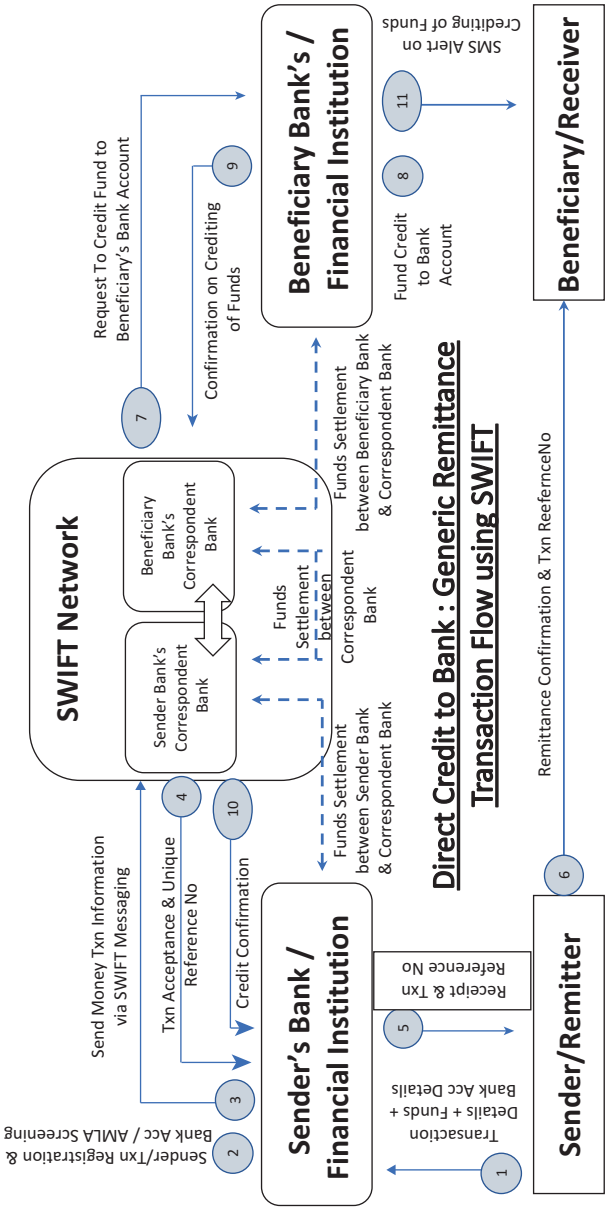

Fig. 6.3 The Flow of Direct Credit to Bank Account via SWIFT. (Source: Author own)

remittance process. These gaps were identified by FinTech companies and they found an opportunity to relook into the remittance model using technology and gain a foothold by lowering processing charges and passing savings on foreign exchange rates to make it further attractive. 'Digital' is an umbrella comprising of channels such as 'mobile' and 'online' channels for sending money instead of visiting branches and bypassing costly brick-and-mortar-based networks. Digital remittance is causing disruption to the traditional remittance industry and tech-savvy remitters are increasingly preferring digital remittance. The availability of high-speed data networks and consumer behaviour are amongst some of the key factors fuelling the demand for digital remittance. It is also observed that the cost of sending money home digitally has been shown, on average, to be 50% lower than using traditional channels (Abu Sammy, 2018). Digital remittance is facilitating an opportunity to win, serve, and retain the remittance customers by offering convenience, efficient, secure, and engaging experiences. The common digital mode of remittances offered is explained below.

Online and Mobile-Based Remittance Models Using Bank Account

Online Remittance service provider (ORSP) is practising digital model for remittance. There is no standardized business model for digital remittance. The common approach amongst online models is to avoid a middleman for transaction processing, instead of having a direct relationship in foreign countries either directly by obtaining a license in the respective country or partnering with the licensed agents in respective countries. This gives them a direct option without using MTO as the middleman and enables them to keep the charges low and offer better exchange rates, which makes it attractive for remitter. ORSPs do not accept cash to make their operations more cost-effective for customers. For the collection of funds from the remitter to perform the remittance, the Online and Mobile remittance platforms are integrated with Payment Gateway or with local Bank's Payment system to debit the remitter account and credit the ORSP's bank account to initiate the remittance. There are many service providers in this space, such as Remitly, which practise digital approach to remittance. The differentiator from conventional remittance model is that offering of low charges, better locked-in exchange rates, and user-friendly experience via their website or mobile app. Other examples of new remittance start-up companies include WorldRemit, MoneyMatch, and

TransferWise, following digital approach to remittance. In addition to the cost-benefit, speed in transaction processing, it also enables cashless remittance, which is in line with the initiative of regulatory bodies and to meet stringent AMLA (Anti Money Laundering) requirement on the identification of the source of funds.

Mobile-Money-Based Remittance Models Using M-Wallet

Mobile Remittance platform enables a low-cost and flexible remittance service which is based on Mobile Money. Mobile money involves customers using mobile phones and electronic money ('m-wallet') to perform remittance (Greenacre, 2013). The remitter deposits money with an 'm-wallet issuer', which is usually a non-banking institution such as Mobile Money Operators (MMOs) or an internet or telecommunications company also known as Mobile network operators (MNOs), in exchange for physical cash or funds debited from remitter's bank account. Remitter will also have the option to convert the funds from 'm-wallet' into physical cash through the authorized agent/branch network. Mobile money also serves as a gateway to financial inclusion, enhancing the impact of international remittances as per the latest report published by Groupe Speciale Mobile Association (GSMA, 2017). The remitter can perform the following modes of remittance using Mobile Money:

- Mobile to Mobile: This is a very straightforward remittance, whereby funds are debited from the remitter's mobile wallet account and is credited to the receiver's mobile wallet account. The MTO will receive a request for remittance from a remitter's 'm-wallet' service provider for easy reference 'local m-wallet'. The information will be provided along with the beneficiary's 'overseas m-wallet' details and the transfer amount. The MTO will provide the charges and the amount that will be received by the beneficiary on a real-time basis and upon confirmation from the remitter, the 'local m-wallet' will be debited. The MTO will then initiate a credit to 'overseas m-wallet' service provider on a real-time basis and the beneficiary m-wallet will be credited and normally there will be SMS alert for notification on the crediting of funds to both remitter and the beneficiary. The beneficiary can go to any access point such as Agent or Branch or ATM to get physical cash or can also use electronic money for any purchasing. The generic transaction flow is illustrated in Fig. 6.4.

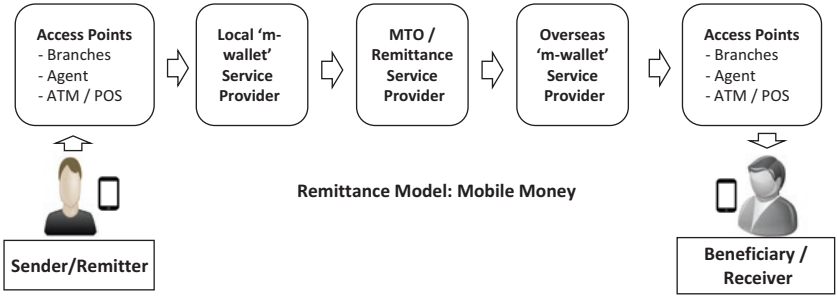

Fig. 6.4 The Flow of Mobile to Mobile. (Source: Author own)

- Mobile to Cash: This model is used where Remitter is using 'local m-wallet' service provider for remittance; however, the beneficiary doesn't have any m-wallet account in the receiving country. Under this model, the funds will be debited from the remitter's mobile m-wallet account and the payment will be done via using the network of foreign agents. This model is no different from the 'Cash Pickup' model; the only difference is that the initiation of fund transfer uses mobile money instead of physical cash or bank account. The generic transaction flow is illustrated in Fig. 6.5.

Cryptocurrency and Blockchain-Based Remittance (ReBittance)

Cryptocurrency is the by-product of digital cash, conceptualized and invented by Satoshi Nakamoto, the inventor of Bitcoin which is the first and the most important cryptocurrency. It is a peer-to-peer electronic cash system with a unique feature of completely decentralized (Nakamoto, 2017). The word 'crypto' refers to the encryption or cryptography that the instrument is built on and then added to a blockchain database. The 'currency' here refers to the recognition of the instrument as a medium of exchange amongst its users (Abu-Bakar, 2018). The concept behind cryptocurrency is like peer-to-peer networks used for file sharing. Cryptocurrencies are universal currency and not controlled by any centralized authority such as Government or Bank, etc. That means anyone in the world is free to buy and sell cryptocurrency. In a simplistic manner, a cryptocurrency is a digital or virtual currency designed to work as a

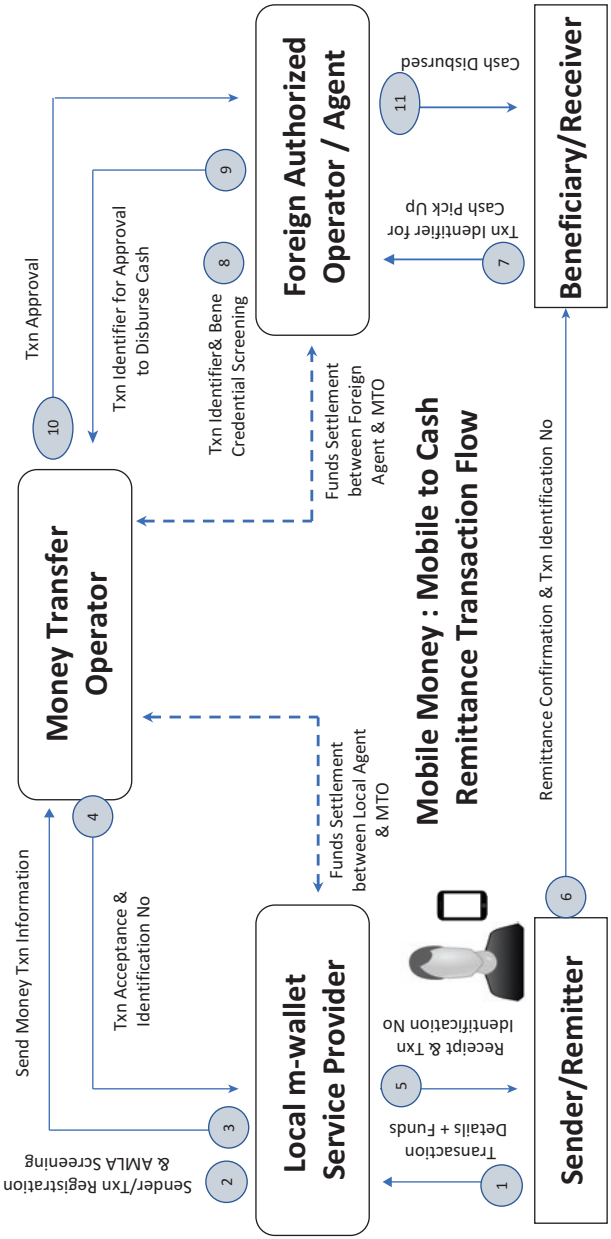

Fig. 6.5 The Flow of Mobile to Cash. (Source: Author own)

medium of exchange. It uses cryptography to secure and verify transactions as well as to control the creation of new units of a cryptocurrency (Cointelegraph.com, n.d.).

The technology used behind cryptocurrency is the blockchain, where there is a public ledger with blocks (information) of all transactions that ever happened within the network added block by block in chronological order, available to everyone connected to the network. Bitcoin is the foremost implementation of blockchain technology. Everyone in the network can see every account's balance held in a wallet, also known as public keys (wallet); any change or new block has to be approved by all, which makes it non-hackable. All cryptocurrencies are held in a wallet and it must be signed by a private key for the cryptocurrency wallet holder to initiate any transfer. This follows a cryptography approach and transaction is broadcasted on the blockchain network and needs to be confirmed by all participants to make the transaction unforgeable and irreversible.

Cryptocurrency for remittance is becoming a competitive option in comparison to fiat-to-fiat money transfers. Remittance backed by blockchain technology, instead of the traditional model based on a centralized network, is also called ReBittance. The cryptocurrency is decentralized and means that blockchain transactions can bypass the network of financial middlemen built-up over decades for crediting funds to the beneficiary. Blockchain makes the remittance transaction cheaper by cutting out intermediary banking costs and the transfer can be completed in minutes. There are various remittance models using cryptocurrency, whereby beneficiary can either retain the digital currency or can convert into fiat currency. Alternatively, with the growing acceptance, the digital currency can also be used at the merchant outlet for payment of goods and services. The remittance using cryptocurrency and blockchain will be as easy as giving cash to a friend, that is, punch in coin numbers on a smartphone and credit it to the beneficiary, it would be as spendable as coins in our pockets.

Figure 6.6 illustrates that using blockchain eliminates middlemen or banks from the picture and makes remittance simple, and this would make any such transfer more cost-effective. In general, the conventional remittance takes time in processing and depends on the remittance model, however, in the case of ReBittance it happens on a real-time basis. Another advantage of ReBittance is the near elimination of intermediary fees especially when the transfer is happening in cryptocurrency. The sender needs to pay a small transaction fee for cryptocurrency transfer to be added to the blockchain. However, this fee is minuscule (cents on the dollar,

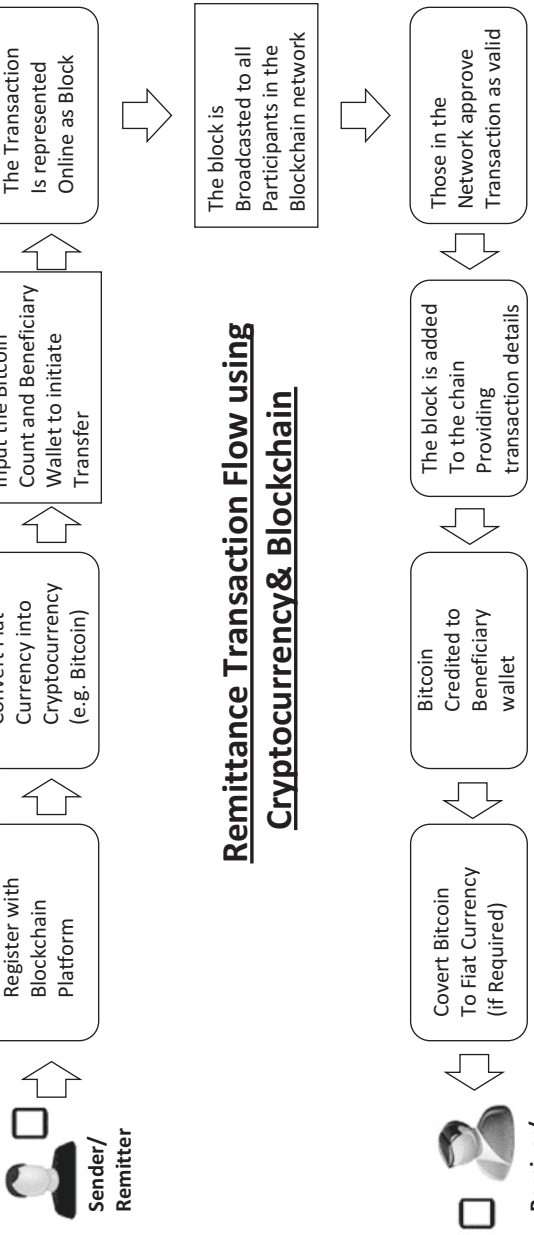

Fig. 6.6 The Rebittance Transaction Flow using Cryptocurrency and Blockchain. (Source: https://fintuned.net/. Adapted and enhanced further to illustrate the process)

usually) (Fuller, 2018). This transfer mechanism using cryptocurrency circumvents banks' transaction fees. Start-ups such as Bitspark in Hong Kong, and Bloom, Payphil, coins.ph and Satoshi Citadel Industries' (SCI) remittance unit Rebit in the Philippines, are trying to turn that into a business model (Reuters, 2018). "BitPesa is another blockchain-based platform able to receive local currency directly, which it then sends in bitcoin to a digital broker who then deposits it as local currency in the receiving country. Regular money transfers would involve at least one deposit within a correspondent bank" (Edwards, 2016). The result is a cheaper transaction (charges run between 1 and 3% of the transaction), faster (same-day crediting), transparent, and efficient. More and more FinTech companies are now pursuing the ReBittance model due to its various tangible benefits; although it is still in a nascent stage in winning acceptance from the masses, including regulatory bodies, but promises massive potential in the future.

Cryptocurrency and Blockchain and Islamic Finance

Cryptocurrency and blockchain are making inroads in the financial sector including Islamic Finance. Islamic Financial Institutions are jumping on the bandwagon, although in the early stage of catching up with the digitalization wave, to offer efficiency, convenience, and a better experience to the customers. The buzz word is digitalization; however, in practice it could be launching of a new app such as mobile banking or could be new channel creation for customer acquisition or even automation of current processes or business models. There are now initiatives on the implementation of blockchain and use of cryptocurrency amongst Islamic financial institutions and it is still at the very infancy stage. Islamic Finance is governed by Shariah (Islamic Jurisprudence) and the holy book *The Quran*, which goes beyond interest (Riba)-free banking, speculative (Gharar) investments, and is based on pr convenience, and a ofit and return sharing principle.

FinTech, pursuing cryptocurrency and blockchain technology embedded with the Islamic values of trust, justice, equality, and efficiency into banking and remittance promotes the true spirit of the Shariah. The early adoption of the latest technology will help in gaining competitive advantage over conventional counterparts rather than playing catch-up by replicating soon-to-be-outdated conventional practices.

Digital disruption aims at creating faster, convenient, efficient, and cheaper financial services that will be an essential part of the Digital Financial Economy. Islamic Financial Institutions are leveraging on FinTech driven solutions to be part of the digital wave. In fact, the UAE already has a Bitcoin exchange by the name of BitOasis and they also offer services like Bitcoin Wallet. BitOasis also offers services in Qatar, Kuwait, Bahrain, and Saudi Arabia. There are also services in the APAC region like Bitcoin Indonesia and Coinbox in Malaysia that offer Bitcoin-related services. (Cointelegraph.com, n.d.)

Gharar-Free ReBittance in Practice

Remittance based on blockchain and cryptocurrency is something which Islamic Financial Institutions and FinTech companies need to explore with the understanding that it complies with the requirements of the Shariah. The concept of blockchain technology is in compliance with Shariah principles as it is based on computational and mathematical applications with no prohibited elements within its content. It also eliminates the presence of Gharar from transactions since its verification process is strong and transparent for all participants on the network and with a proper trail. In addition, when cryptocurrency is being used for remittance along with blockchain then the transaction is processed on a real-time basis and there is no element of the speculative (Qimar) in the transaction. The entire transaction flow using blockchain promises transparency, trust, and efficient environment for the processing of remittance.

There has been much advancement in the implementation of blockchain and cryptocurrency in Islamic finance. Hada DBank is a digital Islamic Bank based on blockchain and cryptocurrency, which is founded upon the tenets of Islam and which ensures services follow Shariah. They also offer remittance services, that is, Free Transfer/Remittance of funds (FIAT & Cryptocurrency) between personal savings accounts and e-wallets. In addition, 0% fee on exchange transactions via HADA Exchange (between cryptocurrencies) and no charges on major fiat currencies during the conversion of Fiat to Crypto and vice versa (Hada DBank, n.d.). Al Rajhi Bank (ARB), the world's largest Islamic Bank, has also completed a secure, cross-border money transfer using Ripple Blockchain Technology. This successful transaction marks the first time the technology has been used in Saudi Arabia. The Kingdom of Saudi Arabia is the second leading country for remittance in the world. Al Rajhi

Bank specifically is the leading bank in the region for remittances, with over 200 remittance centres across the kingdom (Al Rajhi Bank, n.d.). There has been much advancement in MENA to embrace the blockchain and cryptocurrency technology (Askar, 2018):

- Dubai has created the FinTech Hive accelerator, and the Innovation Testing Licence, a regulatory sandbox.
- Abu Dhabi has launched the RegLab, also a regulatory sandbox.
- Bahrain has launched a Regulatory Sandbox, a FinTech Unit for the central bank, and FinTech Bay, planned for rollout in February 2018, expected to be the largest FinTech hub in MENA.

The above initiatives will further strengthen the adoption of blockchain and cryptocurrency technology in the MENA region. According to Ernst & Young, FinTech products have the potential to attract 150 million customers to the Islamic banking sector by 2021 (Al Awar, 2018). This shows there is potential, and it is now up to Islamic Financial Institutions and FinTech to apply the Islamic model to become part of this forward-looking vision with agility to respond to the new opportunities.

Conclusion

Clearly, the blockchain and cryptocurrency bring many advantages and it can't be ignored. It has opened many opportunities to banking practitioners and customers, going beyond remittance in the area of Islamic finance such as crowd financing, etc. Digitalization of remittance clubbed with blockchain and cryptocurrency will bring trust, transparency, savings, and efficiency for customers. This is in line with the Islamic Financing initiative of banking for all under the 'financial inclusion' umbrella, representing and complying with the values of Islamic principles. In addition, the technology behind blockchain reduces the transaction risk as it is highly secured, un-hackable, and with a proper trail. However, more in-depth research is required concerning blockchain and digital currencies to ensure compliance with shariah principles and the absence of the gharar element. There are still mixed views on permissibility due to the principle of gharar. This concern can be addressed, whereby cryptocurrencies are not used for investment or speculation but for carrying out international money transfers and remittances.

Currently, ReBittance isn't a preferred option in comparison with fiat-to-fiat money transfers. The possible reasons are low awareness on understanding of cryptocurrency amongst migrant workers. The convesrion of fiat currency to crypto currency and vice versa using blockchain remittance platform could also be expensive or take longer time as it depends on the blockchain remittance platform and also the regulations. In addition, there is the legality issue of cryptocurrencies, its limited acceptability and not being recognized as legal by regulatory bodies due to its complete anonymity, which may lead to tax evasions or money laundering. However, the acceptance of cryptocurrency is increasing especially due to the saving on charges and convenience. In MENA, the initiative to strengthen the adoption of blockchain and cryptocurrency is providing room for innovation and is under the supervision of regulatory bodies to ensure compliance with regulations and legal frameworks. The blockchain is being embraced enthusiastically within the financial services industry and Islamic Financial Institutions are aware that they need to evolve with the changing times. There are projects which are in experimental or in pilot stages which are paving the way for wider adoption of blockchain and cryptocurrency in the MENA region.

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CHAPTER 7

Regulatory Issues in Cryptocurrency Usage

Abdolhossein Zameni and Nafis Alam

Introduction

Without innovation and technology that mankind brought to our daily life, we still would have been living in the Stone Age. But humankind during the ages learned how to find its way through, by inventing new tools and technology and keep doing it at a faster pace for mankind development. Therefore, these innovations have created a revolution in different business disciplines and have reformed all the industries such as financial markets, supply chains, consumer and business-to-business services, and publicly held registers.

Cryptocurrency, which is one form of the disruptive technology, is created to serve the economy in various ways different from conventional systems, like immediate settlement, lower fees, no identity theft unlike a

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credit card, access to everyone, decentralization and universal recognition. Other examples of disruptive technologies are the internet of things (IoT), artificial intelligence (AI), blockchain technology amongst others (Cag, 2015). Cryptocurrencies were designed to have a revolutionary role in the economy and serve everyone in equal and fair way, but currently, it is thought as a financial asset to make quick gains which are creating another chaos for customers/investors. Another important concern is the regulation and monitoring of the cryptocurrencies; due to crypto's decentralized nature it is getting difficult for the lawmakers to regulate its activities.

In recent times, blockchain and cryptocurrencies became too big to ignore, which also led to contrasting opinions regarding its current usage and future application. Supporters of cryptocurrencies believe that cryptos should function freely across the borders which should not be regulated by any financial watchdogs. Contrarily, critics of other members have a slightly different opinion. They see the regulation as both unavoidable and needed. Given this, they wish the bitcoin community's interest and arguments to be represented and heard in government (Narayanan et al., 2016). The value of the cryptocurrencies comes from the user's trust as if they receive it as payment, they would be able to use it somewhere else to buy something they want or need. By knowing the fact that bitcoin is not the only cryptocurrency available in the market, reasons amongst others that make the bitcoin stand out from the rest are its network effect, proven security, and accessibility (Song, 2017).

Cryptocurrencies (crypto) do not appear to be an established and mature form of currency in its current form. Further evolution in capacity and acceptance would supposedly improve this situation. But the users dealing with cryptocurrencies are encountered with more resonate issue. Who will protect crypto investors at times of conflict or legal issues? Regulators and central banks, who are still undecided about the actual form of cryptocurrencies whether to classify as a commodity, an asset or a form of currency, provide little or no solution when it comes to cryptocurrencies management.

This chapter aims to evaluate whether the existing and upcoming disruptions brought by cryptocurrencies would require the vigilant eyes of regulatory bodies and, if so, in what capacity. In addition to the first aim, we intend to investigate the benefits and drawbacks of the cryptocurrencies evolution and evaluate whether the evolving crypto regulation is enough to protect its users and investors alike. Despite its benefits to the economy, cryptocurrencies have a long journey ahead before being a

proper replacement for credit cards, fiat currencies, and legal tender as if it is going to be used as a tool for global commerce. The significance of the study is to shed light on how to fully understand the made promises of the cryptocurrencies to the global economy and understand its role in the global financial system by evaluating the current regulations surrounding cryptocurrencies globally. Even though there have been numerous industry-based reports on the cryptocurrency regulation (Blandin et al., 2018; Ziegler et al., 2018), there is a limited academic discussion on the topic. We hope this chapter will provide substantial value to academics, practitioners, policymakers, and regulators alike.

Cryptocurrency Price Determination

The broad response to "why this price?" is "supply and demand, greed and fear" of investors. Equilibrium price happens at the intersection point between the buyer's demand and seller's supply. Given this, many of the initial adopters were intelligent or fortunate enough to earn, buy, or mine the massive amount of bitcoin before its value appreciation. The demand for bitcoin amongst the public has been further accelerated by banking blockades and normal currency crises (Buy Bitcoin Worldwide, 2017).

Analysing price interdependence is essential not only to explain relationships between different asset prices but also to realize whether prices in different markets rapidly react to each other or, in other words, whether markets are efficient. The paper by Brandvold et al. (2015) is the first paper that studies the price discovery process in bitcoin markets by employing econometric models. Their results show that a higher fraction of the price discovery happens at exchanges with higher trading volume and highest information share like Mt.Gox and BTCe.

Given the importance of price discovery mechanism, the study of Giudici and Abu-Hashish (2019) aims to understand the relationship among different cryptocurrencies and on other asset prices. Giudici and Abu-Hashish (2019) consider a multivariate statistics viewpoint, which concentrates on the interdependence among crypto prices or on those between crypto prices and classic market prices. Their analysis shows that bitcoin prices are typically unrelated to classical market prices. This is to support the "diversification benefit" property of crypto assets. But investors need to be aware of the idiosyncratic risk of cryptocurrencies that is difficult to hedge against (Corbet et al., 2018). In this context, Bouoiyour and Selmi (2015), Bouoiyour, Selmi, and Tiwari (2015), Kristoufek

(2015), Ciaian, Miroslava, and D'Artis (2014), Van Wijk (2013) and Yermack (2013) found that there is a potential influence on bitcoin price fluctuations in the long term which can be extended to other cryptos too. These contributors include supply-demand fundamentals, the exchange-traded ratio, the monetary velocity, equity market indices, exchange rates, oil prices, and the estimated output volume.

Misuse of Cryptocurrency

Due to the lack of coherent and consistent domestic and global regulation on cryptocurrencies, the immaturity of cyber-security, and the advent of technology, cryptocurrencies are the prime target of hackers and criminals. Because of the abovementioned fact, cryptocurrencies are used by scammers such as Shady exchanges, Pyramid and Fraud (Ponzi Schemes, Phishing), Pump and Dump, Initial Coin Offerings (ICOs), and Coin does not exist (Phillips, 2017).

Besides, other illegal uses of cryptocurrency are listed as online black markets, money laundering[1] (e.g., cyber-criminals, drug trackers, child pornographers, and other deleterious actors) (Affairs, 2012), unethical hacking, terrorist financing, crypto extortion, and exploitation of women and children (Arora, 2017). The recent research by van Wegberg, Oerlemans, and van Deventer (2018) shows mixed results about the usage of bitcoin in money laundering. "Some of the examined services provide an excellent, professional and well-reviewed service at a competitive cost. Whereas others turned out to be scams, accepting bitcoin but returning nothing in return" (van Wegberg et al., 2018).

Given this, some of the prominent cryptocurrency's frauds are discussed in brief. A Chinese bitcoin trading platform (GBL), suddenly shut down on October 26, 2013, and subscribers could not log in and lost up to US$5 million worth of bitcoin (Shubber, 2013). In February 2014, the world's largest bitcoin exchange, Mt. Gox, declared that it had lost nearly US$473 million of their customer's bitcoins probable because of theft and price of a Bitcoin dropped from US$1160 in December to under US$400 in February.[2] "If you are starting an exchange and you

[1] https://www.imf.org/en/Publications/Policy-Papers/Issues/2016/12/31/Financial-System-Abuse-Financial-Crime-and-Money-Laundering-Background-Paper-PP128

[2] https://gmt-crypto.com/en/the-history-of-cryptocurrency/

lose clients' money, you or your company should be 100 percent accountable for that loss. And right now there is nothing like that in place" (Roberts, 2017).

The Drug Enforcement Administration and the US Secret Service were charged with wire fraud, money laundering, and other offences for allegedly stealing bitcoin during the federal investigation of Silk Road, on March 31, 2015. The owner of the now-defunct GAW Miners website was accused of securities fraud following his development of the cryptocurrency known as Paycoin,[3] on December 1, 2015. On August 24, 2016, a federal judge in Florida certified a class action lawsuit against defunct cryptocurrency exchange Cryptsy and Cryptsy's owner. The Cryptsy's owner was accused of misappropriating millions of dollars of user deposits, destroying evidence, and is believed to have fled to China.[4] Japanese consumers reported 33 cases of cryptocurrency-related fraud in the first seven months of 2017, signifying more than half a million dollars worth of losses. According to the National Policy Agency (NPA), roughly ¥76.5 million (US$710,848) was lost in fraud-related thefts between January and July. The rate of the complaints seems to have increased as the year progressed, conforming to the growing cryptocurrency market, with ¥17.3 million reported stolen in July alone (De, 2017).

There are lists of unsavoury practices that are banned in conventional security exchanges to prevent financial market manipulation but are prevalent in crypto's environment. Faking trading volumes to pumps the price, wash trades, spoofing, painting the tape, front-running, or insiders with access to the database trading on their own. Ironically, each of these illegal activities is possible in different crypto exchanges (Coppola, 2018).

Regulatory and Policy Implications

Before moving to the regulatory need for cryptocurrencies, it is essential to pay attention to the potential and challenges of wider cryptocurrency adoption. Central banks, government, and finance department of different countries are studying digital cryptocurrencies as electronic distribution of digital cash brings in potential efficiencies in capital markets and reduce fraud in trade finance (Probst, Frideres, Cambier, & Christian

[3] https://gmt-crypto.com/en/the-history-of-cryptocurrency/
[4] https://gmt-crypto.com/en/the-history-of-cryptocurrency/

Martinez-Diaz, 2016). Digital currency, unlike physical cash, uses a ledger of transactions that is absent from physical cash (Walport, 2015).

Finding the best equilibrium between governance and regulation, and between legal code and technical code, require lawyers, mathematicians, and computer experts to work together to rectify most of the critical matters (Lessig, 2006). In the case of the digital world, there are two sets of rules or codes that control the operation of digital technologies. The first is the classical set of rules provided by the legislative framework, the code of law and regulation. The second is the set of rules that determine the operation of the algorithms encoded by the software (Kroll, Davey, & Felten, 2013). This is the technical code, and there needs to be at least as much focus on ensuring the rigour of the technical code as on legislative code.

Many unsolved security and technology challenges should be tackled before the full potential usage of cryptocurrency is achieved. There is also a wonderful array of opportunities to develop algorithms that will add complexity to ledgers by supporting smart contracts, signatures, and other applications (Probst et al., 2016). This arena is emerging quickly, and many of these glitches are already being investigated and, in some cases, solved. If government delays for perfect resolutions, it will miss the opportunity to form and procure executions of the technology that will provide maximum value to both the public sector and economic (Walport, 2015).

There is also a growing need for regulating cryptocurrencies if the regulators across the world would like to tackle the misuse of the cryptocurrencies. The primary concern for regulators is to keep a track on the transaction involving criminal activities which use cryptocurrencies as a mode of the payment. Untraceable digital cash-like cryptocurrencies make sorts of crimes easier, crimes like kidnapping and extortion that contain ransom payment. Those crimes would be easier when payment can be completed at a distance and anonymously, making it difficult for the law enforcement to track the money.

Likewise, tax evasion would become easier when it is less challenging for criminals to circulate money around and to involve in transactions that are not easily tangled to a specific person or entity. Another key problem is money laundering. The objective of the anti-money laundering policy is to stop enormous flows of money from crossing borders or moving between the underground and genuine economy without being discovered. Anti-money laundering is meant to make some sorts of crime more difficult, particularly organized crime. Governments try to stop money

laundering by applying some laws under Know Your Customer (KYC), like identify and authenticate clients, evaluate the risk of the client, watch for the anomalous client and mandatory reporting for companies in a broad range of sectors, reporting currency transactions that are over US$10,000 (Bank Secrecy Act 1970).[5]

There has been increasing demands for a more global discussion on cryptocurrencies. According to the head of the International Monetary Fund (IMF) Christine Lagarde, "It's only a matter of time before cryptocurrencies come under government regulation." She also mentioned to CNN Money that "It's inevitable and it's a domain where we need international regulation and proper supervision." She also noted that "there is probably quite a bit of dark activity [in cryptocurrencies]." Lagarde also mentioned that The IMF is actively trying to prevent digital currencies from being used to launder money or finance terrorism. She said regulators need to focus less on entities and more on activities—who is doing what, and whether they are properly licensed and supervised (Tessier, 2018). Also, French and German finance ministers noted that digital tokens "*could pose substantial risks for investors*" and potentially long-term financial stability. They called for greater protections for retail investors speculating in crypto (Anisimov, 2018).

Governance Versus Regulation

Regulation is not that famous, particularly among the people who are inclined to like cryptocurrency. As different types of regulations primarily govern the current financial system and distributed ledgers, we must, therefore, ask the question: who makes the rules?

a. Current financial system: a mixture of private and public rulemaking:

There are numerous places where the legal code is being created in the current financial system, but these can be generally divided into two categories: private rulemaking (governance) and public rule-making (regulation).

The design of the public legal code in the current financial system is the province of policymakers who have to consider the effect of regulations on the different institutions of the financial system as well as the impact on

[5] https://www.fdic.gov/regulations/examinations/bsa/basics2.html

the system as a whole (a 'macroprudential' approach) (Haldane et al., 2015; Leger, Kepple, & Leinwan, 2014). As the financial system is global, international bodies such as the Basel Committee on Banking Supervision convene policymakers from around the world to reach voluntary accords that can then be translated into legislation in a specific jurisdiction.

b. Distributed ledger systems (permissioned and un-permissioned DLSs):

In the case of bitcoin, the software is governed by an ad hoc process involving a handful of informal institutions and power holders. The software is open-source, and anyone can suggest changes to it, but the technical authority to admit modifications to the official version of the software is held by a team of five core developers appointed by Gavin Andresen (Trautman, 2014). This governance process worked well when the changes to the code were uncontroversial bug fixes, but it has started to show signs of breaking down recently because some decisions require choosing which stakeholders' interests to prioritize over others' (Walport, 2015). Gavin Andresen and others have stated that the process needs to become more formal (Buntinx, 2015). The community is debating what such a formal governance system should look like, but this is complicated by the fact that it was founded on an ethos of anti-institutionalism. This is an interesting conundrum, as it demonstrates the worth of legal code and shows that technical code alone does not produce an optimal outcome. In contrast to conventional private financial networks like Visa, un-permissioned distributed ledger systems like bitcoin lacks a central legal entity with formal responsibility for the system.

If these systems are to grow in value and influence, they will most likely need to develop more robust internal governance processes. In this context, Yeoh (2017) noted that the lack of a central legal entity also makes it more challenging for public regulators to regulate distributed ledger systems via legal code. Governments should, therefore, consider ways of regulating distributed ledger systems by influencing the technical code that defines their rules. In finding the right blend, the government should consider the strengths and weaknesses of both technical code and legal code, recognizing that the two interact and should be designed accordingly. Policymakers should recognize the influence of technical code on the financial system and consider how such influence could be made part of the regulatory system, with potential benefits such as lower compliance costs (Lessig, 2006).

There are many unsolved issues which need to be tackled before adopting the blockchain, distributed ledger, and related financial technology. The government has a significant role to play in designing security and privacy in the FinTech industry. The government to protect investors needs to work closely with academia and industry to ensure the standards are set for the integrity, security, and privacy of distributed ledgers and their contents (Palmer, 2016). These standards should be incorporated into both regulatory and software code.

Cryptocurrency Regulation Around the World

An ambiguous regulatory situation makes it tough to function and use cryptocurrencies in many jurisdictions. Additionally, the absence of regulatory outline hampers product development and service provision in cryptocurrencies as the ambiguity makes such an endeavour high risk. The absence of regulation surrounding virtual currency upsurges the potential of crypto being used for darknet activities, tax evasion, money laundering, and terrorist financing. Virtual currencies, generally, pose a challenge to regulators as cryptocurrencies syndicate the properties of currencies, commodities, and payment systems.

In 2016 the European Parliament's proposal to set up a task force to monitor virtual currencies to combat money laundering and terrorism, passed by 542 votes to 51, with 11 abstentions, has been sent to the European Commission for consideration (European Parliament Press Room, 2016). The European Commission also offered a "parallel" proposal aimed at stopping tax evasion practices as discovered in the Panama Papers (del Castillo, 2016). In 2017 it was publicized that the proposal will involve cryptocurrency exchanges and cryptocurrency wallets to recognize doubtful activity (Coleman, 2017). Previously, some African countries like Algeria (Zitouni, 2017), Nigeria, South Africa, Namibia, and Zimbabwe did not have a clear stand regarding the legality of the bitcoin. But, recently in 2017, the Central Bank of Nigeria and Bank of Namibia has passed a circular to advise their banks that bank transactions in bitcoin and other virtual currencies have been banned and cannot be accepted as means of payment for goods and services in Nigeria and Namibia (Opeyemi, 2017) (Bank of Namibia, 2017).

On the other hand, North American countries like Canada (Openparliemnt.ca, 2014), US (United States Department of the treasury), and Mexico have a clear stand and regulations about the usage and legality

of the bitcoin (Appel, 2014) (IRS, 2014). In these three countries, the usage of the bitcoin is legal. For example, Mexico made it legal as of 2017, and it is going to be regulated under the FinTech law. Furthermore, the Chicago Mercantile Exchange, the world's largest options and futures exchange has launched bitcoin trading by the second week of December 2017 (Sedgwick, 2017). Interestingly, bitcoin legality in South American countries is disputable. For example, Argentina, Brazil, Chile, and Colombia have not announced the usage of the bitcoin illegal, but they mentioned, it is not regulated (The Law Library of Congress, 2014), whereas Bolivia and Ecuador have banned bitcoin and other digital currencies (Cuthbertson, 2014).

Asia, especially the Middle East, governments of Israel (Wolf, 2014), Saudi Arabia, Jordan, and Lebanon (Knutsen, 2014) have not announced the usage of bitcoin or any cryptocurrency illegal, but they have issued a warning discouraging the announcement of not using the cryptocurrency as it is not regulated yet. Saudi Arabian Monetary Authority (SAMA) in July 2017 warned people of using cryptocurrency and cautioned crypto dealers of having no protection or rights. Russia acknowledged that cryptocurrencies are legal, but it is illegal to purchase goods with any currency other than the Russian Rouble.

Bangladesh in the year 2014 and Nepal in the year 2017 have declared bitcoin as illegal (Sanzblog, 2017). Bangladesh bank mentioned, "anybody caught using the virtual currency could be jailed under the country's strict anti-money laundering laws" (AFP, 2014). Besides, Nepal also mentioned that using virtual currency could have a severe consequence (Sanzblog, 2017). India (Anand, 2018) and Pakistan have not regulated the bitcoin. India and Pakistan reason that cryptocurrencies could be used for tax evasion and money laundering (Zeb Khan, 2017).

East Asian countries such as China (News, 2013), Hong Kong, Japan, South Korea, and Taiwan (Reynolds, 2014) have not announced the bitcoin as an illegal currency. Interestingly, holding and trading bitcoin and other cryptocurrencies in China is not illegal (Wenhao, 2018). China is now the first country in the world to develop and run its own national digital currency. Although, in the case of Japan, they legitimately recognize bitcoin and another sort of virtual currencies as a "means of payment that is not a legal currency" (Smart, 2016). The city of Hirosaki has officially accepted bitcoin donations to attract international tourists and finance local projects (Parker, 2017b). In 2017, Japan's government announced that bitcoin could be used as a method of payment (Parker, 2017a). Countries in other regions of the world, like

Southeast Asia, Central Europe, Eastern Europe, Northern Europe, Southern Europe, Western Europe, Australia (Hartge-Hazelman, 2013), and New Zealand have not announced the usage of cryptocurrency as illegal. Australia on July 1, 2017, has officially announced that it will consider the bitcoin just like money and it will no longer be subject to double taxation (Suberg, 2017).

Regulators across the globe from Japan to the United States to Australia are keen to keep pace with developments to ensure that existing laws are enforced to prevent illegal activity, such as money-laundering and financial crime. The countries as mentioned above are also enacting new laws to address the changing FinTech and cryptocurrency landscape. Such is the importance of regulating FinTech and digital currency landscape that it was included as one of the main agendas for G20 summit held at the beginning of 2017.

GCC Regulation

GCC states have adopted some of the most accepted and applicable Fintech regulations and standards within their own context to foster and quicken the penetration of the Fintech. Besides, GCC has put in place a series of forward-looking policies that helps enable the development of the Fintech industry. For instance, sandbox regulations set a legal framework for the live testing of small-scale innovations in a controlled environment. In line with this, the GCC region provides an attractive environment given both its light-touch regulations and leaders' ability to introduce and implement speedy reform.

According to Altoraifi (2019), "Government-sponsored sandboxes and incubators in GCC have surged since 2017. In January 2017, the Dubai International Financial Centre started FinTech Hive, while Abu Dhabi launched, in March 2019, Hub71 endowed with significant financial backing ($272m). Notably, Hub71 has sought to leverage its status by partnering with global tech giants, such as Microsoft and Softbank, to facilitate cooperation between venture capitalists, start-ups and regulators in Abu Dhabi". On a bigger front, Bahrain in order not to stay behind in the Fintech development competition has positioned itself at the forefront of the regulatory transformation. In the year 2017, Bahrain's central bank was the first to authorize Fintech companies to examine their products and services with clients.

At present, one of the main pending regulation in the GCC states is the approval of the law that allows small- and medium-sized enterprises

(SMEs) to raise financing through crowdfunding (either conventional or Sharia-compliant). Given the importance of the Fintech expansion, United Arab Emirates (UAE) has an interest in the blockchain development. In line with this, UAE has published its blockchain strategy in 2021 a few years back. This blockchain strategy aims to handle at least 50% of all government's transactions by 2021. If this aim is met, it will save the federal government an estimated $3bn per year by cutting down 77 m hours of work and reducing the size of government to the tune of $389 m. It would further save $1.6bn by shaving kilometres off driving distances (Altoraifi, 2019).

On the other hand, knowing all the benefits of the Fintech, still, Fintech industry in GCC remains marginal. Due to this issue, the Fintech development in GCC needs special care and initiatives by Governments and regulators to educate, create awareness, and pave the road for substantial players in the finance market. Given this, technology can boost financial inclusion in the GCC region. Awareness of fintech services among citizens in the Gulf surged to 84% in 2019, compared to 62% in 2015. This bodes well for the financial services sector, investment and development and, most importantly, financial inclusion. However, GCC states account for only 1% of the $90bn already invested in the sector globally. Therefore, for fintech to be successful, regulators need to develop an ecosystem that encompasses a raft of supplementary legislation, such as new investment laws and incentives to encourage not only investors but a broader base of customers which includes all segments of society.

Implications and Conclusion

It can be seen from the above discussion that cryptocurrency can revolutionize the payment system, but unstandardized and unstructured regulatory treatment is making some quarters to abuse the innovation. Crypto has emerged as a new financial asset class and without clear regulations, this innovation is being stifled by the likes of entrepreneurs, investors, and users. One of the key implications of crypto regulation will be that of building greater trust in the digital asset and digital asset exchanges. Regulations will also ensure that cryptocurrency businesses have adequate standards in place for the protection of customers and their funds. Crypto regulations will also bring clarity in its usage by protecting businesses and consumers.

An individual who would not intend to do illegal deeds spending normal currency could be benefited with the advantages of virtual currency because of its anonymity and low-cost attributes. Given the fact that no country or jurisdiction no longer can deny the existence, development, and expansion of the cryptocurrencies, it would be beneficial to all the stakeholders to acknowledge the emergence of the cryptocurrencies and start to address the associated regulatory issues of it as soon as possible to look after everyone's interest.

With all different occurrences in the crypto market, lawmakers noticed that cryptocurrency require more than computer algorithms. However, countless regulations defeat the main purpose of cryptocurrencies evolution, but there are advantages to regulation. Without proper regulations, exchanges can do some shady things, such as forgo ample security measures, misuse client's cryptocurrency, pretend fake hacks, or compromise on their website security.

Some of the suggested remedies to overcome regulatory challenges can be that regulators could develop guidelines on imposing costs on trading in cryptocurrencies. The regulatory charge should be accustomed to anonymity. For instance, the merchant should be permitted to receive cryptos by another side who discloses its identity by endorsing receipts of the transaction or by using a private identification number. Any cryptos that has not been revealed should be forbidden. This would not upsurge the transaction cost of using cryptocurrency against fiat currency. The system also can ask customers who choose to circumvent the regulatory expense to provide information with the same as other financial accounts. This information can be delivered to the merchant or to a third party to approve trades for the merchant. This action would offer some advantages as it would discourage criminals from misusing the virtual currency platform for criminal undertakings, as they should be careful of the regulatory expenses and disclosed identity. Further, if law-abiding customers are motivated to reveal their identities, the whole cryptocurrency platform will become more transparent.

Referring to the ecosystem of the cryptocurrencies, they are not issued, endorsed, or regulated by any central bank. Instead, they are generated through a computer-generated process, namely mining and these currencies do not exist in a physical form. Thus, it can be utilized for cross-border transactions with no exchange rate fees. These transactions should be executed through cryptocurrency exchanges which function 24/7. The bought currencies can be stored in the digital wallet. Perhaps finance

regulatory body of different countries or regions such as European Banking Authority (EBA), European Union (EU), ASEAN, and MENA amongst others can collectively come together under some international financial organizations such as IMF or World Bank and get the base right. It is important to consistently implement international standards agreed by international organizations on a country-by-country basis to minimize regulatory inconsistencies. Possibly, they can agree on how to regulate and protect the cryptocurrency exchanges and digital wallets no matter where they are from in terms of location. Maybe the organization can provide a master list of approved and reputed exchanges with their ratings, pros and cons, verification requirements and so on.

Moving forward, international authorities that oversee quality and quantity of cryptocurrency exchanges can keep track of those investors that intend to cash out their crypto and would be able to tax them. In contrast, maybe governments instead of investing resources on a new and unknown financial system tend to spend their effort and resources to amend and make the current and existing financial system efficient, less human involvements and more efficient.

Lawmakers should be quite cautious of imposing too much of limiting regulations on exchanges as it may deprive them of participating in the cryptocurrency market. Restrictive regulation can persuade exchanges to involve in illegitimate activities. This chapter highlighted the origin of cryptocurrency in conjunction with its numerous advantages and weaknesses. It has been observed how cryptocurrency is being misused for performing illegal actions due to the characteristics that make it appealing. Although, it is obvious to everyone that cryptocurrency is a revolutionary innovation, it is crucial to mention that the dark side use of it has created more concerns than benefits. It is critical to have an authority that can limit the crypto's abuse without upsetting its benefits as an effective payment method. We hope this study can provide significance to academics, practitioners, policymakers, and regulators alike.

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CHAPTER 8

Beyond the Jurisprudential Quagmire: Perspectives on the Application of Digital Currencies and Blockchain Technology in Islamic Economics and Finance

Evren Tok

Introduction: Background on Blockchain Technology and Digital Currencies

In recent years, digital currencies have received a great deal of attention, including hype and sensationalist coverage—both positive and negative. A digital currency can be considered a special case of the use of the distributed ledger technology (DTL), or blockchain; it is simply a limited entry in a database that cannot be changed without fulfilling specific conditions. The cryptocurrency consists of a decentralized network of peers who each have a record of the complete history of all transactions and thus a balance of every account. Each transaction is confirmed by cryptographers known as 'miners' who compete to validate each transaction such that it becomes

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an immutable record (on a block) that cannot be reversed through cryptography or solving mathematical algorithms. This validation system is known as 'proof-of-work' and leads to the ledger being collectively updated (Kiviat, 2015). The first miner to succeed in validating the transaction gets rewarded in new cryptocurrency for their time and computational power expended to validate the transaction. Hence, new blocks are added containing the details of each transaction and is connected to previous blocks, making a blockchain.

Digital currencies are said to have the following desirable properties:

- Irreversible: transactions are irreversible after they are confirmed.
- Pseudonymous: cryptocurrencies are sent to addresses (random chains of around 30 characters) via a public key and accessed via a private key. Neither transactions nor accounts are connected to real-world identities.
- Fast and global: transactions can be made nearly instantly and confirmed in minutes through the internet.
- Secure: digital currency funds are locked in a public key cryptography system. Only the owner of the private key can send cryptocurrency. Although the '51% attack' is discussed as a theoretical case of the network being hacked and transactions reversed, it is downplayed in practice (due to computational costs of having to change the hash of each block on the blockchain and controlling over 50% of nodes of the network which becomes exponentially more difficult as the blockchain gets longer).
- Permission-less and inclusive: anyone with internet access can receive or send cryptocurrencies after downloading the software. Digital currencies were designed to forego the traditional means of transferability through intermediaries, such as banks, by enabling direct transfers from the sender to the receiver—peer-to-peer (P2P)—without intervention from a third party. This is deemed to enhance financial inclusion.

Digital currencies constitute only one of a seemingly limitless number of ways in which blockchain technology can be applied. Blockchain is not necessarily a new technology but rather its novelty lies in the integration of three technologies—a peer-to-peer network, private key cryptography and a protocol governing incentivization. It represents an innovation in information registration and distribution through a decentralized public

ledger that eliminates the need for a trusted party to facilitate digital relationships. In the context of digital currencies, it can securely record of all past transactions on the network and overcomes the 'double spending' problem – that currency or any digital document can be copied ad infinitum. Blockchain is thus considered the 'gate-keeper' of the emerging 'trust economy' and plays an integral part in the contemporary financial-technology ('fintech') revolution (Deloitte, 2017).

Regulatory Issues on the Demand and Supply Side of Digital Currencies

There are immense challenges surrounding the regulation of digital currencies due to their current evolutionary nature and deep technical knowledge required in order to understand them, the multitudes of stakeholders and variation in their usage, such that many of the regulators are not only still confused about how to classify these digital currencies but also about how to fit them within the existing frameworks (Carney, 2017). These regulators include central banks, monetary authorities, legislators and financial authorities. Regulation cannot be answered alone by the regulators but rather by a combination of innovators, regulators and those who use and demand the technology. The drive for regulation is led by the need to protect users' capital in the market and maintaining financial stability (Carney, 2017). The three cardinal reasons for the regulation of cryptocurrency are consumer protection, to achieve broader macroeconomic policy aims and to prevent illegal transactions (Luther, 2016). The author argues that the need for consumer protection is because consumers would like to protect themselves from all manners of risk and exploitation (such as exchange rate volatility and capital loss due to security concerns around the cryptocurrency protocol) while the innovators are interested in maintaining good relationships with their customers. Governmental, legal and regulatory institutions can act to either facilitate or limit the growth of digital currency industry by influencing the demand for and supply of digital currencies through legal and regulatory decisions. Regulation of 'virtual currency business activities' spans transmitting, holding, buying and selling, providing exchange services, and controlling, administering, or issuing a virtual currency. However, there is a degree of ambiguity in the statutory language and scope (Rowland & Kiviat, 2018). In another research, it has been shown that the forward architecture for a

safe derivatives market on a public blockchain and an advance in technology may pave the way for lightened regulation (Morini, 2017). The same study also notes that understanding the power of blockchain technology using basic design architecture that may be at odds with the current regulation but proposes changes to business processes and technology may create valuable lessons for regulators and thus shape the future of regulations within the market.

The original creators of digital currencies intended for them to be a form of money (Nakamoto, 2009). Some regulators concur with the creators that it is indeed a form of money while others classify them as financial securities, commodities or even intangible assets. Digital currencies differ from fiat currencies as they are not claims ('IOUs') like banknotes and bank deposits. However, unlike physical commodities, such as gold, they are also intangible assets, or digital commodities (Ali, Barrdear, Clews, & Southgate, 2014). Whether or not digital currencies can be considered a form of money depends on the extent to which they serve the following functions of money: (i) a store of value; (ii) a medium of exchange, and; (iii) a unit of account (ibid.). According to the Bank of England report on digital currencies, at present, digital currencies do not serve these functions effectively (Ali et al., 2014). Other analysts concur with this view, such as Jamali et al., who conclude that digital currencies do not function as money, as their valuation is driven almost exclusively by speculation and value drivers cannot be determined, unlike traditional currencies (Jamali, Li, & Pantoja, 2017). In 2015, the US Commodity Futures Trading Commission (CFTC) issued a ruling that defined and classified digital currencies, such as Bitcoin as commodities. The CFTC argued that the definition of "commodity" under Section 1a(9) of the US Commodity Exchange Act is broad and encompasses among other things, "all services, rights and interests in which contracts for future delivery are presently or in the future dealt in" (Kirkpatrick, 2015). This position was further cemented by a US district judge, Jack Weinstein who ruled (CFTC, 2018) in 2018 that the US CFTC had the authority to regulate digital currency as a commodity in the absence of federal level rules. Other regulators are of the view that some of these digital currencies should be regulated as securities especially when it comes to their use in Initial Coin Offerings (ICOs). The US Securities Exchange Commission in its statement dated 25 July 2017 noted that the definition of US securities may apply to sales, offers and trading of interests in virtual organizations like the Decentralized Autonomous Organization (DAO) (SEC, 2017).

Innovators, users of digital currencies and regulators exert influence on each other in a mutually reinforcing manner, shaping the demand and supply of digital currencies. On the supply side, innovation is key to the growth of economies, it improves the lives of the people as consumers but also changes the lives of the innovators, creates jobs, improves efficiency and may also lead to a sustainable way of life. However, the benefits of innovation cannot be fully realized where there is no regulation and guidance on how these developments will achieve their full potential. The regulation may be the biggest source of innovation in the future with non-banking and banking institutions likely to adopt newer and more efficient ways of doing business so as to gain a competitive edge while also remaining compliant to existing prudent rules (Wall, 2014). The traditional regulation in the financial sector was less concerned with innovation in the sector which was reduced to a more secondary role or even ignored (González-Páramo, 2017). With the arrival of the transformative digital age, regulation has been forced to evolve to accommodate digital innovations that are more efficient and beneficial to the customer. Some of these transformative financial innovations in the digital age include mobile money, cryptocurrency, online payments and e-money and regulators worldwide are now drafting frameworks in order to accommodate such innovations. The author further notes that innovations cannot spring up in isolation because they need a conducive environment and favourable regulation to guarantee their success. Unfavourable regulations may also create operational uncertainties while also putting a strain on the startup costs for innovations creating obstacles to their development.

The supply side of digital currencies poses quite a challenge for regulators because unlike fiat currencies where the originator is known, some of the cryptocurrencies, such as Bitcoin, have proved to have anonymous originators. One of the salient features of digital currency is the degree of anonymity it offers the user which puts it in contrast with the modern banking system where the issuers, users and transaction amounts are known. The absence of an identifiable "issuer" of the instrument raises challenges and attempts at regulation that governments normally conduct. While financial institutions are required to comply with Anti Money Laundering (AML) laws and Counterterrorism Funding (CTF) regulations and are required to declare the amounts, sources and transacting parties in an effort to ward off money laundering and terrorism financing, the anonymity offered by the digital currency market could provide a loop-hole for illegal activities, such as black market transactions, money

laundering, and terrorist financing. Furthermore, their creation is not controlled by central banks and they allow payment to be made directly between payer and payee. This could potentially create challenges in trying to maintain a stable macroeconomic policy because the issuing party—in this case, the innovators of the cryptocurrency—is different from the authorities in charge of ensuring a stable macroeconomic policy. Thus, policymakers are seeking to provide sound and robust regulation. Some of the world's central banks and monetary authorities are also now exploring the option of a Central Bank issued Digital Currency (CBDC) with many carrying out research in this area.

Anonymity hinders tax compliance and promotes tax evasion because cryptocurrency offers the users an opportunity to transact beyond the reach of the relevant tax authority. Where most of the transactions are not within the reach of the tax authorities, this further creates budgetary constraints and hence has a negative impact on the macroeconomic stability of the society. This thus creates a need for regulation driven by the regulatory authorities and possibly the innovators themselves. Without regulation, and where it is left unchecked, the cryptocurrency economy may have a significant impact and where possible a negative one on the whole economy hence the need and drive for regulation to ensure a stable monetary policy. It should also be noted that it is through regulation that monetary policy is transmitted to the wider economy.

Regulation is also likely to play a role in shaping the supply of digital currencies by creating barriers for new entrants such as cryptocurrency exchanges and innovators into this digital space. Barriers of entry may be necessary given the proliferation of digital currencies, making it hard to assume they may be at all useful in the real economy. We may take note of the historic forex regulations in the West that require potential forex brokers to go through a strict sieve before they can finally meet the licensing criteria (CBR, 2017). This shapes the regulation in terms of complexity and cost of compliance which also limits and keeps out smaller potential players. Hence, the regulatory challenges can be reduced through a collaborative effort, vision and direction from concerned stakeholders, public authorities and the private sector (González-Páramo, 2017).

On the demand side, high levels of demand from users of digital currencies can stimulate regulators to adopt a proactive approach. If users continue to use digital currencies like Bitcoin, regulators will work with the industry rather than against it which will, in turn, open their eyes to the potential benefits and opportunities associated with cryptocurrency

(Mandjee, 2015). From the results of a survey based on a sample pool of economic and financial professionals, multinational enthusiasts of Bitcoin and executives from the financial world, the category of corporate users, top-level managers and executives directly have an impact on the regulation and acceptance of Bitcoin (Singhal & Rafiuddin, 2014). This underscores the role of the customers on the demand side as users of cryptocurrency who influence regulation. Furthermore, as demand for digital currencies increases, regulators must adopt a proactive approach to prevent the systemic risk that may result as the market grows. For example, the innovators of the cryptocurrency called AAA Reserve (AAA) which is a coin backed by a basket of currencies, when asked why they had selected Jersey for their Initial Coin Offering (ICO), commented that regulators in Jersey were proactive and that the issuers were also able to engage with all the relevant parties which included the government and the regulators themselves (Fund Europe, 2018).

The general lack of regulation of digital currencies across jurisdictions contributes to their high-level market volatility. In the absence of measures to address fraud, users of the cryptocurrency lose confidence in the market which also causes a change in their perception (Jabotinsky, 2018). Digital currencies, such as Bitcoin, Ether, Ripples have had swings in their prices due to investigations into fraud as users rush to dump their coins or in instances where the authorities have (proved positively); this has caused a jump in prices while reacting to possible regulation or even bans in some cases (Cointelegraph, 2018). It has also been witnessed that many regulators put in place regulations that hinder the development of innovations like cryptocurrency, explicitly banning their usage or trade. Countries like China banned ICOs and have also proven hostile to cryptocurrency exchanges while other countries in Europe are much more accommodative and some have taken a precautionary approach where they do not want to be seen stifling innovation. In May 2015, in its first civil enforcement action against a digital currency business, FinCEN announced a $700,000 fine against Ripple and a simultaneous settlement agreement because Ripple sold XRP for several months without a proper anti-money-laundering program in place, failing to designate a compliance officer and not soliciting an independent review of its practices and procedures (Kiviat, 2015). From the results of a study of the drivers and inhibitors of cryptocurrency in Malta, the regulatory shortcomings were a key obstacle to cryptocurrency adoption and those sectors that were subject to heavy regulation showed hesitancy towards cryptocurrency adoption while the

underlying technology was found to be popular (Galea, 2016). The author recommends that in order for this popularity to thrive among users and to support local adoption of cryptocurrency, the regulations have to offer protection against the key issues and risks associated with the innovation. Users of digital currency would, therefore, desire regulation in order to protect their invested capital within the digital currency market without stifling their autonomy over their financial activity.

Legal and regulatory disparities across jurisdictions create challenges for issuers and users of digital currencies because they need to conform to local or international regulations. There may, therefore, arise a question of which regulations users and owners need to adhere to, where these regulations may have to be implemented and who will be in charge of such an implementation of the regulations responsible for cryptocurrency. This creates a conflict between the need for cryptocurrency transactions and owners to conform to local and international regulation while also struggling to remain true to the original decentralized design of operating beyond borders without any third-party intermediary like banks (the perceived trade-off between transparency and anonymity). The desire to maintain a stable macroeconomic authority will also be influenced by the degree of decentralization desired by the users who are potential drivers of regulation on the demand side. A decentralized system as suggested by the innovators of digital currency may create challenges of financial instability, speculation and excessive uncertainty which eventually erodes the real value of the economy. Speculation has always created instability in prices of these cryptocurrencies such that the direction and maturity of the innovation is yet to be fully realized. While some users of cryptocurrency prefer to follow the same model of decentralization and anonymity as the original innovators, regulation is likely to court a decentralized model. However, this may not be possible because it conflicts with the current existing regulatory centralized model of monetary authorities.

Digital Currencies and Blockchain Technology in Islamic Banking and Finance

Digital currencies have prompted a mixed response from the world of Islamic banking and finance. Questions have been raised as to whether digital currencies accord with the Islamic concept of wealth (*mal*) and

currency and secondly, if they do fit, how they may be regulated and applied to the Islamic banking and finance industry.

The Islamic juristic definitions of *mal* can be broadly divided between the Hanafi school of jurisprudence on one side and the other schools (Maliki, Shafi'i and Hanbali) on the other; the Hanafi School puts emphasis on *mal* being something that is tangible while the other schools consider both tangible and intangible things such as the usufruct in the asset itself (Islam, 1999). With the advent of time, there has been a variation in the view of the Hanafi scholars with some of the contemporary Hanafi scholars like Taqi Usmani being of the view that intangible items such as patents, copyrights, rights and benefits may be treated as *mal* (Abu-Bakar, 2018). These contemporary scholars accept that the prevailing customs (*'urf*) of the time have to be factored before some of these intangible assets can qualify as *mal*. The author also notes that some scholars maintain that tangibility is not a key factor in treating something as *mal*, but rather its ability to be stored. This may be the reason why some of the classical jurists preferred to define *mal* as something tangible because, during their time, only tangible items could be stored. With the turn of the century, innovation has also made it possible for valuable and intangible things like some of the cryptocurrencies to be stored.

Table 8.1 provides a summary of the various juristic definitions of *mal* as per the four famous schools of Islamic jurisprudence and checks whether or not cryptocurrency accords with these definitions.

Apart from the tangibility aspect, digital currencies can be said to possess the above-mentioned attributes of *mal*. But nevertheless, there has been some development in the understanding of *mal* since the classical period. For example, Islam M. W (1999) defines an asset (*mal*) as a representation of what man obtains and possesses that may be tangible like gold, animals, crops and silver or intangible like usufructs and in the modern world; things like software, digital formats of books and audios are also considered to be intangible assets. The author further notes that the Shari'ah has not limited the definition of *mal* to a narrow scope but it can also be defined based on the times, customs and utility by the prevailing populace. As is exhibited on the online exchanges, digital currencies are valuable (Bitcoin's market capitalization stood at over $119Bn as of August 2018), they can be owned, possessed and stored, and their ownership is transferable to an identified owner. Their potential relative benefits include increased security against fraud and identity theft, immediate settlement and removal of costly third parties and therefore lower fees, and

Table 8.1 Definitions of mal as per different school of jurisprudence

School of jurisprudence	*Definition of* mal	*Whether cryptocurrency fits within this definition of mal. (Yes or No)*
Hanafi School	Something that is material/tangible and can be possessed.	No
	Protected from the encroachment of others	Yes
	It is beneficial as per prevailing customs and permissible within the Shariah.	No (possibly)
Shafi'i School	Something that is beneficial, has value and is exchangeable.	Yes
	Its destructor would be made liable to compensation	Yes
	Reflects the price during its appreciation if it is financially valuable	Yes
Hanbali School	Inherently bears a lawful benefit.	Yes
Maliki School	Ownership is conferred and it is protected from the encroachment of others.	Yes

increased access to financing services. The full range of potential benefits of digital currency is currently being explored by various stakeholders, including governmental and non-governmental institutions, financial institutions and business leaders.

As to whether the digital currency can be considered as a form of money and regulated accordingly, the Shariah position on money must be elaborated. During the Prophet's time, raw metals or Roman coins were used as money for all sorts of economic transactions and these types of money included gold (dinar), silver (dirham) and copper (fulus). The coins were sometimes treated as raw metal and some of the coins such as gold were weighed to determine their value in weight while the cheaper ones like silver and copper were counted rather than weighed. It was further noted that in scenarios where intrinsic value did not count as significant, the money was exchanged for its conventional value rather than the intrinsic value (Siegfried, 2001). The Shari'ah does not offer any specific text from the Quran and the Sunnah that makes it compulsory for Muslims to adopt specific forms of money from the Prophet's era or from the era of caliphates thereafter (Chapra, 1996). Early Muslim scholars such as Al-Ghazali,

Ibn Taimiyyah, Ibn al-Qayyim and Ibn Khaldun commented that money is not desired for its sake but rather because of the various functions it plays to facilitate trade which includes being a medium of exchange and a measure of value (Islahi, 2001). In classical Islamic legal thought, a currency should be lawful to use; it should be an independent standard of value; it should be legal tender, and should be acceptable within the monetary system.

Money has since evolved to contemporary fiat currency which has little or no intrinsic value but is however considered legal tender. In 1982 the Council of the Islamic Fiqh Academy (Majlis Majma' al-Fiqhi al-Islami)'s passed a resolution that determined the permissibility of paper money. Some of the reasons cited for its permissibility include:

- Fiat paper money derives its value from the government guaranteeing those values on the paper money
- The community has accepted fiat paper money as a medium of exchange, means of making payments
- It is also a store of value, even though its value is not the paper but the numbers that are printed on it.

Similar to fiat currency, cryptocurrency does not possess intrinsic value, although unlike fiat currency it has yet to be considered legal tender in many jurisdictions. The approach taken by the above mentioned Islamic Fiqh Academy's resolution can offer guidance and can also be used as an analogy when arriving at the decision on whether digital currencies are permissible as currencies. We summarize below a check of cryptocurrency against the above-mentioned characteristics of a currency (Table 8.2).

The prominent Islamic economist, Monzer Kahf, is of the view that cryptocurrencies are a representation of nothing but fictitious assets similar to indices and options (AboutIslam, 2017). Kahf refers to the OIC Fiqh Academy ruling on the prohibition of owning, buying, selling and trading of indices and options as virtual assets because they represent the ownership of nothing and thus further asserts that cryptocurrency is actually lesser (more?) of fictitious assets than indices and options (Aboutislam, 2017). In regard to speculation associated with currency, this is also prohibited in the Shari'ah as buying and selling of currency is strictly limited to instantaneous delivery for both currencies in the same quantities. Also, the Mufti of Egypt, Dr Shawki Allam, considers the trading of cryptocurrency as impermissible because of the risks associated with its use, not

Table 8.2 Cryptocurrency legal permissibility in Islam

Factors considered for an item to be considered as a currency	*Whether cryptocurrency meets these conditions; Yes or No*	*Additional comments*
It should be lawful to use	No	It has been banned in some countries (but is it lawful in a growing number of countries)
It should be an independent standard of value	No	Its value is derived by comparison against the USD
It should be legal tender	No	It is not yet considered legal tender (although it could be)
It should be widely accepted within a stable monetary system.	No	It is not yet widely accepted as a currency (although it is increasingly being accepted)

being legal tender, not backed by real assets, and concerns regarding the ambiguity of the cryptocurrency market.[1] The opinions of such authoritative scholars are not to be ignored and are likely to continue to shape the trajectory of digital currency markets.

Cryptocurrency such as Bitcoin will be more favourable for implementation within IB&F because of its vast unexplored social benefits and potential contribution to the greater good (*maslaha*), its conformation to interest prohibition while also fostering risk-sharing rather than risk-shifting (Evans, 2015). However, there is no doubt that currently the digital currency markets offer a space for carrying out certain illegal and immoral activities from a Shariah perspective, and therefore the subject must be approached with caution. For example, links to harmful material such as pornography including in all its forms were being spread knowingly or even unknowingly by users on the blockchain by a recent study (Matzutt et al., 2018). In the same paper, it has been shown that some of these files have pornographic (including child pornography) links embedded after an analysis of over 1600 files (99% texts and images studied) on the Bitcoin blockchain. The results further note that although such links are embedded within data that is shared by unsuspecting users on the blockchain, it ends up being shared widely by unsuspecting participants (Matzutt et al., 2018). Other contemporary scholars hold that digital

[1] http://gate.ahram.org.eg/News/1764841.aspx

currencies are permissible in principle (Abu-Bakar, 2018). Starting from the Islamic jurisprudential maxim that everything is permissible unless it is found to contradict the Shari'ah, the author explains that any cryptocurrency that is a form of payment, measure of value, unit of account and is acceptable in a number of jurisdictions for transaction purposes (such as Japan) is therefore permissible in principle. The author counter argues some of the reasons raised by some of the prominent Muslim clerics that may invalidate cryptocurrency like Bitcoin within the Shari'ah which have been summarized below (Table 8.3).

Islamic economists and jurists have always favoured a centralized model of the financial system because it offers acceptability and a degree of confidence in the currency as the money issuing authority is already known to the users (Adam, 2017). The monetary system is also regulated within a centralized system and this at least creates an additional level of security and as the monetary authority can easily intervene in such a monetary

Table 8.3 Counter arguments against cryptocurrency impermissibility

Reasons cited for the digital currency being impermissible by certain Muslim scholars	*Counter-argument against these reasons (Abu-Bakar, 2018)*	*Our comments*
It is not legal tender.	Cryptocurrency not being legal tender is not a reason enough to affect its usability as money.	Currently, this argument may not hold because acceptability of money is based on it being legal tender. But it is likely that digital currencies will be more widely accepted as legal tender in the future.
It lacks a central issuing authority.	This is actually a strength because, throughout history, monetary authorities have played a major role in destroying wealth.	Muslim jurists have always favoured a centralized financial system rather than a decentralized one. Although this does not constitute a definitive ruling but rather a question of governance (*siyasa shari'yyah*) and public benefit (*maslaha*).
Digital currencies are volatile and their price is not stable. Cryptocurrencies are used for illicit purposes	This is the same case for gold, dollars and other fiat currencies which also makes them subject to inflation.	Like other currencies, digital currencies can be subjected to regulation and intervention of monetary authorities to ensure a stable monetary policy.

system to hedge against shocks and any threats of financial instability that may occur in the market. However, the blockchain platform offers (potentially) a decentralized financial system that promises to be more efficient and secure. Nevertheless, the preferred regulatory direction of the chosen model whether decentralized or centralized for cryptocurrency will be influenced by its ability to protect the users' wealth, the comfort and the financial stability it accords its users, and whether it enables or facilitates confirmation to the Shari'ah and is not used as a gateway to engage in explicit prohibitions such as interest, theft and excessive speculation. The Shariah concern largely pertains to issues that could be overcome by developing sound legal and regulatory infrastructure (Abu-Bakar, 2018).

Given the evolutionary nature of digital currencies and the fact that the debate is still ongoing amongst Shariah scholars in regard to their permissibility, it seems unwise to adopt a definitive legal judgement on digital currencies. Nevertheless, the perception of Muslim users of cryptocurrency is heavily influenced by its compliance with the Shari'ah. Hence, the ongoing debate regarding the Shari'ah permissibility of digital currencies has a huge impact on the demand for and supply of digital currencies in the Islamic finance industry. Due to the limited research in the area of application of Bitcoin in Islamic Banking, the majority of respondents from the survey were not sure about the extent to which Bitcoin is compliant with Islamic Shariah principles and could also not say whether Bitcoin could be accepted in Islamic Banking (Singhal & Rafiuddin, 2014). While the smallest percentage of the respondents were positive that it could be accepted in Islamic banking, a slightly larger percentage were negative about its acceptability. However, it was reported in April 2018, when the price of Bitcoin rose by $1000 dollars in 30 minutes; it was possibly due to increased interest from Muslim crypto traders after a Shari'ah cryptocurrency report on the permissibility of such cryptocurrency was published by Blossom Finance, a fintech startup operating out of Indonesia (Zuckerman, 2018).

Islamic finance users' perceptions of cryptocurrency may in turn be influenced by how useful the innovation is and whether it can be put to beneficial test within the realm of the Islamic economy. As an example, one of the first cases of a mosque using digital currency occurred in May 2018 when Shacklewell Lane Mosque in London received donations in the form of cryptocurrency. A total of 13,983 pounds was raised through 24 crypto donations, compared to 3500 pounds sterling in fiat currency donations (Dezmond, 2018). This was realized through the blockchain

project Combo Innovation. Such developments on the ground will also influence the direction of the Shariah discussion. The next section elaborates on the potential of blockchain technology application within IB&F.

The Potential Application of Blockchain Technology to Meet Objectives of the Islamic Economy

While digital currencies have received the most attention in the media, there is no doubt about the potential benefits of the underlying distributed ledger technology or blockchain. The potential uses for blockchain are endless—from more efficient legal validation and enforcement to electoral systems to marriage contracts (Linver, 2018). In particular, blockchain has the potential to enhance the aims and objective of the Islamic economy in a number of ways.

Blockchain technology is particularly relevant for Islamic banking and finance which emphasizes principles of fairness, transparency and agreeability in contracts between parties. Islamic financial products and services often combine multiple contracts. The average Islamic finance contract requires three or more contracts involving multiple parties (agency and sales contracts) in order to be Shariah-compliant (Ikram, 2018). This stands in contrast to a conventional loan agreement which only requires a single contract between the bank and the borrower. The higher contractual requirement equates to higher administrative and legal cost (Ethis, 2017). Second-generation blockchain technology allows for smart contracts to be incorporated into the ledger. Hence, the range of nominal contracts that are used in IB&F, such as *Murabaha*, *Mudharaba*, S*alam*, and so on, can be automated by using smart contracts. This would be more efficient and would facilitate the Shariah auditing process. Currently, IFIs use manual techniques to record various stages of the contract which is time-consuming and error-prone. For example, the *Murabaha* contract contains the promise to buy, the bank taking ownership of the asset and the sale contract to the customer which must all be conducted in the correct order. However, a self-automated smart contract will only execute the contract if the terms of the contract are met, thereby reducing administrative and legal costs as well as operational risks, counter-party risks and Shariah-compliance risks.

Recently, the Islamic Development Bank (IDB) began working with blockchain firms to develop blockchain smart contracts that can reduce the administrative and legal costs associated with Shariah-compliant

products and services (Forbes, 2018). The blockchain features are said to allow for instantaneous clearing and settlement of transactions and asset exchanges while helping to eliminate counter-party risk (Reuters, 2017). The IsDB's research arm, the Islamic Research and Training Institute (IRTI) signed an agreement with a local firm Ateon and Belgium-based SettleMint to perform technical feasibility studies for creating Shariah-compliant products using blockchain's smart contracts to be implemented in IsDB member states (Settlemint, 2017). Saudi Arabia's central bank—Saudi Arabian Monetary Authority (SAMA)—and US-based Ripple signed a deal to help banks in the kingdom improve their payment infrastructure using blockchain platform xCurrent (Reuters, 2018). This platform is expected to allow participating banks to instantly settle cross-border transactions with greater transparency and lower costs. SAMA is the second central bank, after the Bank of England, to support the use of blockchain technology in modernizing payment infrastructure (Ripple, 2017).

Other Gulf nations are also attempting to integrate blockchain technology into their financial systems. Bahrain is exploring the use of digital currencies to boost its role as a regional financial hub. As Dubai seeks to position itself as 'the world's capital of the Islamic Economy' positive steps are being taken to integrate IB&F with digital currencies and blockchain technology. Dubai-based OneGram Coin (OGC) offers an example of the development of an 'Islamic' digital currency. In order to overcome the problem of high volatility associated with the price of digital currencies, the coin/token is backed by gold on the basis that gold is historically a resilient asset. Hence, the exposure to downside risk will be limited as the base price of an OGC is always at least equal to the spot price of gold. Each transaction of OGC generates a 1% transaction fee, 70% of which is reinvested to purchase more gold (25% is used for development and operations, 2.5% rewarded to miners, and 2.5% donated to charity) (Onegram, 2018). Hence, the coin's value is determined in three parts: (i) the gold value, (ii) the transaction fee being used to reinvest in more gold, and (iii) the economic value that is determined by market demand. After launch, the coin will be issued and redeemed for gold via the GoldGuard platform and bought, sold and traded via any major cryptocurrency trading platform. Blockchain technology is also making inroads into other areas of the halal industry beyond finance. Halal-Chain provides a decentralized platform for the traceability of halal products. It aims to provide technical

solutions for enterprises, regulators, end-consumers, developers and other industry stakeholders, enabling users to trace halal products across the supply chain (Halal-Chain, 2018). It thereby seeks to overcome challenges, such as the absence of a standardized halal certification system and lack of traceability of products which damages Muslim consumers' confidence. This can be done without relying on a centralized authority, which seems to be extremely difficult to establish given the complex and interlinked nature of the global industries, such as food, medicine and cosmetics. The Halal-Chain primarily collects data from tags, tracers, sensors and other IoT devices. In a similar development in June 2018, Apla, a developer of blockchain for government and enterprise platforms partnered with HalalGuide—a platform that gives Muslims around the world access to halal products and services (it has over 1.5 million users and covers more than 120 countries) (Apla, 2018).

The potential for blockchain technology is also being explored in the humanitarian sector, particularly with regard to payment systems and identity verification. In 2016, Stellar, a blockchain-based payment system partnered with Oradian's payment-transfer network among several microfinance organizations to enable 300,000 clients in Nigeria to cheaply transfer money, mainly in rural areas across Nigeria. BanQu, an economic identity technology platform enables a digital identity to be created on a blockchain that can be used for citizens that lack access to the financial system, such as refugees, displaced and those living in extreme poverty. Users maintain ownership of their personal information and decide what information to share and with whom, giving them control of their economic identity, which enhances economic empowerment. Arguably, one of the highest-profile uses of blockchain technology in the humanitarian sector is United Nations World Food Program (WFP), which completed a project in May 2018 to direct resources to approximately 10,000 Syrian refugees by giving them cryptocurrency-based vouchers that could be redeemed in participating markets. The vouchers were used to purchase food items such as olive oil, pasta and lentils. The platform recorded and authenticated transfers using the Ethereum blockchain.[2] WFP has a full in-house record of every transaction that occurs at the retailer, ensuring greater security and privacy. It allows for improved reconciliation and

[2] Interestingly, the co-founder of Ethereum worked with the WFP to set up the blockchain network for the project.

reduction in third-party costs. WFP plans to extend the program. The UN has also partnered with the World Identity Network to create a blockchain-based digital identity system to help secure identity data in order to fight child trafficking around the world.

Conclusion

Digital currencies are yet to fully materialize into a beneficial form of currency or an asset that is useful and acceptable by a large number of users, such that they would constitute rivals of fiat currencies. Nevertheless, regulators around the world are attempting to amend law and regulation in a way that provides a balance between supporting innovators and entrepreneurs on the one hand while also protecting the users' wealth and prevent systemic risk on the other. In this way, regulators are attempting to deal with the demand side and supply-side factors that are influencing the digital currency market. One of the most pertinent questions is whether the digital currency should be regulated as money, an asset, or as a technology enabler.

It is noteworthy that prominent Muslim scholars and jurists are currently discussing the relevant questions regarding the nature and permissibility of digital currency within the realm of the Shari'ah. However, as of now, the discussion has not moved on sufficiently to discuss the regulation front from an Islamic economic point of view and how digital currency can be regulated in a way that can contribute to socio-economic uplift in an ethical manner. In order to do this, it is essential that the Muslim jurists hold debates with tech experts and practitioners in Islamic finance so as to guide future regulation of digital currency and also be at par with the benefits of technology in improving the lives of humans. This is necessary in order for Muslim jurists to make informed decisions in light of the rapid pace of development of the sector.

Nevertheless, digital currencies are only one more segment of a wider technological revolution that includes blockchain technology, cloud technology, artificial intelligence (AI), the internet of things, and so on. When applied to the financial sector, some of the intended benefits of this technology include greater accessibility and efficiency of financial products and services, with the promise of leading to financial inclusion and poverty reduction. Blockchain technology is already showing promising signs of applicability as highlighted by the aforementioned cases in this chapter.

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CHAPTER 9

Does FinTech Revolution Lead to the Disintermediation of Banks? A Study into Islamic Bank Income

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Introduction

Banking history has shown that bank as an intermediary is entrenched in the economic and social structures. It has consumer trust with incredibly valuable resources. Despite the undeniable shifts that financial technology

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(Fintech) is bringing to the new landscape of doing business, it seems unlikely that traditional banks will find themselves superseded as a whole. In fact, alternative finance and financial technology have the potential to change the landscape of financial services globally. Fintech is described as a dynamic segment at the intersection of the financial services and technology sectors where technology-focused start-ups and new market entrants innovate the products and services currently provided by the traditional financial services industry (PwC, 2016). Fintech also refers to an economic industry composed of companies that use technology to make financial systems more efficient. (Wharton, 2014).

The emergence of Fintech significantly affected the financial services sectors, particularly the banking industry. Basically, Fintech start-ups present a credible threat to incumbent banks using a combination of technology, consumer-centric service and flexible business practices. These new Fintech companies are able to reduce the cost of doing business as well as expanding their customer base. Hence, to retain market share, banks have to change their operations in order to compete or consider partnerships with the businesses that threaten the industry. According to the International Data Corporation Research (2016), approximately 25 percent of the big banks see financial technology firms as potential acquisitions, which is both surprising and uplifting news for the future of financial services worldwide.

Most developed countries are now facing the common challenge on how to retain their yearly growth. Same goes for the developing countries which struggle to ensure their banks continue to function. The Fintech industry gets more attention from the customers as an alternative to

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earnings model creation using innovative financial techniques from an existing earning model. PwC Global Fintech Report (2016) indicated that the consumer banking and payments have experienced a high level of disruption with the surge of new-technology driven payment process, new digital applications that facilitate easier payments, alternative processing networks and the increased use of electronic devices to transfer money between accounts. In consumer and commercial lending, for example, the emergence of online platforms allows individuals and businesses to lend and borrow between each other. Lending innovation also manifests itself in alternative credit models, use of non-traditional data sources and powerful data analytics to price risks, rapid customer-centric lending processes, and lower operating costs. It implies that Fintech is the most powerful weapon of disintermediation of banks.

In the theory of financial intermediation, transaction costs have been a fundamental issue in discussing the existence of financial intermediaries, including banks. Numerous studies have discussed the transaction costs in the financial intermediation theory. (For example; Baltensperger, 1980; Benston & Smith, 1976; Gurley & Shaw, 1955.) The studies have suggested that the intermediation process allows diversification in the transaction costs. It exploits economic advantages in the transaction technology, including search, monitoring costs as well as costs related to risk. Thus, the role of financial intermediation is to transform financial claims into different types of financial claims. However, several recent reviews on the financial intermediation theory among others are Santomero (1984), Bhattacharya and Thakor (1993), Gorton and Winton (2002), and Scholtens and Van Wensveen (2003), which have proposed that the information-based theories of intermediation provide a more fundamental interpretation. The emergence of new financial instruments and the development of information technologies lead to the changing roles of financial intermediaries. Technological advancement has substantially reduced the cost of information and minimized informational asymmetry. Several empirical studies have shown that the demand for financial intermediaries is increasing (Allen & Santomero, 1997, 2001; Scholtens & Van Wensveen 2000, 2003). Allen and Santomero (1997) and Holmstrom and Tirole (2000) suggest that due to rapid changes in the development of financial intermediaries, the traditional focus of intermediation theory, such as transaction costs and asymmetric information, are less relevant in explaining the development of the intermediaries. They further exert that the

technological revolution and enhancement have substantially reduced the cost of information and information asymmetry.

Of late, Islamic banking institutions have focused on fee-based income activities (Alfarasi, 2015). There are a greater amount of fee-based incomes derived in Islamic banks compared to conventional banks (Beck, Demirguc-Kunt, & Levine, 2010). For Islamic banks, income consists of profit generated from banking activities, including financing, such as equity-financings and debt-financing; investments activities; and non-financing income, such as fee and other operating income (Ibrahim, 2015; Muda & Ismail, 2010). Fee income comprises commissions and guarantees, service charges and other fee income which are developed based on several underlying *shariah* contracts such as *kafalah*, *wakalah*, *hiwalah* and *ujr* and are available in Islamic banking operation to facilitate non-traditional fee-based activities (Shamimi, Ismail, & Ahmad, 2006).

From this perspective, the present study argues: what keeps financial intermediaries alive? Is the role of financial intermediaries still significant in new financial intermediation landscape as a result of the technology-driven market? Does Fintech have an impact on Islamic banks' income? Thus, the aim of this study is to provide empirical evidence on the impact of Fintech on Malaysian Islamic banks' income from the perspective of the theory of financial intermediation. The remaining of the chapter is structured as follows: Section "Theoretical Considerations" presents reviews of the literature on the roles of Islamic banks from the theory of financial intermediation. In section "Research Methodology", model specification is proposed and a discussion of findings comprises section "Findings and Discussions". Finally, section "Conclusions" presents the conclusion.

Theoretical Considerations

Traditional theories of financial intermediation discussed more on the roles of financial intermediaries to reduce transaction costs and asymmetric information (Allen & Santomero, 1996). However, in recent years, studies of financial intermediation theory have focused on a new perspective. For instance, Scholtens and Wensveen (2000, 2003) and Allen and Santomero (2001) have highlighted the increasing importance of financial intermediaries in the modern financial markets. These studies suggest that although there has been a reduction in the price of information, asymmetric information and transaction costs in financial markets, there is a steady increase in the need for financial intermediaries.

Theoretically, the transaction cost is the price to pay for market imperfection. Thus, financial intermediaries exist to match the difference in the objectives or needs of savers and investors arising from their asymmetry in information. The concept of transaction cost was first introduced by Coase (1960). In his seminal work, the transaction cost is simply defined as '*the cost of using the price mechanism*'. It was the first neo-classical theory attempt to define transaction cost in relation to the market. The neoclassical literature presumes that transaction costs are incurred only when a market transaction takes place (Allen & Santomero, 2001).

Among the earliest work, Gurley and Shaw (1955) discussed the role of financial intermediaries in channelling funds in the market and emphasized the role of transaction cost in the intermediation process. They believed that intermediaries have an advantage over individuals because they allow such costs to be shared and diversified. Benston and Smith (1976) in a seminal work view the role of the financial intermediary as creating financial commodities and selling them for prices which are expected to cover both direct cost and opportunity costs.

However, several recent reviews on the financial intermediation theory among others, such as Santomero (1984), Bhattacharya and Thakor (1993), Gorton and Winton (2002) and Scholtens and Wensveen (2003), suggested that informational asymmetries are the most basic form of transactions costs. Pyle (1971) presents the idea on the needs of intermediation is due to the role of asymmetric information. A similar fundamental argument has been pointed out by several studies during that period (Akerlof, 1970; Spence, 1973; Stiglitz & Weiss, 1981). Eventually, financial intermediaries can minimize the costs of acquiring and processing information and be able to channel funds efficiently. Two subsequent studies, Diamond (1984) and Ramakrishnan and Thakor (1984) formalized the ideas in Leland and Pyle (1977). The studies demonstrated the value of diversification in reducing monitoring costs due to asymmetric information. Since the financial intermediary has a cost advantage in acquiring and analysing information from the market, the cost advantage must net out the costs of providing incentives from any cost savings in producing information.

The emergence of new financial instruments and the development of information technologies lead to the changing roles of financial intermediaries. Technology advancement has substantially reduced the cost of information and minimized informational asymmetry. Several empirical studies have been conducted to show that the demand for financial intermediaries is increasing (Allen & Santomero, 1997, 2001; Scholtens &

Wensveen, 2000, 2003). Allen and Santomero (1997) and Holmstrom and Tirole (2000) suggested that due to a rapid change in the development of financial intermediaries, the traditional focus of intermediation theory, such as transaction costs and asymmetric information, are less relevant in explaining the development of the intermediaries. They implied that technological revolution and enhancement have substantially reduced the cost of information and information asymmetry. In a later study, Allen and Santomero (2001) found that the traditional banking business of accepting deposits and making loans has declined significantly in the United States. The trend shows that there is a switch to pension funds and mutual funds from directly held assets. However, banks have maintained their positions relative to the gross domestic product by innovating and switching from their traditional business to fee-producing activities such as trusts, annuities, mutual funds, mortgage banking, insurance brokerage and transaction services. Genberg (2007) supports the underlying idea and believes that the financial system should be differentiated through relationship-based and arm's-length interaction between borrowers and lenders. These transformations entail different risks and raise the issues of risk management in the financial intermediation.

Based on the above, it is noted that the financial intermediation theories are built on the role of intermediaries in the reduction of transaction costs and informational asymmetries. The significant role of financial intermediaries in new financial intermediation landscape is a result of emerging markets, including product innovations, technological advancements and prudent regulatory framework.

Islamic Banking and Financial Technology Revolution

Basically, Fintech is gaining significant momentum and causing disruption to the traditional value chain of financial institutions and to the economy, globally. Fintech companies are offered business solutions and creating a better customer experience compared to the traditional banking system and capability. Besides that, Fintech also makes financial services and financial technology accessible for the "underbanked" in the developing countries, including Malaysia. The transparent and real-time operation of Fintech innovations, like blockchain and digital currencies, are generating new unique selling preposition not just in financial services but across the economy.

Fintech is able to create and capture the benefit of consumer data, allowing more specialized products and services, and greater efficient markets and systems leading to a reduction in information asymmetry in the financial market. However, banking history has shown that banks are embedded in the economic and social ecosystem. Besides, it takes a decade to build up the infrastructures and also to develop solutions for compliance and regulatory challenges. Most importantly, the traditional bank has consumer trust, an incredibly valuable resource. In fact, some of the savviest of Fintech start-ups aren't seeking to sidestep the banks so much as to build on their existing infrastructure. By working directly with banks, start-ups have the opportunity to acquire user data which can help inform innovations at a product level and gain an invaluable understanding of an established customer base within the existing market.

In Malaysia, the Central Bank of Malaysia or Bank Negara Malaysia (BNM) has acknowledged the Fintech revolution as a catalyst for the development of progressive financial services. In October 2016, BNM issued the Financial Technology Regulatory Sandbox Framework which sets out the requirement for participating in the regulatory sandbox. This sandbox was developed to allow the regulatory flexibilities to be granted to the financial institutions in Malaysia and Fintech companies. This initiative was to experiment with the solution provided by the Fintech companies in a controlled environment which includes the appropriate safeguards and within a limited implementation period. This initiative ensured that the Malaysian financial services sector will keep up with the paradigm shift of technologies in financial services. This acknowledgement also aligns with the direction from BNM to reduce the numbers of cheques issuance and promoting e-payment directive under the e-payment currency management consultation group (ePCMCG) (Financial Stability and Payment Systems Report, BNM, 2017). The key reflections from the Regulatory Sandbox Framework are a mechanism to balance risk and innovation through tailored regulation, validation the robustness of current regulation, catalyst for change in consumer behaviour and discovery for new market opportunities. BNM focuses on ensuring the highest standard of integrity and pervasive ethical culture in the financial market in Malaysia.

Whilst alternative finance and distributed ledger technology have the potential to change the landscape of financial services, the growth of Fintech increases the risk of non-traditional competition and raises challenges for the banks and regulators.

Research Methodology

The study makes use of bank-level data for Islamic and conventional banks and macro-level data for Malaysia. It consists of panel data from 2009 to 2016. Malaysia was ranked among the high emergence of the financial technology market, that is, a number of financial technology start-ups in the countries.

One important role of Islamic bank as financial intermediary is to mobilize resource and create values using Islamic financing instruments (Muda & Ismail, 2010; Abdul-Rahman et al. 2014; Sapuan, Sanusi, Ismail, & Wibowo, 2016; Sidiqqi, 1983), for the benefits of legal owner of funds and the *ummah* as a whole. As prescribed in the *maqasid shariah*, among the objective is the protection of property and a fair and equitable distribution of resources. However, does the emergence of financial technology lead to disintermediation and disaggregation of the value created by Islamic banks? From these arguments, the empirical specification is designed to assess the bank income and financial technology and verify whether Islamic banks' income is significantly affected. The chapter structures the model as follows:

$$V_{it} =_{\beta} NI_{it} + \lambda X_{it} + \varphi_1 FT_t + \varphi_2 MS_t + \alpha_{it} + \varepsilon_{it} \tag{9.1}$$

where V_{it} is Income for Islamic banks represented by Fee-based income generated from non-traditional income activities of Islamic banks, NI_{it} is Ratio of Net income margin to Total asset, X_{it} is a vector of bank-specific variables, FT_t represents Financial technology revolution, number of online banking transactions and number of E-money transactions, MS_t is Natural logarithm of Money Supply (M3) as control variable, α_{it} *is* bank-specific effect, and ε_{it} is the common error term. The study also considers a set of bank-specific variables as follows: the natural logarithm of Total Asset (Bank size), Ratio of Total Deposit from customers (Liquidity) and Risk-Weighted Assets (Risk).

This study employs panel data estimation technique and utilizes data from Malaysia. Panel data models are able to handle data limitation and control for heterogeneity among variables. In addition, the method enables the construction and testing of more complex behavioural models, the effects that are not identifiable in pure cross-section or pure time-series data (Baltagi, 2008). This study incorporates a set of variables that are expected to affect the value creation of Islamic banks that are represented

by banks' income as found in the established empirical literature on the determinants of bank performance and profitability (e.g. Berger & Bonaccorsi di Patti, 2006; Brissimis et al., 2008; Fiordelisi & Molyneux, 2010) and Islamic bank performance (e.g. Haron, 2004; Hassan & Bashir, 2003; Muda & Ismail, 2010; Abdul-Rahman et al. 2014; Rosly & Zaini, 2008; Sapuan et al., 2016; Sufian, 2007).

Findings and Discussions

Table 9.1 shows the descriptive statistics for all variables used in the model. Data set for Malaysia, Jarque–Bera normality test results indicate that NIM (Net income margin) to Total asset, Natural logarithm of Fee-based income, Total Assets (LTA), Natural logarithm of the number of online banking transaction and number of E-money transaction are normally distributed. However, the Jarque–Bera test also indicates that at the 5

Table 9.1 Summary statistics of all variables used in the model for Islamic banks, conventional banks; and Islamic and conventional banks from 2009 to 2016

	LNTFI	*NIM*	*LNTA*	*CD*	*RWA*	*LNOBT*	*EMNT*	*LNMS*
Islamic banks								
Mean	9.5604	1.9714	16.6763	0.7096	56.2836	5.5589	1054.87	14.117
Max	12.1491	3.9900	18.9657	0.8951	98.5700	6.3784	1662.00	14.312
Min	6.5568	0.0100	15.1571	0.2434	2.5400	4.7023	698.80	13.832
SD	1.2260	0.7453	0.8446	0.1513	16.3716	0.5221	320.97	0.1682
JB	1.1617	0.4421	3.7460	34.3367	17.6866	5.0567	10.9938	11.728
Prob	0.5594	0.8017	0.1537	0.0000	0.0001	0.0798	0.0041	0.0028
Conventional banks								
Mean	12.8957	1.9781	18.3769	0.7331	62.3919	5.5506	1050.9	14.1150
Max	14.6917	2.5900	20.0222	0.8452	93.0300	6.3784	1662.0	14.3126
Min	10.6748	1.4400	17.1091	0.0581	43.7500	4.7023	698.80	13.8327
SD	0.80898	0.2463	0.7441	0.1103	10.0761	0.5243	320.31	0.1690
JB	0.13746	4.5130	5.2499	3202.77	3.3901	4.0951	9.1863	9.4510
Prob	0.93358	0.1047	0.0724	0.0000	0.1836	0.1291	0.0101	0.0089
Islamic banks and conventional banks								
Mean	11.0567	1.9744	17.4392	0.7201	59.0238	5.5552	1053.1	14.1163
Max	14.6918	3.9900	20.0222	0.8951	98.5700	6.3784	1662.0	14.3126
Min	6.5568	0.0100	15.1571	0.0581	2.5400	4.7023	698.80	13.8327
SD	1.9703	0.5763	1.1651	0.1347	14.2050	0.5220	319.92	0.1681
JB	12.5204	35.0696	5.3276	529.412	66.7607	9.1510	20.175	21.1778
Prob	0.0019	0.0000	0.0697	0.0000	0.0000	0.0103	0.0000	0.0000

percent level of significance, the null hypothesis of normality is rejected, other variables are not normally distributed.

The model specified in Eq. (9.1) serves to test the impact of Fintech revolution on Islamic banks' income which is represented by fee-based income (Non-traditional income activities): (1) Fee-based income activities are measured by the ratio of fee income from investment of shareholders' of Islamic banking fund and depositor's fund plus commissions to total asset and (2) Fintech revolution represented by the number of online banking transaction and number of E-money transaction Malaysia. This study runs three sets of models: Islamic banks, conventional banks and pooled Islamic and conventional banks to observe the behaviour in a dual banking system. Firstly, the models were estimated using panel least square method and the pooled least square regression models were tested thereafter. The models do not explicitly contain an unobserved effect, which means it assumes a constant intercept and slope of cross-section or time. Table 9.2 shows the results for the three models. The null hypothesis H_0: $\beta_{ik} = \beta_k$ is rejected and the panel data is not poolable. Secondly, the models have been estimated using a fixed-effect model to allow for different intercepts representing each bank. The redundant fixed effects test statistic and cross-section F-test were significant at the 5 percent level, thereby showing that the null hypothesis of the redundant fixed effects is rejected. The test was performed to select a better model between the pooled and fixed-effects model with the null hypothesis of H_0: $\alpha_{it}=\alpha$ and H_1: $\alpha_{it}=\alpha_i$. The Lagrange Multiplier test for random effect indicates its significance at the 1 percent level, and the null hypothesis of no effect is rejected. Thus, the random effect model is preferred. Furthermore, the Hausman test is significant at 5 percent, thereby indicating that the fixed effects model is preferable for the models in Panel C. On the other hand, the random effect models are preferable for the models representing individual Islamic and conventional banks in Panel A and B, respectively. Enders (2009) suggested that generalized least squares (GLS) should be applied if the variances of the observations are not equal and transformed data for correcting errors may be used. The current study used GLS transformed data with the cross-section weights for this model, which takes covariance of the presence regarding cross-section heteroscedasticity in estimation that allows for a different residual variance for each cross-section. The GLS weight and white cross-section produce residuals between different time periods, and varying cross-sections are assumed to be zero. The study used

Table 9.2 POLS, fixed effects and random effect models. Panel A: Islamic banks; Panel B: Conventional banks and Panel C: Pooled data for Islamic & conventional banks

Panel A: Islamic banks				
	POLS	FEM	REM	REM*
	(1)	(2)	(3)	(4)
C	−61.7720	−59.8520	−60.5491	−60.5491
	(29.6041)	(15.7405)	(15.6842)	(16.7187)
NIM	0.3819**	0.47804***	0.4624***	0.4624***
	(0.1553)	(0.1390)	(0.1293)	(0.1704)
LNTA	0.6760***	0.7911***	0.6989***	0.6989***
	(0.1256)	(0.2927)	(0.2066)	(0.2244)
CD	0.5784	0.5356	0.3902	0.3902
	(0.7348)	(0.8678)	(0.7469)	(0.8661)
RWA	0.0235***	0.0074	0.0084***	0.0084*
	(0.0061)	(0.0045)	(0.0044)	(0.0046)
LNOBT	−2.3359*	−2.2453***	−2.2466***	−2.2466***
	(1.2905)	(0.6771)	(0.6764)	(0.6687)
EMNT	0.0017	0.0015**	0.0015**	0.0015**
	(0.0012)	(0.0006)	(0.0006)	(0.0007)
LNMS	4.8691*	4.6282	4.7922***	4.7922***
	(2.4864)	(1.3828)	(1.3422)	(1.4314)
R-squared	0.3889	0.8561	0.3294	0.3294
Adjusted R^2	0.3500	0.8246	0.2868	0.2868
F-statistics	10.0012***	27.1870***	7.7197***	7.7197***
(Prob)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Likelihood test			22.25[0.0000]	
Breusch Pagan LM test			170.60[0.0000]	
Hausman test			7.20[0.4080]	
Panel B: Conventional banks				
	POLS	FEM	REM	REM*
C	3.3090	−2.1358	−1.1816	−1.1816
	(12.8084)	(8.1110)	(8.0432)	(9.5123)
NIM	0.0883	0.0900	0.1345	0.1345
	(0.2109)	(0.2214)	(0.1803)	(0.2504)
LNTA	0.9689***	0.9548***	0.9646***	0.9646***
	(0.0574)	(0.3190)	(0.1272)	(0.0819)
CD	−0.4487	−0.3876	−0.3248	−0.3248
	(0.3930)	(0.2871)	(0.2791)	(0.4494)
RWA	−0.0171***	0.0050	−0.0007	−0.0007
	(0.0045)	(0.0064)	(0.0054)	(0.0029)
LNOBT	−0.0627	−0.0634	−0.0594	−0.0594
	(0.5537)	(0.3454)	(0.3454)	(0.2298)

(*continued*)

Table 9.2 (continued)

EMNT	0.0003	0.0001	0.0002	0.0002
	(0.0005)	(0.0003)	(0.0003)	(0.0002)
LNMS	−0.4918	−0.1765	−0.2454	−0.2454
	(1.0696)	(0.7563)	(0.6824)	(0.7193)
R-squared	0.7900	0.9286	0.5226	0.5223
Adjusted R^2	0.7733	0.9120	0.4846	0.4846
F-statistics	47.2811***	55.67***	13.7606***	13.7606***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Likelihood test			13.60[0.0000]	
Breusch Pagan LM test			103.64[0.0000]	
Hausman test			3.63[0.8700]	
Panel C: Islamic banks and conventional banks				
	POLS	FEM	REM	FEM*
C	−37.3775	−35.1389	−35.7057	−35.1389
	(22.7800)	(9.4273)	(9.4179)	(10.1715)
NIM	0.2900**	0.3902***	0.4178***	0.3902***
	(0.1444)	(0.1058)	(0.1004)	(0.1469)
LNTA	1.3912***	0.8341***	1.2006***	0.8341***
	(0.0633)	(0.1995)	(0.1223)	(0.2054)
CD	0.3699	0.0144	0.0930	0.0143
	(0.5749)	(0.3979)	(0.3818)	(0.5195)
RWA	0.0268***	0.0072**	0.0097***	0.0072*
	(0.0053)	(0.0034)	(0.0033)	(0.0038)
LNOBT	−1.4046	−1.2616***	−1.2936***	−1.2616***
	(0.9947)	(0.4088)	(0.4086)	(0.3916)
EMNT	0.0010	0.0009**	0.0009**	0.0009**
	(0.0009)	(0.0004)	(0.0004)	(0.0004)
LNMS	2.0224	2.5899***	2.1701***	2.5899***
	(1.9140)	(0.8225)	(0.8012)	(0.8695)
R-squared	0.7358	0.9615	0.4217	0.9615
Adjusted R^2	0.7268	0.9544	0.4020	0.9544
F-statistics	81.9674***	136.0616***	21.4559***	136.06***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Likelihood test			40.52[0.0000]	
Breusch Pagan LM test			411.91[0.0000]	
Hausman test			15.20[0.0334]	

Note: Numbers in parentheses are standard errors and the values in [ ] are p-values. ***,** and * indicate significance at the 1%,5% and 10% levels

the weight and white cross-section of coefficient covariance corrected for the degree of freedom to amend the problems (Sargan & Bhargava, 1983).

The models underwent several diagnostic tests. One important issue in a panel data causality analysis is to consider possible cross-section dependence across states. The Jarque–Bera values show that the standardized residuals are normally distributed and the diagnostic tests confirm a cross-sectional dependency presence at the 5 percent significant level. Therefore, the current study uses the corrected standard errors and produces the results as reported in Column 4 of all models in Table 9.2.

Table 9.2 presents the panel data estimation for coefficients corresponding to each variable for POLS, random effect models, fixed-effects models, and models with corrected standard errors in each column (1) to (4), respectively.

In Panel A, the regression results for Islamic banks from the adjusted random effect model (in column 4) shows that there is positive and significant evidence of Fintech revolution which is represented by the number of E-money transactions that affect banks' income, while the number of online banking transactions appears to affect the banks' income negatively, perhaps due to the low penetration of online banking transaction for Islamic banks in Malaysia. In Panel B, the adjusted random effect model shows that both proxies of Fintech revolution do not significantly affect the bank's income for the conventional banks. The banks were aggressively invested in innovation and technology whilst indirectly switching from traditional banking to non-traditional banking activities. This result is in line with the previous study by Hunter and Timme (1986) which reported that larger banks are better equipped to use new technology and exploit the result of the cost savings and gain better efficiency. Panel C depicts the regression results for a set of pooled date of Islamic and conventional banks which represent a dual banking industry in Malaysia. It shows that both proxies for fintech revolution, the number of online banking transactions and number of E-money banking transactions are significantly affecting banks' income. The number of E-money banking transaction is part of banking services that can contribute to the banks' income directly, its nature is similar to other payment solutions such as credit card and debit card facilities. In contrast, the number of online banking transactions appeared to affect the banks' income negatively. It serves as a platform for customers to manage their account and to perform an online transaction. A high volume of internet banking cannot be translated into banks' income although it was directed by BNM to promote the

internet banking transaction through the ePCMCG initiatives. This is due to the fact that all banks in Malaysia are required to lower the fee charges for fund transfer transaction through internet banking platform.

Generally, in Malaysia, the highest contribution of online banking transactions was contributed by conventional banks. The banks have started their collaboration with Fintech companies to ensure their banks are less directly affected by the technology disruption.

Conclusions

This study aimed to analyse the role of banks in the era of Fintech, from the perspective of the theory of financial intermediation. Banks as financial intermediaries play a crucial role in mobilizing funds and allocating the resources to create values to their stakeholders. In the Islamic banking operation, fee-based income is a significant component of income derivation of providing services. The study argued that the financial technology revolution has made access to financial services at a lower cost; hence reducing potential fee-based income for Islamic banks. The study presented evidence on the impact of Fintech revolution on the banks' income in Malaysia. The present study employed a panel data approach using specific banks and country-level panel data set of Islamic banks and conventional banks from 2009 to 2016 for Malaysia. The findings indicated that Islamic banks appear to be significantly affected by the Fintech revolution due to the low penetration of online banking and larger banks are relatively investing more on the technology, resulting in cost-saving and increased efficiency. Collectively, an excessively strict licensing by a regulatory body is one of the main drawbacks preventing Fintech revolution in Malaysia. It implies that the demand for financial services from Islamic banks is still significant relative to conventional banks. However, Islamic banks should embrace the paradigm shift and the emergence of financial technology revolution promptly to sustain and create value to their stakeholders.

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CHAPTER 10

Utilizing Blockchain Technology for Post-Trade Securities Settlement: A Framework for Islamic Capital Markets in the GCC Region

Leisan Safina and Umar A. Oseni

Introduction

Financial digital innovations in form of financial technology, commonly known as fintech, attracted the attention of millions across the world. Decades of innovations have contributed significantly to the evolution and

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development of financial markets, changing the ways financial institutions interact with each other. Currently, market players predict that new technologies such as blockchain could change the market, particularly, the securities market. The European Central Bank (Pinna & Ruttenberg, 2016), European Securities and Markets Authorities (European Securities and Markets Authority, 2016), Reserve Bank of Australia (Manning, Sutton, & Zhu, 2016), Board of Governors of the Federal Reserve System (Mills et al., 2016), Bank for International Settlements (Committee on Payments and Market Infrastructures, 2017a), Bank of England (Benos, Garratt, & Gurrola-Perez, 2017) and other international financial institutions have conducted detailed studies on the potentials of blockchain technology on the securities settlement lifecycle. In 2017, the Australian Stock Exchange announced its plans to replace its existing Clearing House Electronic Sub register System (CHESS) with blockchain technology (McDowell, 2017).

Despite the increasing paradigm shift to blockchain technology, there has not been any research related to this idea on the Islamic capital markets in the GCC region. It goes without saying that the GCC region has great potential in embracing the blockchain technology to further deepen the Islamic capital market. The GCC countries captured only a tiny fraction of their digital potential: UAE – 16.4%, Qatar – 14.9%, Bahrain – 13.6%, Saudi Arabia – 11.5%, Oman – 8.2%, and Kuwait – 7.6%; hence there is always a room for improvement. This reveals the significant opportunities for digital innovations in the region (Elmasry, Benni, Patel, & Moore, 2016).

Some governments of the region have developed cornerstone strategies and visions. Under Saudi Arabia's Vision 2030, the country set an ambitious nationwide goal to become one of the top five nations in the E-Government Survey Index. In a similar vein, in a well-planned move to diversify its economy, Kuwait has introduced the "Vision 2035: New Kuwait" which includes a smart cities strategy underpinned by most advanced technological innovations. The National Innovation Strategy, which is part of Vision 2021 of the United Arab Emirates, identified digital technology as one of the top seven primary national sectors. Similarly, Qatar Vision 2030 sets the priority to create a knowledge-based economy characterized by entrepreneurship, innovation, excellence in education, the efficient delivery of public services, a world-class infrastructural backbone, and accountable and transparent government (Elmasry et al., 2016).

The GCC region has four vital elements necessary for building a Fintech ecosystem: regulatory support, business environment, financial expertise and access to capital. It is reasonable to predict that the GCC will build the ecosystem and reap broader economic benefits (Diemers, Lamaa, Salamat, & Steffens, n.d.). Therefore, leveraging on the foregoing potentials, this study aims to propose the framework for post-trade securities settlement based on blockchain technology in the GCC region.

This study is organized into five major sections. After this introductory section which sets the background of the study, section "The Post-Trade Securities Settlement in Islamic Capital Markets" discusses the lifecycle of the current securities settlement in Islamic capital markets with a focus on Saudi Arabia and Bahrain. The challenges associated with the current practice are also highlighted. This chapter has specifically excluded the discussion on the nature of blockchain technology since some previous chapters have addressed it. Section "Blockchain for Post-Trade Securities Settlement" discusses the framework of post-trade securities settlement based on blockchain technology. Section "Blockchain and Securities Settlement: Some Sharī'ah and Legal Considerations" briefly identifies some Sharī'ah and legal considerations in implementing blockchain technology for securities settlement in Saudi Arabia and Bahrain, while the last section concludes the study and identifies future research areas. It is pertinent to emphasize that this study has a number of limitations. It covers only the application of the blockchain technology to post-trade securities settlement in the GCC market with specific reference to the two jurisdictions. Issues related to the payments aspect of virtual currencies are out of the scope of this study.

The Post-Trade Securities Settlement in Islamic Capital Markets

Trade was very simple in the early days when securities were exchanged for payment on a spot basis. However, over time the transaction volumes and the complexity of market participants increased, resulting in the emergence of frictions and high cost as well as increased risks in financial markets. Market players were prompted to look for solutions to reduce the costs of transacting and improve operational and financial inefficiencies. One good example of innovations in the capital market was the introduction of electronic databases and advanced communication network to

clear and settle securities. The innovation reduced operational and liquidity costs of handling complicated, geographically diverse and multi-party transactions (Mills et al., 2016).

Today the market is at a critical junction. A blockchain-based structure of the capital markets is being developed (Peterhoff, Miller, Romeo, Patel, & Holroyd, 2014). The proponents of blockchain technology believe that the implementation of the technology in the post-trade securities settlement process will fundamentally change the market structure (Mills et al., 2016). The idea stems from the potentials of the blockchain technology to correct the inefficiencies of the current practice. For this, it is vital to highlight the challenges in the current post-trade securities settlement, which will be discussed after investigating the current securities settlement processes in the Kingdom of Bahrain and the Kingdom of Saudi Arabia.

The Saudi Arabian Post-Trade Securities Processing System

The financial system of Saudi Arabia comprises Saudi Arabian Monetary Authority (SAMA), Capital Market Authority (CMA), Saudi Stock Exchange (or Tadawul), licensed retail banks, specialized lending institutions, and private investment programmes. The Saudi Arabian Monetary Authority is the central bank of the country and was established by a Royal Decree on 4 October 1952. Before July 2003, the central bank was empowered to regulate and monitor the whole financial market activities as there was no separate authority to regulate and supervise the capital market. In July 2003, the CMA was established under the Capital Market Law by Royal Decree M/30. Since then, CMA has been the sole supervisor and regulator of the capital market. Nevertheless, the central bank still manages and regulates the clearing and settlement of government securities including floating rate notes, government development bonds and treasury bills.

The Saudi Capital Market Law provides for the establishment of the Saudi Stock Exchange (Tadawul), a joint-stock company with an independent board of directors appointed by a Decree of the Council of Ministers. Since 2001, Tadawul operates the stock exchange and the Security Depository Center (SDC). Tadawul is solely authorized to conduct transfer, deposit, settlement, clearing and ownership registration of securities traded on the exchange. As at the end of the year 2017, the market capitalization of listed companies in Tadawul was SAR 9.025 trillion ($US

2.41 trillion) by the end December 2019, as it was considered the ninth biggest market in the world in December 2019 (Zaywya, 2020).

The operation of Tadawul consists of four main areas, which are: providing listing, trading, market data and functions of a central security depository. Sellers and buyers submit orders to their respective brokers. The brokers enter the data into an electronic trading system which is linked to a central securities depositories (CSD). If the deals are matched, they are transferred to the settlement system in real-time. The trading system checks the seller's holding on the subject of the availability of the securities being sold and the buyer's account on the subject of enough cash. The buyers are required to pre-fund their accounts when the order is entered into the trading system. The corresponding buying broker blocks the required funds and transfers the funds to the broker's omnibus account once there is a trade notification. Upon any buying or selling, the broker's net cash position is updated. At 3.30 p.m. or at the end of the trading day from Saturday to Wednesday, the net position of each bank in respect of their broker clients is calculated by the depository system and transmitted to the Saudi Arabian Riyal Interbank Express (SARIE) (the payment system of Saudi Arabia) and by 3:40 p.m. final settlement of cash takes place daily (T + 0). While the settlement of equities is done at T + 0, bonds and Sukuk are settled and cleared on T + 2. Murābahah settlements in the Saudi market follow the standard T + 2 settlement process.

Each broker has to have a commercial clearing bank who acts as a guarantor and sets the broker's daily settlement cap before 10 a.m. daily. The limit cannot be exceeded even though it might be updated. The depository system monitors the broker's exposure and if the limit was exceeded, the system automatically rejects the transaction.

There are certain risk-mitigating measures to prevent the brokers' default such as pre-funding securities and cash prior trade requirement to have a bank guarantee and blocking the transactions by the depository. However, there are no guarantees against the default of the clearing bank which is a guarantor to brokers (Committee on Payments and Market Infrastructures, 2012).

The clearance and settlement of the government securities is managed by the central bank. Each commercial bank investing in government securities has a security account and current account in the central bank. In the primary market, the transactions are settled in SARIE on a T + 2 basis. And in the secondary market, the transactions are executed by sending trade confirmations between sellers and buyers. The copy of the trade

confirmation is sent to the central bank by both banks, and if they are matched, the ownership is transferred and interbank payment is settled by SARIE (Committee on Payments and Market Infrastructures, 2012).

Post-Trade Securities Clearing and Settlement in Bahrain

The financial sector of Bahrain is represented by a wide range of Islamic and conventional financial institutions including non-bank financial institutions, banks, insurance companies, investment businesses and ancillary service providers. The Central Bank of Bahrain (CBB) is the sole regulator of the whole financial market covering Islamic and conventional financial institutions. It has been undertaking significant reforms to modernize the payment, clearing and settlement infrastructure over the past two decades. The latest and most prominent were the implementation of the Real-Time Gross Settlement (RTGS) System and the Scripless Securities Settlement (SSS) System in 2007. The innovations enabled the market to conduct payment and securities-related transactions on a real-time basis.

Currently, there are two main providers of post-trade processing, clearing and securities settlement services in Bahrain which are the central bank (CBB) and Bahrain Bourse BSC (BHB). Bahrain Bourse BSC is an exchange licensed by the central bank. It facilitates trading, clearing and settlement of transactions related to mutual funds, equities and debt securities listed on BHB. By the end of 2019, the market capitalization of the Bahrain Bourse BSC was BHD 10.1 billion (circa $US 3.9 billion) with 44 listed companies. Since 1977, the central bank issued government securities and since June 2007 it issued such securities in a scriptless form in the SSS System.

Government securities are settled by the SSS System on a Delivery versus Payment (DVP) 1 basis which means the immediate settlement of cash leg in the RTGS System and securities leg in the SSS System. The securities are transferred between a buyer and a seller without corresponding fund transfer. Each security is entitled by an International Securities Identification Number. The SSS System sends the matching deals and immediately starts the settlement process. If a buyer and a seller have sufficient holdings, the System first settles the transfer of funds directly through the parties' settlement accounts in the RTGS System. After the payment has been made, the system sends securities settlement advice to the parties. Once the funds and securities are transferred it is irrevocable. In case there are no sufficient securities in the seller's account, the

future-dated transaction is possible for the members which might be up to 10 calendar days. Even though the government securities transactions are settled trade-by-trade and on a real-time basis, the SSS System has operating hours limitation. It is open from 8 a.m. to 2.11 p.m. from Sunday to Thursday.

Securities listed on the Bahrain Bourse and traded at the Automated Trading System (ATS) are cleared and settled at the Central Securities Depository, which is a division of the Bahrain Bourse. Apart from clearing and settlement function, the Depository operates the Central Securities Registry and issues the International Securities Identification Number (ISIN) for securities issued in Bahrain. Every investor has a unique National Investor Number (NIN). Even though the NIN is unique for every investor, an investor might have several trading accounts with different members and securities might be transferred from one account to another one.

As for the flow of securities settlement process at the Depository, once the trade is executed on the ATS, it is sent to the clearing system at the Depository. The system calculates the net clearing obligations in real-time. At 13:30 or after half an hour after the trading session is completed, the final settlement reports are issued to members. The transfer of securities from a seller's account to the buyer is executed electronically upon the execution of the trade, thus enabling the new owner of the securities to sell it in the same trading session. The final settlement and transfer of the ownership of securities in electronic book-entry form takes place on the second market day following the trading day (T + 2) at 9.15 a.m. on a DVP 2 basis.

Bahrain Bourse undertakes a number of risk management measures. The main one is the timely settlement of net obligations of each member which is supported by the Guarantee fund and Liquidity Reserve. All members of the Bahrain Bourse are licensed by the central bank, and one of the requirements to get the license is to pay the prescribed minimum contribution to the Guarantee Fund. The amount varies according to the membership category; it is held at the settlement bank and represents the trading cap of a member. If a member is willing to exceed the trading cap, he/she must obtain permission from the central bank and deposit the total amount in the liquidity reserve account not later than 9:15 a.m. on the following day after the trade (T + 1). The Fund is a cushion to ensure each member settles their payment obligations by 9:15 a.m. on the settlement day (T + 2). If a member does not settle the payment obligation, the

settlement bank informs the depository and the depository uses the Guarantee fund to settle the debt. According to Resolution 20 of 2001 with respect to the clearing, settlement and central depository procedures, a defaulting member is obliged to transfer an amount due to the Guarantee fund account.

Liquidity Reserve ensures the settlement of the due amount on the settlement day (T + 2). On the next day after the transaction (T + 1) before 9:15 a.m., a member is required to pay 30% of the trading transaction and on T + 2 the remaining 70% of the trading transaction. The Reserve is settled in the central bank's settlement account. If a member fails to pay the amount due on T + 1, the central bank immediately ceases trading services for such a member. From the settlement account, the funds are transferred to the central bank's clearing account on T + 2 at 9:15 a.m. After the settlement of the cash, simultaneous transfer of the securities is performed (Committee on Payments and Market Infrastructures, 2017b).

The Challenges in the Securities Settlement

The process of securities settlement, regardless of the asset type, includes intermediaries, infrastructures and procedures from the time trade of financial securities is agreed up to the time it is finally settled. This process consists of three main functions such as order management (includes trade validation), clearing (for example, the calculation of parties' obligation), and settlement (for example, the final transfer of assets) (Benos et al., 2017). Most commonly, these functions are performed by such financial intermediaries as payment systems, central securities depositories, securities settlement systems, and central counterparties where each of them performs particular functions (Mills et al., 2016). The correct functioning of this whole system is so important that it is highly regulated and supervised by the relevant authorities; most commonly it is done either by a central bank or separate securities regulator (Benos et al., 2017).

Despite the complex nature of the system, it was mostly built before the globalization of the market and as a result, the system cannot operate 24 hours per day, 7 days a week and 365 days per a year. For example, as it has been mentioned, in Saudi Arabia the trading hours are until 3.30 p.m. from Saturday to Wednesday. Additionally, it still lacks full integration and consists of manual processes, which is one of the current limitations of the settlement (DTCC, 2016). Thus, the speed of trading

outpaces the process of completing such a transaction, which increases counterparty risk or the risk that one party in the settlement chain may default. During the time between trade and settlement, a purchaser has purely contractual rights and only after the full settlement it becomes proprietary. The settlement of securities is required up to three business days after the transaction day. Therefore, real-time or near-real-time settlement and clearing is the target of the market (Caytas, 2016).

Apart from operational issues, the cost of the process is substantial for market end-users (Benos et al., 2017; DTCC, 2016). There are different numbers in terms of industry expenditure solely for securities post-trade settlement and related functions ranging from USD12–17 billion yearly (Taliaferro et al., 2015). The cost partly results from multiple intermediations in settling a single transaction where each intermediator relies on its own system for processing, receiving and sending transactions, and is required to update the records in the chains of the intermediates. Adding the lack of standardization results in costly back-office reconciliation procedures. It is expected that up to USD2–4 billion could be saved annually by standardizing post-trade securities processing systems and making them interoperable (Taliaferro et al., 2015).

Additionally, there are issues which are relevant specifically to Islamic capital markets. Kasri and Lukman (2017) analyze the practice of contra trading from the Sharī'ah perspective. This issue is discussed in section "Blockchain and Securities Settlement: Some Sharī'ah and Legal Considerations" of this study under the relevant discussion on the Sharī'ah perspective.

In order to overcome the above-identified challenges, this study proposes the use of blockchain technology for post-trade securities settlement in the Islamic capital market. It is, however, important to emphasize that the European Securities and Markets Authority highlighted four possible ways of blockchain adoption in the securities markets, which are, a *tool of internal technological improvement* of the existing system, *total replacement of the current market participants* and market infrastructure, the *median between the first and the second*, and lastly, a *status quo* or the current securities market will prevail over the blockchain-based new system (European Securities and Markets Authority, 2016). There are various strategies, but the goal is the same: to survive and generate profit from digital disruption. Banks need an open innovative mindset to join the game (Menat, 2016).

Blockchain for Post-Trade Securities Settlement

The importance of a robust and efficient national payment and securities settlement systems cannot be underestimated. A number of studies have been conducted to understand potential benefits, challenges and the main risks of blockchain implementation in the securities market (Benos et al., 2017; Committee on Payments and Market Infrastructures, 2017a; DTCC, 2016; European Securities and Markets Authority, 2016). Before proceeding with them, it is vital to highlight the main features of the post-trade securities settlement system based on blockchain technology.

There are different types of blockchain technologies and there is no "one size fits all" blockchain. The practitioners are of the opinion that private permissioned blockchain with authorized participants suits best financial markets generally and post-trade securities settlement in particular. The reason is the control of participation which is one of the features of permissioned blockchain. Financial institutions and their activities are highly regulated by the respective authorities. They are required to review all customers under the Know-Your-Customer (KYC) and anti-money laundering (AML) guidelines (European Securities and Markets Authority, 2016; Morgan Stanley, 2016). In designing the system, existing participation restrictions may be imposed. For example, in Saudi Arabia, there is a minimum capital requirement of SAR 50 million for trading participants (Committee on Payments and Market Infrastructures, 2012). Other markets have similar restrictions which are set by regulatory and supervisory authorities.

A smart contract, which is a self-executing contract, will automatize the execution of the agreement. The contract, including contractual terms such as confidential agreements, payment terms and conditions, will be written as code into the blockchain (European Securities and Markets Authority, 2016). For example, currently, in Bahrain, there are two membership types for participation in government securities transactions. Type A or direct members and Type B or indirect members. Indirect members can only participate in primary market transactions (Committee on Payments and Market Infrastructures, 2017b). A triggering event like a transfer of payment triggers the transfer of securities ownership to the respective party. Further, the contract executes itself according to the encoded terms.

The security of that information, as well as the balance of cash and assets held on accounts, may be provided by using encryption identifiers

instead of names. Most participants will not know the exact identity of the counterparty of a transaction, yet the proper operation of such a system should be put in place. Depending on the nature and the scope of the transaction, participants may get different levels of access to the network (European Securities and Markets Authority, 2016). This will allow for the anonymity of participants.

Apart from personal information, providing the security of assets held in the network is essential. The assets could be cryptographically secured by the pair of public and private keys. A public key represents the address of the asset, while a private key gives access to the asset allocated at the address represented by the corresponding public key (Financial Industry Regulatory Authority, 2017).

Any party within the network can initiate the transaction, provided he or she owns an asset or has access to the asset. After that, it is required to verify that a buyer and seller are rightful owners of the assets which they are exchanging, based on the transaction history recorded on the blockchain. The process of verification may involve one or several nodes of the network which varies depending on the verification method employed. Since there are various consensus protocols, the network is based on the private permissioned blockchain where an administrator or any other authorized participant does the verification. After the verification has been performed, the transaction is cryptographically hashed and permanently recorded on the blockchain. All verified transactions are time-stamped and consequently displayed to all participants of the network provided they are granted access to such information (Financial Industry Regulatory Authority, 2017).

As can be observed, there is an instantaneous transfer of the security and money in the transaction. From the above-analyzed case studies, one would realize that in Saudi Arabia, as in 2012, more than 90% of negotiable securities were dematerialized and immobilized in the CSD (Committee on Payments and Market Infrastructures, 2012). Similarly, in Bahrain as in 2016, all securities settled by the CSD were either dematerialized or immobilized (Committee on Payments and Market Infrastructures, 2017b) so that the titles can be transferred electronically. As for the transfer of the money, we propose the respective governments to issue government cryptocurrency, the price of which will be linked to the current fiat money of the respective country and as such it will be considered as the legal tender. Currently, central banks of such countries as Japan, Sweden and China are developing their own cryptocurrencies while Uruguay,

United Kingdom and Kazakhstan have expressed similar ambitions (Chen, 2017). It is noted that in February 2019, the Central Bank of Bahrain introduced the cryptocurrency regulation, which highlights new supervision and enforcement standards for entities providing crypt-assets services, including cryptocurrency exchanges.

Once a securities transaction is recorded in the blockchain, it is almost impossible to remove it from there. This feature of the blockchain facilitates creating unique reference database of all securities with provided ownership information. It could record the ownership of securities and safely keep the assets. Each asset will have a unique security identifier embedded in the system which is shared among all participants of the network. It is important to mention that assigning such kind of identifier is not a new concept by itself. Currently, various standard identifiers are used in the market such as the ISIN. The identifier might become an integrated part of securities trade and settlement lifecycle by bringing new solutions (European Securities and Markets Authority, 2016). Even though it was publicly known that once the transaction is verified and added to the chain, it is permanent, Accenture has developed a prototype enabling permissioned blockchain to be edited in abnormal situations to solve human errors, accommodate regulatory and legal requirements and other issues while preserving key cryptographic features (Accenture, n.d.). At the same time, in Bahrain currently, the directives and regulations issued by the central bank assure that the settlement of government securities is final and irrevocable. That is done to keep the settlement risk in the primary and secondary markets to a minimum (Committee on Payments and Market Infrastructures, 2017b).

So blockchain will speed up clearing and settlement processes by removing a number of intermediaries. Parties will be able to transact easily with each other where each party will have his or her own copies of the ledger without conflicting information. There are opinions in the market that clearing and settlement will be done in one single step or almost instantaneously (European Securities and Markets Authority, 2016). There are other opinions that the current practice of settlement is ideal in comparison with real-time settlement as it limits the frequency of the transfer of assets. But on the other hand, real-time settlement limits the counterparty risk. Therefore, it is predicted that the settlement time of securities will vary from the type of asset, the volume of transactions, liquidity requirements and other variables (Financial Industry Regulatory Authority, 2017). The smart contract may impose any necessary restrictions required by the market players.

The other substantial benefit of blockchain implementation in securities settlement is costs reduction. Smart contract based on blockchain technology streamlines middle and back office processes which are currently performed manually. The same is applicable for monitoring and reporting functions. Thus, it is expected that transaction costs will be substantially reduced (European Securities and Markets Authority, 2016).

Blockchain potentially could improve the process of collection, consolidation and sharing of the required data for reporting purposes, risk management and supervision. Regulators could have direct access to the system and the currently stored information. Additionally, they will be able to trace the history of records from the day of the inception of the system. Apart from that, the speed of access to information will be improved (European Securities and Markets Authority, 2016). Since the settlement is almost instantaneous, the counterparty risk that each party had been exposed to previously, will be almost eliminated (European Securities and Markets Authority, 2016).

Some previous studies have highlighted a number of possible issues and shortcomings of using the blockchain for securities settlement. The European Securities and Markets Authority mentioned such challenges as scalability or whether the system is operable on a large scale; interoperability with the existing systems and between the different networks; payment settlement or how to bridge fiat currency and the system; recourse mechanism or how to reverse the transaction in the case of mistakes, who will be entitled to the right of the correction; and the issue of supervision taking into the consideration the differences in securities and relevant laws in different jurisdictions. Apart from the operational challenges, the report provides a detailed discussion on such key risks as cyber-attack, fraud and money laundering (European Securities and Markets Authority, 2016). Nevertheless, it is the role of regulators to ensure some of the challenges highlighted in the report are considered and the associated risks are proactively mitigated to ensure investor protection.

Blockchain and Securities Settlement: Some Sharī'ah and Legal Considerations

The ability of the blockchain-based system to fit into the existing regulatory framework would determine its deployment and scalability. Therefore, the discussion on Sharī'ah, regulatory and legal issues is pertinent. From the legal and regulatory perspective, there are two main areas that should

be covered: legality and enforceability of the records kept on such a system under the legal and regulatory frameworks of Bahrain and Saudi Arabia (European Securities and Markets Authority, 2016). In addition, from the Sharī'ah perspective, it is pertinent to discuss some key principles that support the instantaneous settlement of securities transactions in order to mitigate counterparty risk.

Legal and Regulatory Framework

In Bahrain, the Islamic capital market is regulated by the same legal framework that regulates the conventional capital market. The Central Bank of Bahrain's Capital Markets Supervision Directorate is the organ saddled with the responsibility of supervising and regulating the capital markets. The specific requirements for clearing and settlement are provided in Clearing, Settlement and Central Depository (CSD) Module of the CBB Rulebook, Volume 6. Pursuant to this law, CBB issued the Clearing, Settlement and Central Depository Rules in 2009. Under the Rules, electronic data in whatever form are considered evidence of ownership of securities. This may be interpreted to include evidence of relevant data on the blockchain.

In addition, in Bahrain, the Legislative Decree No. 28 of 2002 with respect to Electronic Transactions and its subsequent amendments (particularly the amendment made by Law N. 6 of 2012, which facilitated the implementation of the BCTS) provides a comprehensive legal framework that can be transposed to blockchain technology. The decree specifies that it is not applicable to negotiable bonds which is out of the scope of this study, as it is not Sharī'ah compliant. Interestingly, even though the decree was made in 2002 when there was no blockchain technology at all, the definitions used in the decree could be extended to blockchain technology. The explanation for that is very simple; as it has been mentioned earlier, blockchain is the combination of the old technologies. For example, an electronic agent is defined as: "a computer programme or any other electronic means used to initiate an action or to respond to electronic records or actions, in whole or in part, without review or actions by an individual at the time of the action or response".[1] An electronic agent

[1] Legislative Decree no. 20 of 2002 with respect to Electronic Transactions (the Kingdom of Bahrain), definitions.

is similar to a smart contract which is a code/program self-executing the agreement upon the fulfilment of predetermined conditions.

Further, electronic signature "means information in electronic form in, affixed to, or logically associated with an electronic record, and which may be used by the signatory to authenticate its identity".[2] From the definition, it is seen that electronic signature and private key of blockchain perform similar functions but in case of the private key, it is not restricted to authentication only. Signature-verification device defined as "means data, such as codes or public cryptographic keys, which are used for the purpose of verifying an electronic signature",[3] performs a similar function as the public key in case of blockchain. But just as the case of the private key, the function of the public key is not restricted to it.

Apart from the above-mentioned similarities, the decree states that "information shall not be denied legal effect, validity or enforceability solely on the grounds that it is wholly or partly in the form of an electronic record".[4] Similar legal enforceability is provided to electronic signature.[5] Further, the contract can be formed by the interaction of an electronic agent (computer programme) and a person or by the interaction of electronic agents.[6] From the above discussion, it is clear that in Bahrain blockchain-based post-trade securities settlement will fit into the existing legal structure with some amendments either expanding the existing definitions or adding new terms. Most recently, in 2019, the newly issued regulatory framework for "Regulated Crypto-assets services" was included in this same Volume 6 that governs the capital markets in the country. The new regulations define crypto-assets as tokens operating on a blockchain platform. One of the factors the CBB will consider while giving a pre-approval of crypto-assets is the protocol and its blockchain technology which underpins it.

In Saudi Arabia, there is no difference between the Islamic capital market and the conventional market when it comes to regulation. The capital market is regulated under the Capital Market Law issued by Royal Decree No. M/30 dated 2/6/1424H. The *Trading Procedures* ("Procedures") for Saudi Stock Exchange was issued pursuant to the Capital Market Law

[2] Ibid.
[3] Ibid.
[4] Ibid., Article 5 (1).
[5] Ibid., Article 6 (1).
[6] Ibid., Article 12 (1).

in 2018. The Procedures provide for the process of placing orders and matching orders, as commonly practised in the clearing and settlement process. Article 6 of the Procedures provides that once trading is executed, the transaction shall proceed to settlement under the Securities Depository Centre Rules ("Rules"), also issued in 2018. The Rules provide for electronic transfer of securities under which the above-mentioned blockchain procedures may be considered. It is worth noting that Chapter III of the Rules provides for settlement failures and the procedure to be adopted in such circumstances. This current risk could be mitigated with the implementation of blockchain technology for securities settlement.

Similarly, in Saudi Arabia, electronic transactions are regulated by the Electronic Transaction Protection Law (promulgated by Royal Decree No. M/8 of 8 Rabi'l 1428H). The law additionally provides a legal framework for electronic transactions. Similar to the Bahrain legal framework, in Saudi Arabia, electronic transactions have full legal effect,[7] offer and acceptance of the contract may be expressed by electronic means.[8] Contracts may be concluded through automated electronic data systems previously designed and programmed to carry out such tasks on behalf of the two contracting parties. Such contracts shall be deemed valid and legally effective, notwithstanding the absence of direct intervention of any natural person in conclusion thereof.[9] Electronic Data System is defined as "one or more electronic devices or programs used to generate, retrieve, send, transmit, receive, store, display or process electronic data".[10] Similar to that in Bahrain, in Saudi Arabia, the Law provides a legal framework for operating the system based on blockchain. Also, there might be a need to amend the existing law to accommodate some specificities of blockchain technology.

The Sharī'ah Perspective

From the Sharī'ah perspective, every innovation should be in line with the higher objectives of Islamic law otherwise known as *maqasid al-Sharī'ah* to ensure the legality of it. The objectives of Islamic law aim to preserve

[7] Electronic Transactions Protection Law (promulgated by Royal Decree No. M/8 of 8 Rabi'l 1428H (March 26, 2007), Chapter Two, Article (5).

[8] Ibid., Chapter Three, Article (10).

[9] Ibid., Chapter Three, Article (11).

[10] Ibid., Chapter One, Article (1).

the benefits (*maslahah*) and prevent harm (*darar*) to human; hence, any framework or innovation that would bring benefit to the people and facilitate commercial and financial transactions without breaching any Sharī'ah principle is considered part and parcel of the Sharī'ah under the general rule of permissibility (*ibahah*). Hence, adopting blockchain technology generally in securities settlement in the Islamic capital markets of both Bahrain and Saudi Arabia is considered permissible, subject to proper regulations in place by the regulatory and supervisory authorities. It goes without saying that blockchain technology is only a process to facilitate the transaction. So, once the underlying transaction is considered Sharī'ah compliant based on approved Sharī'ah structure, the means to actualize the transaction through blockchain with a certain degree of immutability, permanence and cost-effectiveness should be acceptable to Sharī'ah scholars as well.

Maslahah or public interest is generally acceptable among Muslim jurists. *Maslahah* is considered as part of the original value proposition of law under the Sharī'ah. Therefore, any mechanism or system that promotes *maslahah* is considered part of the law. Generally, innovating mechanisms or systems that are not regulated by the Qur'an, Sunnah, and *qiyas* (analogical deduction) would ordinarily trigger the application of *maslahah* under the general purview of Islamic hermeneutic principles. It is generally understood that when it comes to matters of the commercial transaction (*mu'amalat*), human beings are required to look for the best solution that would serve the public interest. This legitimates the utilization of blockchain technology in facilitating securities settlement in the Islamic capital market.

As it has been mentioned earlier, the main issue from the Sharī'ah perspective relates to the practice of contra trading in post-trade securities clearing and settlement. The practice was accepted only based on the international industry convention to facilitate the liquidity and efficiency of the market (Kasri & Lukman, 2017). Contra trading is the practice of selling shares before the settlement of the trade. At the day of the settlement, the broker nets off between the amount payable to the original seller and the amount receivable from the new buyer for the price of the shares. Kasri and Lukman (2017) finds that the contra trader is the real owner of the shares which he or she sells to a third party as all the pillars and conditions of a valid sale and purchase transaction have been fulfilled. But there was neither physical nor constructive delivery of shares to the contra trader, the liability related to the shares had not been transferred

either. However, the Sharī'ah Standard No. 21 of the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) gives a different opinion. AAOIFI Standard No. 21 on Financial Paper (Stocks and Bonds) states:

> 3(2) It is permissible to buy and sell shares of corporations, on a spot or deferred basis in which delay is permissible, if the activity of the corporation is permissible irrespective of its being an investment (that is, the share is acquired with the aim of profiting from it) or dealing in it (that is, with the intention of benefiting from the difference in prices).
>
> 3(7) It is permissible to the buyer of a share to undertake transactions in it by way of sale to another and the like after the completion of the sale formalities and the transfer of liability to him even though the final settlement in his favour has not been made.

The main issue here which has stirred some controversy among Muslim jurists is when is liability transferred. Under the Sharī'ah, liability goes with ownership. From the case studies, it is clear that in Bahrain contra trade is practised while in Saudi Arabia it is not clear whether there is such practice or not. It is, however, important to add that in Pakistan, mere execution of transaction without a settlement is not considered full possession of the securities traded. Full possession is only considered on settlement date. Therefore, Sharī'ah scholars in Pakistan do not generally allow the sale of securities before settlement as they view it as sale before taking possession. Since this study is not specifically on contra trade, we will not be tempted to delve into the controversy. However, we would submit that the blockchain technology has the potential to lay to rest the maelstrom of controversies. The new technology allows immediate settlement of both counter-values or either of them as per the convenience of the market players. Thus, blockchain solves the Sharī'ah issue related to contra trade. Additionally, it increases the transparency and efficiency of settlement which is encouraged by the Sharī'ah.

Conclusion

Various views have been expressed on the potential of blockchain in the securities markets; some of them consider it to be able to revolutionize the operations of the industry, while others are of the opinion that the technology will bring changes but incrementally and it will take many years to

develop. However, everyone agrees that the technology has the ability to increase transparency and bring additional efficiencies but with the involvement of some new risks such as those related to data security and privacy (Financial Industry Regulatory Authority, 2017).

In this study, the benefits of adopting the blockchain technology in securities settlement have been discussed in light of the existing regulatory frameworks in Bahrain and Saudi Arabia. Emphasis on the Sharī'ah perspectives is important, as this study seeks to only focus on the Islamic capital market. However, the study finds that in both jurisdictions, the same legal and regulatory framework is used for both conventional and Islamic capital markets; hence, there is not much distinction between the two. Therefore, the approach adopted in the study is to address the legitimacy of blockchain technology from the perspective of the Sharī'ah, as it only seeks to facilitate the securities settlement process.

While this study focused on the significance of blockchain technology for post-trade securities settlement, we are not oblivious of the ongoing efforts of the laudable Arab Monetary Fund in creating an independent body for regional cross-border payments and settlements system, which is expected to state its operation by 2020. It is therefore concluded that the blockchain technology will bring not only the automation of the settlement process but rather it has the potential for an entire paradigm shift in the securities market by developing new business models and new practices (Financial Industry Regulatory Authority, 2017). Real-time or quasi-instantaneous post-trade securities settlement will almost eliminate the counterparty risk or the risk of the default of the other party (Caytas, 2016). Blockchain might reduce reconciliation costs, streamline the post-trade value chain and increase the efficiency of regulatory capital and collateral (Pinna & Ruttenberg, 2016). More importantly, the blockchain technology solves an ongoing Sharī'ah controversy on contra trading.

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CHAPTER 11

Any Luck with Bitcoin in Saudi Arabia?

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Ohoud Saud Mohammed Alfirm,
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Introduction

Internet of things (IoT) and blockchain technology has opened new horizons for novel business models and applications. News, social networking and crypto lovers have promoted the use of Bitcoin, one of the well-known cryptocurrencies of the century. Bitcoin concept, which was started in 2008 by Satoshi Nakamoto, uses cryptographic protocols and algorithm

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that can be used as payment for electronic transactions. Bitcoin provides free access to the blockchain that includes all transactions that have been executed over time without mentioning the identity of the user. Chances of failure are drastically reduced as the blockchain provides better security as each transaction has its own metadata and hash value connected to the previous transaction. Therefore, each transaction is linked to the parent block, thus creating blockchain (Karafiloski & Mishev, 2017). All these transactions are distributed and broadcasted to a decentralized network of nodes online that run the Bitcoin software which validates the transactions. Mining is the main activity that operates the blockchain while the blockchain itself is featured as a high degree of complexity of codes (Santos, 2017).

Baidu, a web service company that runs the largest search engine in China, was the first to accept Bitcoin on October 14, 2013. This action opened the door for other companies around the world to accept Bitcoin. The People's Bank of China later announced that buying, selling and dealing with Bitcoin is highly prohibited, thus Baidu immediately stopped accepting Bitcoin. The speedy growth of Bitcoin prompted governments to regulate the usage of Bitcoin. The reason for such scrutiny was to avoid people taking advantage of Bitcoin to conduct illegal transactions. Transacting with Bitcoin does not require any disclosure, reporting and inquiries on large transactions as many users try to circumvent the rules and regulation (Hendrickson, Hogan, & Luther, 2016). Over the last few years, the Bitcoin market has become highly irregulated and it was found that one-quarter of bitcoin users are involved in illegal activities (Foley, Karlsen, & Putniņš, 2019).

Bitcoin users can transact without identity and they provide power to the system, which is why no singular user is important to the process. Bitcoin accounts cannot be frozen, transactions cannot be reserved, and account holders cannot be identified (Atlam, Alenezi, Alassafi, & Wills, 2018). In contrast, traditional financial transactions can be frozen if the parties are involved in illegal activities or activities banned by the governments. Payments on a traditional network are reserved and account holders can be identified easily in the world. Some sites that encourage and use Bitcoin include SatoshiDice, bitZino and BetMoosewhick, all of which involve betting, gambling and blackjack (Hendrickson et al., 2016).

BitLegal, which tracks the legal status of Bitcoin worldwide has divided the usage into permissive, continuous and hostile. 54 nations are deemed permissive, 7 nations are with continuous status and 2 nations are hostile

(Hendrickson et al., 2016). Table 11.1 presents the market statistics of bitcoin and its astronomical rise since its launch.

Despite its tremendous growth, the legality of its usage and its spread without central authority is still questionable. There are conflicting arguments about the usage of cryptocurrency in the financial industry (Hileman & Rauchs, 2017). The risk of Bitcoin involves price volatility as firms holding the Bitcoin for investment purposes are subject to the volatility of Bitcoin price. Future legislation is another risk where most legislators around the world do not know how Bitcoin should be classified as the uncertainty of enacting laws regulating the transaction of digital currencies imposes a risk for the future value of Bitcoin. Since Bitcoin is stored in digital files on the web, it is subject to attack and theft as in the case of Mt.Gox in 2014, where 750,000 Bitcoins were lost at a value of over $400 million. Third-party reliability is another risk as the vendors of the third party who manage Bitcoin transactions are subject to insolvency. E-commerce vulnerability still exists as Bitcoin transaction are carried out online, therefore data security, authentication, identification and system integrity control must be enhanced (Grant & Hogan, 2015; Nakamoto, 2019).

Regarding the Bitcoin, the Muslim world faces another dilemma related to Halal or Haram aspect, which needs to be dealt with very carefully as it is religion-based. Asif (2018) concluded that technologies used in cryptocurrencies are Halal but different aspects related to a specific digital currency need to be investigated further before declaring it Halal or Haram.

Table 11.1 Major characteristics of bitcoin as of March 6, 2020

Parameters	*Values*
Total Bitcoin (sum of all currently existing Bitcoin)	18,255,614 BTC
Market capitalization (market value of all currently existing bitcoin)	$166,562,529,947 USD
Bitcoin price	1 BTC = $ 9,119.03 USD
Transactions last 24 h (number of transactions in blockchain per day)	332,620
Transactions average per hour	13,859
Average transaction value	2.85 BTC ($25,950 USD)
Average transaction fee	0.000069BTC ($0.63 USD)

Source: Authors compilation https://bitinfocharts.com/bitcoin/

Dubai has legalized it and is using blockchain technology for smart city plans. Saudi Arabian Monetary Agency (SAMA) has warned that dealing with Bitcoin through Internet is considered unapproved currency in Saudi Arabia. SAMA highlighted that "The standing committee warns against trading in the digital currencies or what is known as virtual currency for their negative consequences and high risks on traders as they are out of government supervision" (Kelso, 2018).

In this chapter, we explore the awareness, familiarity, adoption and ownership of digital currencies in Saudi Arabia, specifically Bitcoin, as well as the reasons for adoption and non-adoption, Saudis and non-Saudis preferred payment method, trust towards Bitcoin and its future in Saudi Arabia. This chapter is structured as follows: section "Literature Review" presents the literature on bitcoin, section "Data and Methods" is data and methods, section "Result and Discussion" is results and discussion followed by conclusion and recommendations in section "Conclusion and Recommendation".

Literature Review

Bitcoin is a cryptocurrency that is used worldwide as a payment method. It is a decentralized digital currency. In Saudi Arabia, bitcoin is still in its birth phase and is still a vague industry. Few people are aware of bitcoin and have adopted its usage in their daily life activities.

People can get hold of bitcoin by several approaches including the most common approach of "mining". Other ways are trading in the BTC exchange, buying bitcoins from people for money or selling products for bitcoins. Bitcoin can be stored in web-based wallets such as Blocchain.info and Coinbase, local or offline wallets such as the desktop and paper wallets (Abusaaq, 2014). These cryptocurrencies have built-in incentives that encourage users to trade with them. Thus, when minors solve the problems or puzzles, they receive a reward of 50 bitcoins. Also, they can receive profit after a transaction is done, the buyer or seller can offer a bonus for whoever solves a problem that verifies the transaction (Böhme, Christin, Edelman, & Moore, 2015).

SAMA has issued warnings about the risks of bitcoin transactions because it is not controlled and monitored by a central authority. In an interview with CNBC, Abdulmalik Al-Sheikh, the representative of SAMA stated that bitcoin is still too premature to warrant any regulations in central banks. They need to monitor its development for at least five more

years before deciding whether it will be a future operating cryptocurrency (Haig, 2017).

However, Saudi Arabia and the UAE are planning to create a digital currency to be used in transactions between the two countries that is backed up by banks, which is safe, unlike bitcoin. These currencies would have less cost and save more time for business and other financial services (Wachman, 2017).

Moreover, many countries and governments have prohibited dealing with digital currencies because it is still ambiguous and risky. For instance, in Pakistan, the State Bank of Pakistan has issued a warning that it is prohibited to deal with virtual currencies such as Bitcoin, Litecoin, Pakcoin etc., which is considered to be a suspicious activity (SBP, 2018). Also, USA has imposed sanctions to those dealing with digital currencies in money laundering and terrorism and whose virtual currency addresses are associated with Specially Designated Nationals and Blocked Persons such as North Korea and Cuba (Kluchenek et al., 2018). Therefore, bitcoin is still considered as a risky mode to ensure legal transactions, unstable and unsupported at governmental level in many countries (Baur, Hong, & Lee, 2018; Bouoiyour & Selmi, 2016; Jiang, Nie, & Ruan, 2018).

Table 11.2 presents the countrywide status of bitcoins volume leaders.

Data and Methods

Data was collected through a survey which included questionnaires that were adopted from the research paper "U.S. Consumers' Adoption and Use of Bitcoin and Other Virtual Currencies", which was published in 2016, and "Bitcoin Awareness and Usage in Canada" which was published in 2017. Questions were related to familiarity, awareness, adoption, non-adoption, payment method and bitcoin trust and the future of bitcoin in Saudi Arabia to get a clear understanding and image of the digital currency in the Saudi Arabian community.

Result and Discussion

This section reports the results of the survey about the awareness and familiarity, adoption, non-adoption, payment method, Bitcoin trust and future of Bitcoin in Saudi Arabia. All charts report the number of responses received for each question in the survey.

Table 11.2 Countrywide status of bitcoins: All-time country volume leader board (USD) as of March 6, 2020

S.No	*Country*	*Volume in US Dollar*
1	USA	1.44 bn
2	Russia	1.05 bn
3	UK	738 M
4	Venezuela	707 M
5	China	622 M
6	Rest of Europe	286 M
7	Nigeria	258 M
8	Australia	186 M
9	Canada	100 M
10	South Arica	98 M
11	India	73 M
12	Sweden	68 M
13	Malaysia	77 M
14	Colombia	65 M
15	Thailand	60 M
16	New Zealand	54 M
17	Norway	41 M
18	Hong Kong	41 M
19	Pakistan	36 M
20	UAE	34 M
21	Ukraine	32 M
22	Brazil	30 M
23	Kenya	25 M
24	Saudi Arabia	24 M
25	Mexico	22 M

Source: Authors compilation. http://coin.dance/volume/localbitcoins

Demographics

50% of respondents were in the age group of 25–34, 23% in 18–24 and 17% between 35 and 44. Females dominated the survey as they accounted for 67% of total responses. 92% of the respondents were Saudis, while 7% are non-Saudis. In terms of educational background, 50% were university graduate, 31% are master holders, 10% are PhD holders and 8% from high school. For employment status, there are 68% employed, 18% unemployed and 11% holding "other" status. The monthly income of the respondents ranges from SR 10,000 to SR 29,000 representing 47% from total responses, while 16% selected SR 30,000–SR49,999, 15% selected "other" and 13% for 100,000–more.

Awareness of Virtual Currency

The vast majority of people are aware of virtual currency as they represented 67% of total respondents, which included 32 female and 22 male respondents. As can be seen from Fig. 11.1, females outnumbered males in terms of awareness.

Awareness of Bitcoin

When it comes to awareness about Bitcoin, a similar observation can be seen in Fig. 11.2. The majority of people who are aware of Bitcoin is females in the age group 25–34 years which accounts for one-third of the total respondents.

Figure 11.3 explains the awareness of Bitcoin by education and income. It shows that the majority of people who are aware of Bitcoin are concentrated in the income range of 10,000 SR–29,999 SR holding tertiary degrees. It can be deduced that only people who are well educated and hold high academic degrees are aware of Bitcoin. Also, the majority of them have a good and reasonable monthly financial income.

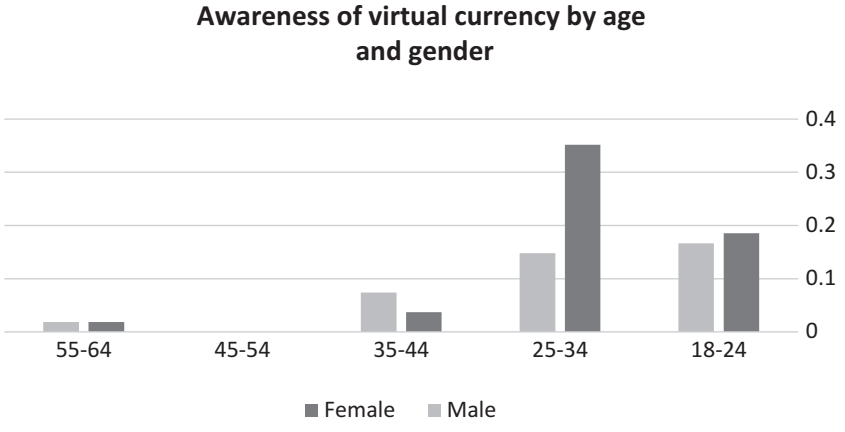

Fig. 11.1 Awareness of virtual currency by age and gender

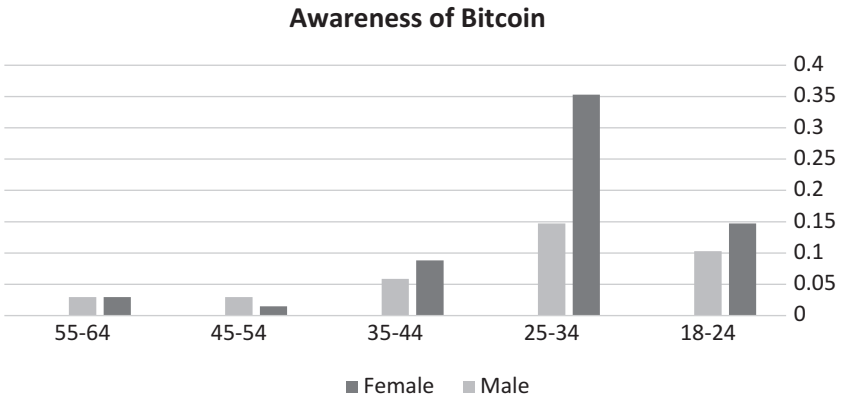

Fig. 11.2 Awareness of Bitcoin

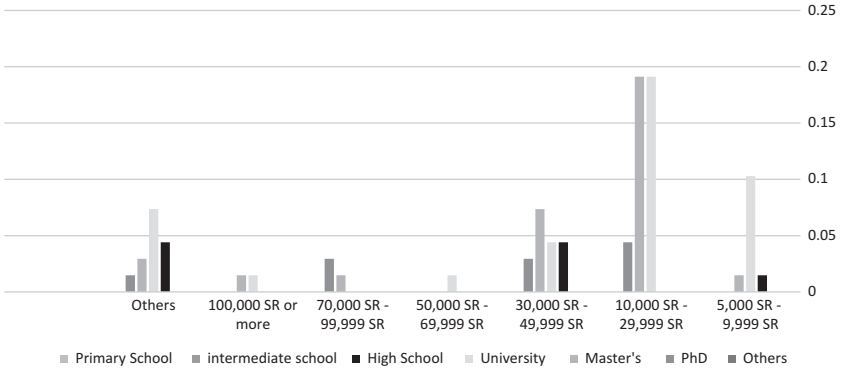

Fig. 11.3 Awareness of Bitcoin by education and income

Non-Adoption of Bitcoin

In the survey, we provided many different reasons that make people refrain from adopting Bitcoin. However, we found that the highest percentage, as shown in Fig. 11.4, based on 80 respondents, fall in different reasons. For example, 34% of 80 respondents (27) somewhat agreed that the main reason for not owning Bitcoin is that they do not understand/know enough about the technology. The survey also found that 39% (31 respondents) somewhat agree that the main reason for not owning Bitcoin is that

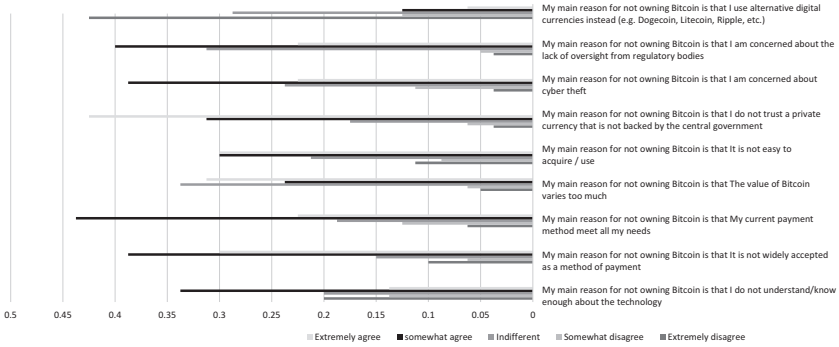

Fig. 11.4 Reasons for non-adoption of Bitcoin. (Note: This graph shows the breakdown of responses when asked about the reasons for non-adoption of Bitcoin)

it is not widely accepted as a method of payment while 44% (35 respondents) somewhat agreed that the main reason for not owning Bitcoin is that their current payment method meets all their needs. This percentage scored the highest reason for not owning Bitcoin. 43% (34 respondents) agreed that the main reason for not owning Bitcoin is that they do not trust a private currency that is not backed by the central government. Other reasons for not owning Bitcoin included, the value of Bitcoin varies too much (34%), Bitcoin not easy to acquire/use (30%), concerned about cyber theft (39%), concerned about the lack of oversight from regulatory bodies (40%). 43% (34 respondents) also extremely disagreed that the main reason for not owning Bitcoin is that they use alternative digital currencies instead (e.g. Dogecoin, Litecoin, Ripple, etc.).

Adoption of Bitcoin

When it comes to the actual usage of Bitcoin in KSA, it can be seen in Fig. 11.5, only 3 people were actual users, out of which 2 were women. All three users were in the age group of 18–44. When asked "How many Bitcoin do they have?", the respondents were careful enough not to divulge the information which shows a lack of trust and protection in terms of Bitcoin usage.

Reasons for owning Bitcoin are all concentrated in the "indifferent" option when the survey explored the reasons for owning Bitcoin. The

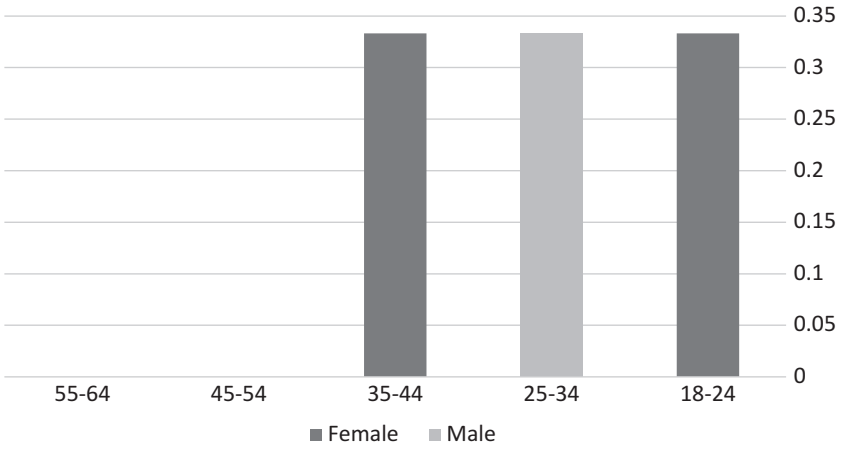

Fig. 11.5 Adoption of Bitcoin. (Note: This graph shows the breakdown of responses when asked "Do you currently have or own any Bitcoin?" and answered with "Yes")

reasons provided were "*interested in new technology*", investment tool or as a payment option for goods and services on the internet, anonymous payment. The users also showed faith in the Bitcoin due to the technology behind Bitcoin (blockchain), which made it secured and trustworthy.

Preferred Online Payment Method

When it comes to preferred online payment method, it can be seen from Fig. 11.6 that two-third of respondents are more inclined to use credit cards like Visa, American express. This shows that people are still strongly going with traditional payment methods using well-known companies like credit card companies.

Bitcoin Trust

The survey also tried to explore respondents' trust in the Bitcoin which is shown in Fig. 11.7. Almost one-third of respondents (30%) extremely disagree with using Bitcoin as a financial transaction (37%), while the bulk of the respondents put their faith in the national currency (Riyal) when

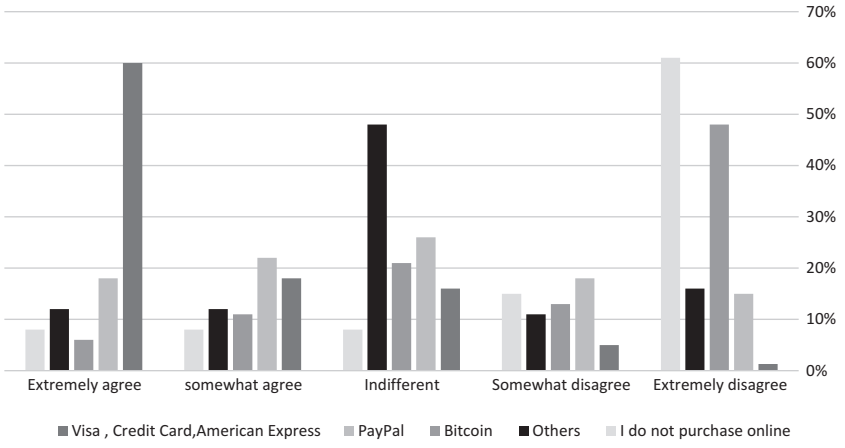

Fig. 11.6 Payment method

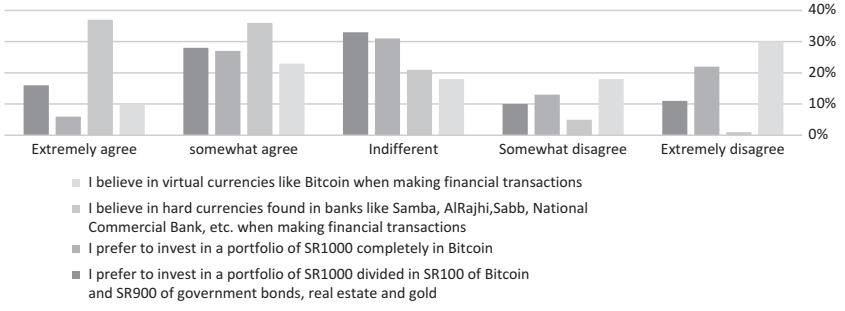

Fig. 11.7 Bitcoin trust

making financial transactions. There was some silver lining for the investment in Bitcoin as 27% somewhat agreed to invest in a portfolio of SR 1000 completely in Bitcoin.

Future of Bitcoin

Figure 11.8 presents the responses about the future of bitcoin. 31% somewhat agree that it is likely that most people will be using Bitcoin in the next 10 years, 32% somewhat agree that they will likely obtain Bitcoin in

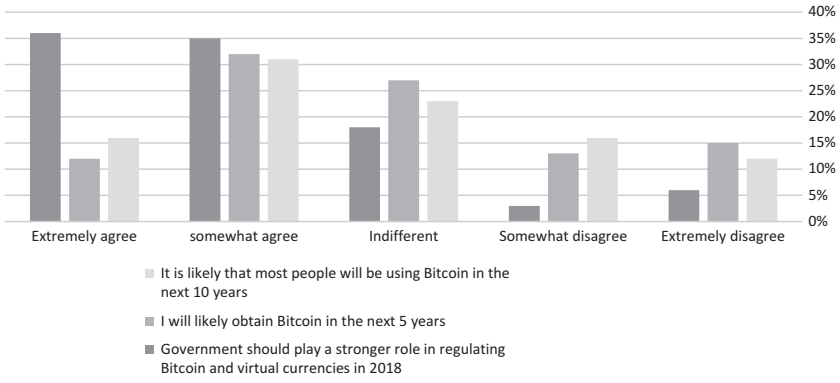

Fig. 11.8 Future of Bitcoin

the next 5 years, 36% extremely agree that government should play a stronger role in regulating Bitcoin and virtual currencies.

Conclusion and Recommendation

Bitcoin has emerged as an alternative to real cash which is gaining ground due to technological advancement. Some countries in future may adopt and deploy the use of Bitcoin among its official monetary transaction and take benefit of it. The lack of a central governing agency for digital currency and issue of volatility remains a big hindrance to making it official. The use of Bitcoin as an investment or a medium of exchange involves great risk and requires cautious consideration. Grant and Hogan (2015) indicated that Bitcoin has caught the attention of large and small firms for investment. Bitcoin acceptance is becoming increasingly welcome by users, therefore it requires accounting agencies to set some proper measures for accounting and reporting of Bitcoin. Firms considering dealing with Bitcoin must take strict precautions by establishing strong internal controls. This research which is constrained with a small sample size shows the factors behind the adoption of Bitcoin in KSA and gives an insight into how people perceive the usage of Bitcoin and what could hinder its adoption.

Future research should be conducted to confirm the results obtained from this limited sample size. This can be extended to the Middle East region to get a better insight into Bitcoin's future.

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CHAPTER 12

Strategic Assessment of Islamic Fintech in GCC Countries

Tariq Gulrez

Introduction

Shari'ah-compliant Islamic finance sector has an excellent opportunity to leapfrog growth by leveraging disruptive technologies such as artificial intelligence, Blockchain, big data, robotics, etc. that is driving the Fourth Industrial Revolution (Schwab, 2018).

Fundamentals of Islamic finance originate from the Holy Quran and Hadith where activities involving Riba' (interest), Gharar (uncertainty), Maysir (gambling) and Trading in alcohol and illegal drugs, etc. are strictly forbidden. The fundamental differences between Islamic and Conventional banking are (Institute of Islamic Banking and Insurance, n.d):

1. Community interest takes priority over individual interests.
2. Relieving hardship takes precedence over promoting benefit.
3. A bigger loss cannot justify easing a smaller loss.
4. Bigger benefit takes precedence over a smaller one.
5. Positive social impact takes precedence over profit.

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Islamic Financial Institutions (IFIs) primarily target Muslims in their respective markets to invest, earn, borrow and save according to Sharia'h principles. A strategic approach by the Islamic finance industry could increase market access by attracting non-Muslim as well as followers of Islam. Muslim population is expected to reach 2.2 billion by 2030 according to Pew Research Center's Forum on Religion & Public Life. Projections show that the concentration of Muslims will be high around the Asia-Pacific (59.2 percent), MENA (20.1 percent) and sub-Saharan Africa (17.6 percent) (Pew Research Center, 2019).

Globally, 31 percent of adults (≈1.7 billion) are unbanked and do not have an account at a financial institution or mobile money provider. They are concentrated in developing economies, with China having 225 million adults without an account, followed by India (190 million), Pakistan (100 million), and 95 million in Indonesia (World Bank Global Findex database, 2017). Females account for approximately 980 million or 56 percent of all unbanked adults worldwide.

Around 30 percent of unbanked adults are young—between 15 and 24 years old. Generation Z, born after 1997 (Business Insider, n.d), is raised in the hyperconnected world and are expected to have high expectations from digital financial services. Crucial traits of Generation Z are that they understand technology intuitively, instinctively see that de-siloing information and technology is vital to long-term success and they crave mobility (Stack, 2018). These factors should be well kept in mind while developing Islamic finance products and services for the next generation.

The Islamic Finance Development Report 2018 shows that the global Islamic finance industry grew year-on-year by 11 percent and stands at USD 2.4 trillion in assets. Iran, Saudi Arabia, and Malaysia remain the largest Islamic finance markets in terms of assets, while Cyprus, Nigeria and Australia saw the most rapid growth. Iraq, Suriname, Nigeria and Ethiopia are crowned as emerging Islamic finance markets that had the most improvements in their financial and supporting ecosystems (Thomson Reuters, 2018).

In line with the global nature of Quranic principles, Sharia'h-approved financial technology innovations (Islamic Fintech) should be developed to reach all; particularly unserved people, underserved populations, regions with growing Muslim population, countries showing the most growth in Islamic finance, emerging markets and those in rural communities that have abstained from conventional banking services due to reach, religious or ethical reasons. While developing Islamic Fintech, we must never lose

sight of fundamentals upholding ethical standards, and moral and social values that Allah SWT revealed in Surah Al-Baqarah, verse 188:

> *And do not consume one another's wealth unjustly or send it [in bribery] to the rulers in order that [they might aid] you [to] consume a portion of the wealth of the people in sin, while you know [it is unlawful].*

Since 2017, several jurisdictions in the GCC region (Lotha, G., 2019) started competing to establish themselves as the region's Fintech hub. Regulatory bodies in these countries started developing an ecosystem conducive to new financial alternatives and attracting international talent to stimulate innovation domestically.

Alongside official development assistance, SDG implementors are continuously exploring new approaches of partnerships and innovative sources of finance e.g. private investments, faith-based funds and social giving. With proper alignment and initiatives, Islamic finance can emerge as an effective tool for financing SDG implementation worldwide and attract people from all faiths and regions towards ethical Islamic Fintech (IF) platforms. To overcome initial apprehensions, one of the approaches would be to reach the unserved or underserved population via SDG financing, which is already approved and comes with global acceptance.

Such global access and international acceptance would be difficult to achieve without proper governance, streamlined global financial policies and a conducive regulatory environment. An agile and visionary global union of Islamic Fintech regulators can bring together international unions, industry players, regulatory bodies, Sharia'h scholars and academia to address existing gaps in the Islamic Fintech ecosystem and guide future developments.

Fintech in MENA Is Ripe for Disruption

Demographic and Economic Material Factors in the MENA Region projects MENA's population to be more than 1 billion by 2100, that is, bigger than China's (McKee, Keulertz, Habibi, Mulligan, & Woertz, 2017). The region is marked with a youthful population that is expected to be early technology adopters—median age across MENA is 26.8 years old. High rates of migration, high birth rates, higher life expectancy, and lower infant mortality rates are important factors contributing to the region's population growth.

Evidence suggests that more savings do not necessarily lead to increases in credit to FIs in the MENA region. Those savings usually side step formal financial institutions. According to data from the World Bank, the number of adults who borrow from friends or family is more than five times the rate at which they borrow from financial institutions (Naceur, Cherif, & Kandil, 2014). High transaction costs make it uneconomical for Financial Institutions (FIs) to offer banking and other financial services to low-income groups in the less wealthy MENA countries. This is also true for large blue-collar expatriate populations in the wealthy GCC countries.

Another factor is the lack of sufficient Islamic financial offerings in these countries. As per an IMF research paper on financial inclusion, 34 percent of Afghan adults, 27 percent of Iraqis and Tunisians, and 23 percent of Saudis cited religious reasons for not having a bank account (Singh, 2020).

Despite the ubiquity of smartphones and internet connectivity, 86 percent of the adult population in the MENA region is unbanked, while three in every four GCC customers are ready to switch banks for a better digital experience (D'Cunha, 2017).

In the MENA, Fintech is coming of age with governments and regulators across the region thinking more deeply about the impact that Fintech companies will have on their broader economy. A few leading initiatives in the region are as follows:

1. The South African Reserve Bank (SARB) established a Fintech unit in January 2018 to monitor the impact of new technology developments on the traditional banking sector.
2. In Kenya, the payment system, M-Pesa, has grown quickly as a result of people having limited access to credit and the need for transferring money from urban to more rural areas.
3. Egypt has a growing number of Fintech start-ups as a result of collaborative efforts of the Egyptian Government and the Central Bank of Egypt (CBE) aimed at upgrading payment systems and becoming a cashless economy. Growth in digital credit lending and crowdfunding is pressing the Egyptian government to introduce a National Council for Payments, an e-Commerce law, and other regulatory reforms. Cairo launched two accelerator schools to nurture start-ups.
4. The UAE government announced plans to utilize Blockchain for 50 percent of federal government transactions by 2021. Dubai is show-

casing increased focus on Blockchain initiatives with the establishment of the Global Blockchain Council.
5. Central Bank of Bahrain (CBB) introduced the Fintech regulatory SandBox to enable foreign and domestic start-ups and financial institutions to test out technology-based products and services.
6. The Saudi Monetary Authority (SAMA) launched an initiative, Fintech Saudi, to promote and develop the Fintech industry.
7. Iran is preparing to use cryptocurrencies for conducting international business to circumvent restrictions due to US-led sanctions. The nation is recognizing cryptocurrency mining as an industry and has voiced plans to introduce a national virtual currency to facilitate international transactions with friendly countries. Iran published a draft of the cryptocurrency regulatory framework in January 2019.

With all these efforts, a range of Fintech companies has found a home in the region. Payments, remittances and mobile wallet services are of the most prominent sectors, especially in Africa. Approximately 85 percent of Fintech firms in the MENA region operate in the payments, transfers and remittances sector (Bahrain Fintech Bay, 2018). Such Fintech solutions rely on banks to provide the Know-Your-Client compliance requirements to a great extent, thus limiting themselves to banked customers and leaving out a vast majority of unbanked customers who may be encouraged to use informal remittance channels (Ratha et al., 2019).

The GCC countries, in particular, is a driving force in remittances with India, Pakistan, and the Philippines as the top three receiving countries due to its expatriate population. However, the World Bank predicts that the growth rate of remittances is likely to remain weak in MENA (at 3 percent) due to structural changes, for example, labour market 'nationalization' and introduction of value-added tax, in the GCC countries (Ratha et al., 2019).

The slowdown in remittances will boost investments in other promising segments that are inward-focused and cater to local market efficiencies like Digital Banking, Crowdfunding, Insurtech, Blockchain, Regtech, and Artificial Intelligence or support international trade like cryptocurrencies and smart contracts.

Islamic Fintech in MENA Region

MENA's population is expected to more than double in size during the first half of the twenty-first century, from 338 million in 2000 to 724 million in 2050 (UNICEF, 2019). The population of Muslims will touch approximately 439.5 million by 2030 in MENA—second after Asia-Pacific (Pew Research Center, 2011), opening up a plethora of opportunities to be unlocked by Islamic Fintech in these emerging markets.

By 2022, MENA's Fintech market is estimated to reach approximately USD 2.5 billion from USD 2 billion in 2018 (Sutton, 2018). This supports the proliferation of new Fintech start-ups with minuscule numbers in 2005 to an estimated 1845 by 2022 (D'Mello, 2019) across the region and 772 in the Middle East. The majority of these Fintech players were founded in this region while a good number of Fintechs joined from other parts of the world after recognizing the potential of this region.

A key milestone in the development of the global Islamic finance industry was the establishment of the Islamic Financial Services Board in Kuala Lumpur in 2002 with a mandate to develop prudential standards for Islamic banking and financial products.

Developments in the MENA Islamic Fintech start-up space can be categorized in two waves, that is, Fintechs that obtained Sharia'h compliance and those which were developed with Sharia'h mindset from their inception. The first-wave Islamic Fintech start-ups comprise companies that obtained Sharia'h compliance to partner with Islamic financial institutions such as Beehive P2P, Stellar and Ovamba, etc. Islamic financial institutions leveraged on these technological innovations and managed to remain competitive.

During the second wave, Fintech start-ups were conceptualized with Sharia'h mindset, for example, Wahed, Haseed and OneGram. New York–based Wahed is a Sharia'h-compliant Robo-advisor. Haseed is an Islamic robo-advisor from Saudi Arabia and listed in the DIFC Fintech Hive. Another example is the launch of UAE-based OneGram—Sharia'h-compliant cryptocurrency backed by gold.

Financial inclusion is an issue for many countries in the region where a large proportion of adults do not hold a bank account. Islamic finance topped with benefits of technology can take advantage of the region's high smartphone penetration and reach these unbanked people via apps or websites.

Put simply, Fintech is a huge sector in the region that is ripe for disruption.

Fintech Landscape and Strategic Initiatives in GCC

Conventional banks have been ahead of Islamic peers in the digital race. As Islamic Financial Institutions (IFIs) start to wake up to this threat, more attention and clarity from the Sharia'h authorities on the compliance of emerging Fintech solutions could boost the digital transformation of Islamic finance in GCC countries.

Fintech's first wave (Lovatt, 2016) in the GCC region appeared after the 2008 financial crisis and was centred on payments. This wave resulted in a minor disruption in the industry as banks controlled the pace of change. The second Fintech wave posed threats to banks as start-ups came forward to offer services that were less expensive, faster and with better user experience. Banks in GCC responded by launching mobile and online banking services to protect their market position. This wave highlighted the need for banks to partner with Fintech to gain a competitive edge via innovation labs and accelerators such as Dubai FinTech Hive.

The third wave is still in its early stage but there are signs of banks starting to adopt Blockchain-based distributed ledger technology in their operations. The pressure is mounting on GCC banks and other financial institutions to upgrade legacy IT systems and reshape their digital offerings. Several UAE banks introduced digital and mobile banking as a result, but this is just the beginning of more investments in new technologies.

Emirates NBD, which is an early adopter of advanced technology, increased its investments in digitalization to AED 1 billion over three years (Mubasher, 2018). The bank's cost-to-income ratio was 31.3 percent in 2017. Abu Dhabi Commercial Bank also recorded an increase in technology-driven expenses.

Home to the largest Fintech sector (including Islamic Fintech) in the GCC region, Dubai saw a surge of interest from Fintech start-ups and banking assets because of its location, private investments, and innovation. In November 2017, Dubai International Financial Centre (DIFC) launched a USD 100 million Fintech-focused funds and signed an agreement with the Monetary Authority of Singapore to undertake joint Fintech projects. In August, Hong Kong's Securities and Futures Commission entered into a cooperation agreement with the Dubai

Financial Services Authority (DFSA) to establish a framework for the two regulators to help each other develop the Fintech industry.

Other markets in the region are catching up fast as well. Abu Dhabi Global Market created the region's first "regulatory sandbox", allowing new products to be tested without full regulatory compliance. Bahrain and Qatar also launched their regulatory sandbox programmes and held Fintech conferences.

Over 80 percent of large financial institutions fear their business is at risk from new Fintech players, according to a PwC survey (PwC, 2017). It is a fact that capabilities of over 150 years' presence of banks are laying down the foundation for Fintech innovation in the twenty-first century globally. This cannot be ignored. Therefore, companies must cooperate and create a supportive ecosystem for each other.

Although it is hard to conclude if banks are collaborators or competitors to GCC's Islamic Fintech start-ups at this point, some banks realized that there is potential as well as risk to their fundamental business models. However, in the given environment, the region's Islamic financial institutions are expected to transform and keep pace with the rapidly evolving Fintech industry—a sector that is talent-rich, has plenty of funding, while businesses and consumers are hungry for innovative products.

Fintech Incubation and Regional Initiatives

Fintech start-ups (including Islamic Fintechs) are likely to be on the rise, helped by several government initiatives and private investments in the Gulf region. Billions are being pumped to fund innovation within this sector. Fintech start-ups in digital payments were among the first to emerge, whereas lending platforms and Blockchain have just begun.

Regionally, specialty accelerators have been established by entities such as regulators, universities and start-up support organizations that are backed by traditional financial industry players keen to explore disruptive innovations. The following lists the strategic signs of Islamic Fintech ambitions in the GCC region.

Bahrain

The Central Bank of Bahrain (CBB) released the rules on a range of activities related to crypto-assets, that is, licensing, governance, minimum capital, control, risk management, AML/CFT, standards of business conduct, avoidance of conflicts of interest, reporting, cybersecurity for crypto-asset

services, and supervision and enforcement standards for platform operator as a principal, agent, portfolio manager, adviser and as a custodian within or from the Kingdom.

RAIN is the first crypto exchange that has been established to facilitate buy, sell and the storage of cryptocurrencies in a regulated, secure and compliant way. It is licensed by the Central Bank of Bahrain (CBB) as a Crypto-Asset Brokerage.

Bahrain has issued rules on crowdfunding and peer-to-peer financing along with provisions to accommodate Sharia'h-compliant platforms.

Established in 2018, Bahrain FinTech Hub is a Fintech innovation centre developed by the Bahrain Economic Development Board and FinTech Consortium (a Singapore-based Fintech incubator). The 10,000 square foot facility offers acceleration programmes, private offices, co-working space and an events venue.

Kuwait

The Central Bank of Kuwait confirmed the development of infrastructure for issuing an e-currency in January 2018 (Library of Congress, 2018). It is planned to be different from virtual currencies and is designed to fall under the umbrella of e-payments. It could be exchanged with other currencies as well as used to make payments.

Saudi Arabia

Saudi Arabian Monetary Authority and the Central Bank of the UAE are jointly developing a proof-of-concept for common digital currency.

United Arab Emirates

Abu Dhabi published rules on virtual currencies in 2017. The UAE confirmed plans to roll out regulations for ICO by June 2019. Adab Solutions, homegrown in UAE, is preparing to launch the First Islamic Crypto Exchange.

Other strategic initiatives of the UAE government are:

- Setup of RegLab (a regulatory SandBox) by Abu Dhabi's Financial Services Regulatory Authority in 2016 with a legislative framework to boost the development of Fintech.
- The partnership of US-based start-up accelerator Plug and Play with ADGM Fintech Innovation Centre and Accelerator, Abu Dhabi. The ADGM's accelerator is open to global companies and will focus

on areas such as artificial intelligence, Blockchain, biometrics, e-payments and regulatory technology (or "Regtech"), etc. It has already secured the support of major international sponsors like Cisco and Microsoft.
- DFSA (Dubai's financial regulator) is allowing Fintech firms to develop concepts without being subject to all regulations.
- Establishment of FinTech Hive at DIFC, Dubai, in 2017, as a result of a partnership between the Dubai International Finance Centre and Accenture. It provides access to investor networks, including DIFC'S USD 100 Mn Fintech Fund.

Qatar

As of 2019, around USD 60 million has been committed to more than 30 Qatari start-ups at different stages. Qatar's specialized Fintech accelerator Qatar Fintech Hub is planned to be launched by the end of Q1 2020. It is being developed by Qatar Development Bank (QDB) in partnership with Medici and EY. Other partners include Qatar Financial Centre, the Qatar Central Bank, QNB, QIB, QIIB, and insurance companies, etc.

Oman

Oman's Islamic banking assets are the 13th largest in the world in terms of total assets (Prabhu, 2019). The Central Bank of Oman (CBO) has constituted a task force to formulate a comprehensive strategy to support the growth and uptake of Fintech in the Sultanate.

The Central Bank of Oman approved Bank Muscat's request to launch a USD 100 million strategic Fintech investment programme on 23 December, 2019. Bank Muscat will partner with reputed Venture Capital (VC) funds to create a high-quality pipeline for direct investments. The programme will target investments in Fintech companies.

Islamic Financial Institutions, in GCC, need to have a clear strategy to upgrade their capabilities and go beyond conventional offerings. Alignment with international Islamic finance regulations and appropriate positioning will open global opportunities for the GCC's Fintechs by providing reach to all unbanked, Generation Z, followers of Islam in distant pockets and SDG financing. Operating from one of the GCC countries, Islamic Fintechs have the opportunity to target global customers and, particularly, in emerging markets across the Middle East, Africa and South Asia. This expanded region is home to 3 billion people, 70 percent of whom have limited or no access to financial services (Lendlt Fintech, 2019).

Mobile subscription reached around 100 percent in 2017 in the Middle East while smartphone penetration neared 60 percent. Bahrain, the UAE and Qatar are amongst the most penetrated markets in the world in 2019. Saudi Arabia and Kuwait soon plan to join the regional bandwagon by launching 5G networks.

Crowdfunding and P2P financing could be a game changer in Islamic finance, giving wider reach and potential to close the gap for Small and Medium-sized Enterprises. SMEs generated about 60 percent of UAE GDP in 2014, while Saudi Arabia's 2020 vision seeks to boost SME contributions to its economy.

Even though Islamic banks are showing enthusiasm at the prospects and are investing in digital initiatives, according to a recent EY report (Ernst & Young, 2017), the Gulf Cooperation Council (GCC) countries are yet to establish deep Fintech ecosystems. There are considerable growth opportunities—notably from Bahrain, UAE and Saudi Arabia, as they have begun gaining traction from the global Fintech community as well as foreign investors.

Most of the Islamic Fintech initiatives are presently placed under the overall Fintech plans in GCC countries. Islamic Finance Institutes need to proactively work towards securing a large portion of the planned investments for developing Islamic platforms and modernizing the sectoral offerings.

Role of National Regulators in Islamic Fintech Development

Innovation has been a hallmark of financial institutions in nearly all countries, though at different levels. They continuously develop and adapt products, services and technology to meet the changing needs of the market. Somehow, Islamic Financial Institutes (IFIs) have been laggards in technology adoption. Concrete actions are compulsory to ensure modernization of IFIs in the Fintech era.

Currently, IFIs have many advantages in developing and adopting innovations. They do have stable funding sources, capital, and extensive customer relationships. They also have a long history of risk management, enhanced information security capabilities, mature credit modelling, underwriting processes, and compliance programmes that help protect consumers.

The latest Fintech disruptions have led to some of the greatest advancements and transformative businesses of our times. The world is witnessing increased automation in trading systems, the rise of alternative financing options like peer-to-peer (P2P) lending, equity crowdfunding, Blockchain adoption and a shift towards analytics platforms enabling informed decisions. Within Islamic Fintech, there is substantial room for growth opportunities in several areas. Two most significant of which are (1) leveraging big data and AI in providing Islamic financial services, and (2) the use of Blockchain in facilitating the growth of Islamic trade finance.

With these innovations on the rise, it is clear that the Fintech revolution will not be slowing down any time soon. We will likely see regulatory and compliance considerations as an ongoing issue in this space for the next few years.

There is a great possibility that a transaction might start within an innovative Islamic Fintech App but will then be processed by an Islamic bank or a money transfer house and disbursed via their existing network. This will give Islamic Fintechs the much-needed regulatory framework and business network to reach the physical world.

The national Islamic finance regulators need to evolve and guide the development of Islamic Fintech regulations to ensure that they thrive in this evolving environment and continue delivering Islamic financial services effectively to evolving consumers, businesses, and communities. There are a variety of agencies involved in driving Fintech agenda forward in the GCC. Unsurprisingly, not all of these agencies are moving together in unison. There are several reasons but the prominent one is the differing structure of regulatory systems (mainland vs. free-zones) in GCC countries.

Free zones operate under separate regulatory and governance structures independent of the "mainland" authorities to a greater extent. As such, the rules and regulations applicable to companies situated in free zones can drastically differ from the rules and regulations applicable to companies operating in the mainland. Understanding the differences between the two and how the regulatory frameworks apply to entities operating on the mainland, a free zone, or both are critically important.

Islamic finance and Fintech development need to be supported by strengthening the whole value chain. There is a need for standards-driven framework to efficiently connect the supply side of IFIs with the demand side of the domestic, regional and global markets. Additionally, corporate and retail consumer awareness of halal products is crucial for generating

demand. IF services should carry halal-certification, service or platform providers should highlight Sharia'h compliance and indicate if it contains non-halal service products. A certified halal payment gateway should always be used.

Collaboration between all parties would give Islamic Banks, Fintechs and other financial institutions greater opportunities, confidence and a massive influence on society in the coming years.

National Islamic Fintech regulator (a national committee or a national programme or an independent entity that has experts in Finance and Banking, Fintech, Sharia'h board and International investments) need to study and develop a modern regulatory framework to ensure that all players are receptive to responsible innovation and are open to the supervision that supports it. The modernization framework should address the following key elements:

1. Foster Culture Receptive to Responsible Innovation, Collaboration and Talent Development

   Sound considerations, strategic planning, and decision making are crucial for the success of all parties. Regulators should analyse how Islamic Financial Institutions have integrated technological innovation in their strategy and plans. All entities within the ecosystem should foster a more receptive culture towards these innovations in the Islamic finance arena for increasing market access and productivity. Regulators should also push businesses to pursue responsible innovations and alignment with SDG goals.

   It is also important to create a culture receptive to collaboration, leading to tie-ups and events that serve as a good platform for academia, training institutes and industry practitioners to produce innovative ideas in Islamic Fintech and top-notch talent.
2. Encourage Fair Access and Treatment of Islamic Finance Consumers

   Islamic Fintechs should be fulfilling their public purpose by promoting fair access to Islamic finance products and/or services and fair treatment of consumers. Islamic Fintech regulators should issue guidelines to ensure fair treatment and obligations of Islamic Fintech operators.
3. Effective Risk Management

   For proactively delivering risk management policies, the regulators should conduct frequent risk measurements in all aspects—credit risk, market risk, liquidity risk, operational risk, legal risk,

reputation risk, strategic risk, compliance risk, yield risk and investment risk. The first eight risks are common risks that are also faced by conventional banks, while the last two risks are unique risks specifically faced by Islamic Financial Institutions.

4. Formal Outreach

   National Fintech Regulators should build a formal communications strategy for consulting all stakeholders in the Islamic Fintech Ecosystem. This will provide the Islamic Fintech Regulatory team with the opportunity to discuss the most recent trends and information that may affect the stakeholders and resolve potential concerns as early as possible. Islamic Fintech regulators should also leverage marketing and education to raise consumer awareness on Islamic finance and Fintech.

5. Collaborate with International Regulators and Unions

   Islamic Fintech Regulators should coordinate and exchange ideas critical for streamlining the industry and guiding technological developments for the benefit of humanity. An Islamic Fintech Forum or Union should be established (global or regional level) to push the Islamic Fintech agenda, streamline policies and regulations, facilitate the development of green financing products and guide Islamic Fintechs towards sustainability-related ventures like agriculture, infrastructure, trading, manufacturing, renewable energy, financing women microentrepreneurs, etc.

6. Strengthen Islamic Finance Sector

   A robust Islamic Fintech industry will thrive on a strong Islamic finance sector. Islamic Fintech Regulators should adopt strategies and policies that ensure an increase in the contribution of Islamic banking and finance business in their national GDPs. Mechanisms should be put in place to regularly track market developments and transparently reflect the GDP contribution of IFIs in national accounts.

7. Strengthening Islamic Fintech Value Chain

   Regulators should develop a plan to strengthen the entire Islamic Fintech value chain in their respective countries. Islamic Fintech development must be aligned with international standards and SDG requirements for easing market access.

8. Strengthening Small, and Medium-Sized Enterprises (SMEs)

As the GCC markets mature, SMEs will absorb more and more of the workforce and contribute to national GDPs. Thus, this sector has great potential in consuming Islamic Fintech services.

9. Strengthening Competitiveness in the Digital Economy

   GCC Islamic Fintech regulators should make efforts in improving their competitiveness by adopting digitalization and deploying Sharia'h-compliant mechanisms in their operation, for example, Sharia'h-compliant digital payment gateway.

10. Promote Value-Based Intermediation

    Islamic Fintechs should consider the development of a sustainable business model that generates long-term positive impact in the community, improves environment and economy, supports SDGs, augments consumer protection, enhances consumer awareness, and boosts trustworthiness and compliance with General Data Protection Regulation (GDPR).

Observations and Conclusion

Technology disruption and its quick adoption in the Islamic financial sector are bound to open doors of opportunities that will take Islamic finance to the next level and deepen its value propositions in a more interconnected information society. The outcome from an amalgamation of the two growing Fintech and Islamic finance segments, Islamic Fintech, segments should grow exponentially and assist Islamic finance in attracting more customers, increasing efficiency, reducing costs and becoming more competitive.

Capitalizing this opportunity would need transformation to a more proactive mindset that challenges the existing norms and aggressively exploits technology to innovate. Islamic Fintech should be a part of much larger efforts among policymakers and Islamic finance regulators across the region. It is an excellent opportunity for Islamic FIs to play its role in contributing to SDG-driven long-lasting socio-economic prosperity and increasing a person's quality of life. Thus, it is recommended to develop a proactive regulatory framework in the GCC countries that is fit for this era.

Recent developments in cryptocurrencies and price fluctuations attracted the attention of nearly everybody related to the finance sector—investors, customers, regulators, exchanges, technology companies, brokers, etc. Review of Bitcoin (the most popular cryptocurrency) under the

Sharia'h principles shows that it misses the mark in a strict interpretation of what qualifies as money in Islam. It is unstable in value (Maysir) with limited circulation, exposed to Gharar and issued by a Majhool source (mining community). Bitcoin should be treated as merely a 'virtual asset' and a product that lacks intrinsic value.

The cryptocurrency (tokenized securities market) may still be relatively nascent, but wider use and robust regulations may unearth its significant potential. Also, the underlying Blockchain platform has a great prospective in increasing accountability and minimizing risks in nearly all industries. Under Sharia'h governance and defined rules, Blockchain will not only win credibility amongst a wider audience but also find deep root into the future of GCC's Islamic finance sector.

Growth drivers for Fintech in the MENA region are large unbanked population, high smartphone adoption rates, preference for mobile-based financial solutions, dynamic financial sector, government initiatives, regulatory SandBox environment, Fintech accelerators, digital infrastructure and openness of banks to collaborate (Lendlt Fintech, 2019).

Developing new services, targeting global consumers, playing beyond their boundaries and supporting internet-based international operations will be difficult for Islamic FIs in GCC to achieve with the traditional set-up. Islamic Banking industry in the region can leapfrog and attain an edge over the modern banking system if the regulators collaboratively guide proper play by Islamic Financial Institutions, Sharia'h scholars and Fintechs. Their active participation can resolve issues and lead GCC investments towards developing a modern Islamic finance infrastructure that is transparent, global and aligned with Islamic principles that are for the benefit of humanity.

Establishment of a joint Islamic Fintech Forum by GCC member countries would assist in pushing Fintech agenda, facilitating the development of green financing products and streamlining necessary regulations at a global level. The Forum can also prepare the ground for Fintechs to target sustainability-related ventures, agriculture, infrastructure, trading, manufacturing, renewable energy, women microentrepreneurs, etc.

Islamic Fintech start-ups in GCC should take advantage of the Islamic Financial Institutions' infrastructure, experience, regulatory relationships, customer and business networks, and databases. The complementing strengths of Islamic Financial Institutions and Sharia'h-compliant Fintechs can offer their innovative technology and analytics to reach international markets and provide a better customer experience at lower operating costs.

GCC countries can drive innovation and maintain healthy talent supply in Islamic Fintech space by collaborating, creating tie-ups and organizing events that serve as a good platform for academia, training institutes and industry practitioners.

Another key consideration for enabling GCC's Islamic Fintech in reaching global customers would be to promote global consumer protection policies and regulations while promoting awareness of Islamic Fintech's viability and trustworthiness at its core. General Data Protection Regulation (GDPR) compliance and other trust factors should be well considered by the region's Islamic Financial Institutions and Fintechs.

Islamic Fintech developments should proactively absorb emerging technologies—Artificial Intelligence (AI), Big Data, Quantum Computing, Mobility, Open Banking, P2P Finance, Blockchain, Cloud Adoption, and Cybersecurity. It should aim at automating labour-intensive tasks and enhancing customers' experiences by generating insights and deployment of predictive analytics.

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Index[1]

[1] Note: Page numbers followed by 'n' refer to notes.

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