The Effects of Digital Transformation and Fintech on Banking Industry: Risks and Opportunities Perspectives

Prof. Dr: Nader Alber
Professor of Finance – Faculty of Business
Ain Shams University

Dr: Muhammed Dabour
Assistant Professor of Business Administration,
Faculty of Management, Economy, and Business Technology
Egyptian Russian University

Abstract

The rise of Fintech in the past decade has received growing scholarly attention. This research surveys Fintech-related articles published in finance arena, providing a review of various theoretical frameworks used by previous research. Moreover, future research agendas in Fintech have been presented.

To capture the studies investigating Fintech adoption, this research employs each of financial technology, mobile payment, digital payment, crowdfunding, p2p lending, and digital investment. In addition, we have presened opportunities and challenges facing banking industry under such innovative Fintech products and services, supported by some scenarios for banks, regulators and FinTech operators.

Keywords

1 - Introduction

The sheer number of FinTech products and services that have emerged in recent years has clearly proved that financial digitization is a highly desirable business with high adoption rates, particularly in light of the COVID-19 pandemic that has afflicted the traditional finance industry. The current phase is considering critical for practitioners in the financial services sector. With this vast amount of technological innovations that have changed the way of doing business, transferring money, and daily transactions, the financial technology sector has become one of the most prominent sectors that receive support from decision-makers worldwide. (Agyemang et al, 2018)

Because of the growing demand for contactless, cashless payments and transactions, the finance world has evolved into a highly inventive FinTech ecosystem that continues to evolve over time. This has necessitated the identification of important FinTech game-changing developments that offer even more innovation and convenience to customers all around the world. (W´ojcik and Ioannou, 2020)

The banking industry has been affected positively and negatively, creating opportunities and threats for the banks. (Chen et al, 2021). The banks are subject to pressure from accelerated technology and social changes, which influencing the customers behavior leading to changing in the customer relationship management processes (CRM) (Kotarba, M. 2016). Strong wave of change impact on the business models is taking place, leading to growing external pressure from nonbanking technology providers as well as from the behavioral changes in the society.

The new innovators has created a confused landscape resulting in different possible scenarios, where banks may freeze, fight, form alliances with innovators, or be forced into flight by the BigTech (Ashta, and Paquerot, 2018; Dahlberg & Mallat, 2008).

2- Literature review

A lot of studies have showed the effects of innovative fintech products and services on banking industry, some of them was positive and the others negative effect on bank surviving, we could outlines it as follow:

(Addai, et., al. 2015) inspected the association between electronic banking services and client satisfaction in Ghana, study gave a proof of positive impact of reliability, availability, and convenience of electronic banking on client satisfaction. (Kotarba, M. 2016), showed key paradigm shifts in client relationships management (CRM) on the financial market and their exploration by the FinTech industry. (Worku, et,. al 2016) found effect of electronic banking on client s' satisfaction in Ethiopian banking industry, which showed that electronic banking led to

an enhancement in client satisfaction. Abramova and Böhme (2016) found in their study that perceived risk has multiple levels, which collectively have a negative impact on the use of bitcoin.

(Misati, et,. al 2017) examined the impact of fintech/digital financial services on bank performance, the results referred to the need for formulating strategies that avoid further financial exclusion of the low-income earners who may not afford smart phones, may not have access to internet or may be unfamiliar with smart phone features. (Isibor, et. al 2018) studied the Impact of electronic banking technology on client s' satisfaction and economic growth. The results showed that, fintech based banking products has improved both client s' satisfaction and caused economic growth in Nigeria.

(Kemunto, & Kagiri, 2018) studied the effects of implementation of Fintech strategies on competitiveness in the banking sector in Kenya, the study found that an increase in e banking; mobile banking; agency banking and; process automation would lead to increase in competitiveness in commercial banks. (Ryu 2018) study identified four dimensions of perceived risk factor, namely, security risk, financial risk, legal risk and operational risk, which may affect consumers' FinTech adoption intention.

(Alwi, et,. al 2019) found that Security and Privacy are the strong significant element of bank high performance towards Fintech mobile payment followed by service quality, information presentation, and ease of use. Also (Sutanto and Siek 2019), examined the influences of Fintech on traditional banking industry in Indonesian. The results showed that the payment of Fintech had hindered the banks; Fintech startups have digital strategies for adopting and developing applications that grant their client s high level of client attraction.   (Putri, et,. al. 2019) determined the level of profitability of companies before and after the emergence of FinTech products. The finding gives more contribution to the FinTech industry about the company's profitability impact of launching FinTech product. (Al Hammadi & Nobanee, 2019) surveyed and examined the role of fintech as a speedier of innovative and focus on sustainable performance of fintech, and summarized for future research and studies. (Ky et al, 2019) have examined the implications for banks in the use of FTPs and how it affects their profitability using a wide range of financial variables traditionally considered in the banking literature.

(Kammoun, et,. al 2020) examined the impact of digital finance on financial inclusion and the stability of the financial system in the context of political instability in MENA zone countries, the study found that FinTech's lending activities increase inflation, find empirical support for the FinTech's role as a driver of economic growth. (Phan et al, 2020) found that the growth of *FinTech* firms negatively influences bank performance. Also (Suharti & Ardiansyah, 2020) conducted Fintech Implementation on the Financial Performance of Rural Credit Banks. (Baber, H. 2020) assessed the impact of Fintech on customer retention in Islamic banks of Malaysia, The

study showed that payments, advisory and compliance services of the FinTech has an impact on the retention of customers while financing service which is treated as important part in conventional banking has no significance on client retention.

(Chen et al. 2021) aimed to investigate the impact of FinTech products on commercial bank's performance in China. The results showed that the perceived usefulness (PU) of FTPs has positive and significant impacts on client satisfaction, low expectation of bank employee assistance, bank's service quality and employee work efficiency, This is the first study that helps commercial banks in China understand the perception of FTPs from both client and employee perspectives. In addition (Singh et al., 2021) This study aimed to understand the impact of financial technology implementation on the profitability of Indian banks; the results display a significant positive impact of FinTech adoption on banks' profitability.

3- Fintech and Value Creation

FinTech' refers to the use of technology to deliver financial solutions (Arner et al. 2016)

Fintech as "technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services.(BCBS, 2018)

Fintech is described as a new era of digital finance worldwide that extends from applying artificial intelligence and machine learning to big data and from the use of biometric identification to blockchain technology (Arner, et al., 2018; Ashta et. al 2018).

The term "Fintech" is composed of the words "finance" and "technology." It refers to the technological emerging companies and providers of financial facilities that compete with traditional banking and financial companies (Darolles S. 2016). It also was defined as an interaction between financial service providers and clients, which shows the entire process that is intended for the user. (Amin, 2016) , Fintech is also described as a new era of digital finance worldwide that extends from applying artificial intelligence and machine learning to big data and from the use of biometric identification to blockchain technology (Arner et al, 2018). (Ashta, et,. al 2018). In addition to the FinTech is defined as the innovation and technology disruption of financial services by non-financial enterprises, with the help of FinTech, customers can participate in a variety of mobile environment services. For example, online payment, fund transfer, loan application, purchase of insurance policies, management of organisational assets and management, stock investment, mobile payment, InsureTech, P2P lending, crowdfunding, cryptocurrency, etc. (Ryu, 2018).

Such financial innovations capable of producing models of new businesses, applications, or products under digitization umbrella which resulted in decent touch for user interaction and will advance client faithfulness ending by impacting financial institutions and markets. (Amin, M. 2016; Hutapea, 2020). Technology is really creating value in financial services. (Scott et al, 2017) First, costs reduced. This is not just the processing costs within banks, but also other transaction costs; second, revenues are increased because banking becomes 24/7: Anytime, Anywhere.

The exploration of the leading key finTech sector's in the new era of digitalization requires the differentiation between the two distinct sides of the finTech coin. FinTech's simplest two expressions, as per KPMG (2017) refer to either:

- **Businesses** that use technology to change how financial services are offered to end-customers.

- **Firms** that use technology to improve the competitive advantages of traditional financial services firms by improving efficiencies, and driving new products and solutions for customers.

FinTech generally excludes pure technology providers, such as large software companies, which provide unregulated services to financial institutions.(KPMG 2017)

We could outline Opportunities (The Perceived Usefulness of Fintech products)

a - Processes Automation

b – Customer Satisfaction

c – Competitive Advantage

d - Fintech can help banks improve risk management significantly through big data

Main reasons for expanding of FinTech in banks: (Ashta and Paquerot, 2018)

a - Comfortability of clients with online money

b - Availability (anywhere, anytime)

c - Cheap communication tools (mobile, internet..,etc)

d - Cheap Computing

e - Big data analysis allows efficient targeting of clients

f - Bank staff lose interest in being locked inside a megabank

g - Banking regulation sidestepped

Largely, banks have multifactor to gain high value after last scenarios of fintech spread due to following reasons: (Augustine, 2017; Mankins, et al 2017)

- First, they know the markets and the regulations.

- Second, they have already frequent client interaction

- Third, older people feel comfortable with physical branches

- Fourth, banks have big data on client s' financials and projects, based

  on their experience.

- Fifth, banks have deep pockets and few alternative projects to finance

4 - The most popular topics of Fintech

Nowadays there is many aspects of involving information technology in financial services as follows:

4 -1 Algorithmic Trading

Algorithmic trading was defined as the use of computer algorithms to automatically make certain trading decisions, submit orders, and manage those orders after submission. (Hendershott, et al. 2011)

Opportunities:

- Larger capacity of algorithms than humans to receive and process information.

- speed advantage, often through high frequency trading, to capture deals in the market

  ahead of human investors.

- Positive effect on market efficiency, and improves market quality

- enhances price informativeness. (Du and Zhu 2014; Hasbrouck and Saar 2013;

Brogaard et al, 2014; Foucault et al, 2016)

Threats:

- introduces adverse selection costs to slow traders

- lead to a socially wasteful arms race on high frequency trading investment.

(Chaboud et al., 2014; Biais, et,.al, 2015; Hoffman 2014; Budish et al 2015; Pagnotta & Philippon 2018)

- might reduce price informativeness or reduce information acquisition. (Weller 2018)

4-2 Blockchain and Cryptocurrencies

On his, study FinTech on the dark web: The rise of cryptos.. (Todorof. M. 2019) defined the cryptocurrency as any digital currency that is secured by encryption technique on arnerthe blockchain, this technology (blockchain) is centralized among its users. (Milian et al 2019) which is freely accessed by users who agree to join the database by giving him a copy of millions of transactions with visible updates, which could be updated for each ledger by complex algorithms through network. (Dimbean, 2017)

Researchers focus on the equilibrium strategy of rational, strategic miners (Biais et al. 2019), gains from blockchain-based settlements (Chiu and Koeppl 2019), Blockchain based smart contracts (Cong and He 2019), Blockchain-based disclosures of public firms (Cheng et al. 2019) Blockchain-based bitcoin ecology (Foley et al. 2019; Easley et al. 2019; Griffin and Shams 2019). - Fintech puzzle: The case of bitcoin. Bitcoin is a popular financial asset (Chang et al. 2018)

4-3 Crowdfunding

This type of platforms is able to bring together those who need funds with those who provide funds as capital or investments (Maier, 2016), Crowdfunding can be divided into two types, reward-based and equity-based (Wonglimpiyarat, 2018).

Reward-based crowdfunding mean that individual contributes to a project or business in the hope of receiving non-financial rewards, like goods or services, at a later stage (Ferreira & Pereira, 2018) Equity-based crowdfunding mostly like conventional investments in the form of shares (Mamonov and Malaga, 2018) (Barbi and Mattioli 2019)

Researches on equity or debt-based crowdfunding centered on several key questions such as (1) the determinants of crowdfunding success; (2) behaviors of crowd funders; (3) firms' learning through crowdfunding; and (4) the relationship between crowdfunding and other sources of finance. (Du et al., 2020)

A lot of studies examined validity of crowdfunding such as (Burtch et al. 2013) examined social influence in a crowd-funded marketplace for online journalism projects, Chemla and Tinn (2020) focused on the learning behavior of firms through crowdfunding. (Cornelius and Gokpinar 2020), investigated the effect of customer investor input on crowdfunding success, (Kim and Hann, 2019) examined the relationship between the difficulty of obtaining bank loans and crowdfunding use by entrepreneurs.

4-4 Marketplace (Peer-to-Peer) P2P Lending

 P2P lending is a financial service that brings lenders and borrowers together on one platform (Fang, et., al. 2014). P2P lending providing unsecured lending where no collateral is required and applying innovative credit scoring models. (PWC, Global Fintech Report, 2017)

Peer-to-peer lending, mean that lenders bid for non-collateralized loan listings from anonymous borrowers. Based on a myriad of standardized (hard) or non-standardized (soft) information. Unlike banks, peer-to-peer platforms serve as a marketplace, a screening agency, and a matchmaker. (Suryono et., al. 2019), hard information such as, borrower's age, gender, income range, education, work experience, home ownership status, borrowing history on the platform, and credit grading assigned by the platform, while the soft information which not familiar for the banks like, residential address, photograph, friend network on the platform, and narratives or post personal stories. (Wei & Lin 2017; Rosavina, et,. al. 2019)

a large number of studies have shed light on such new innovation as follow:

(Herzenstein et,. al 2011) documented evidence of "herding" among Prosper lenders, and strategic herding behavior in peer-to-peer loan auctions. (Duarte et al. 2012) examined the role of appearance in peer-to-peer lending, (Lin *et al*. 2013) argued that friendships signify credit quality in online credit market. (Michels 2012) investigated a type of soft information, that is, the unverifiable disclosure of a borrower. (Iyer et al. 2016) also proved that standard financial and soft/nonstandard information contribute to inference in the quality of small borrowers, (Lin & Viswanathan 2013) confirmed the existence of home bias in the online lending market. (Wei and Lin 2017).studied market mechanisms in online peer-to-peer lending. (Vallee and Zeng 2019) investigated how platforms can maximize their utility through strategic information provision, wherein P2P platforms and investors jointly produce information unlike traditional lending wherein banks are the exclusive information provider. (Tang 2019) designed a conceptual framework to predict the effect of a negative shock to the bank credit supply on the quantity and

composition of P2P loans. (Du et al. 2020) studied how to mitigate moral hazard problems in P2P lending. (Suryono, et., al. 2019) examined Peer to peer (P2P) lending problems and potential solutions, showing that challenges such as, Information asymmetry, The determination of the score borrowers ne ed to utilize big data and Moral hazard.

4-5 Digital Wallets Payments and Mobile Payments

According to (IMF 2019) FinTech has already caused significant disruption in the area of payments. For consumers, finTech innovations in retail payments now combine features of mobile money with Application Programming Interface (APIs) and Quick Response (QR) codes with underlying changes to payment systems. FinTech's advances in the payments space are most apparent in the evolution of 'digital wallets'. PayPal and later Alipay addressed these issues by providing an encrypted digital wallet that stored bank, debit or credit card details enabling users to make online payments on websites via their PayPal accounts.

Developing payment systems on mobile phones with biometric fingerprints or voice payments, several innovations have emerged in the form of electronic wallets, electronic money, and payment gateways. The mobile payment system currently operates in a complex and multidimensional network with the same shared infrastructure (Dahlberg, et., al. 2015).

Many studies shed the light on digital payments, (De Luna, et,. al. 2019) aimed to compare the acceptance of the SMS, NFC and QR m-payments, from customers. (Liu & Ma 2015).examined the evolution of the mobile payments technology ecosystem. (Moon & Kim 2016) studied a payment mediation platform for heterogeneous fintech schemes. (Nabila et al., 2018), discussed Fintech acceptance factors of e-wallet and digital cash, (Omarini, 2018) showed that Fintech and the future of the payment landscape: The mobile wallet ecosystem-A challenge for retail banks. (Ogbanufe, & Kim, 2018), Compared fingerprint-based biometrics authentication versus traditional authentication methods for e-payment. (Kang, 2018) discussed Mobile payment in Fintech environment: Trends, security challenges, and services.

Other technological solutions are related but we didn't presented it here like, Artificial intelligence (AI) /machine learning (ML) /advanced data analytics, Distributed ledger technology (DLT) or Blockchain, Cloud computing.

Figure 1: Sectors of innovative Fintech services
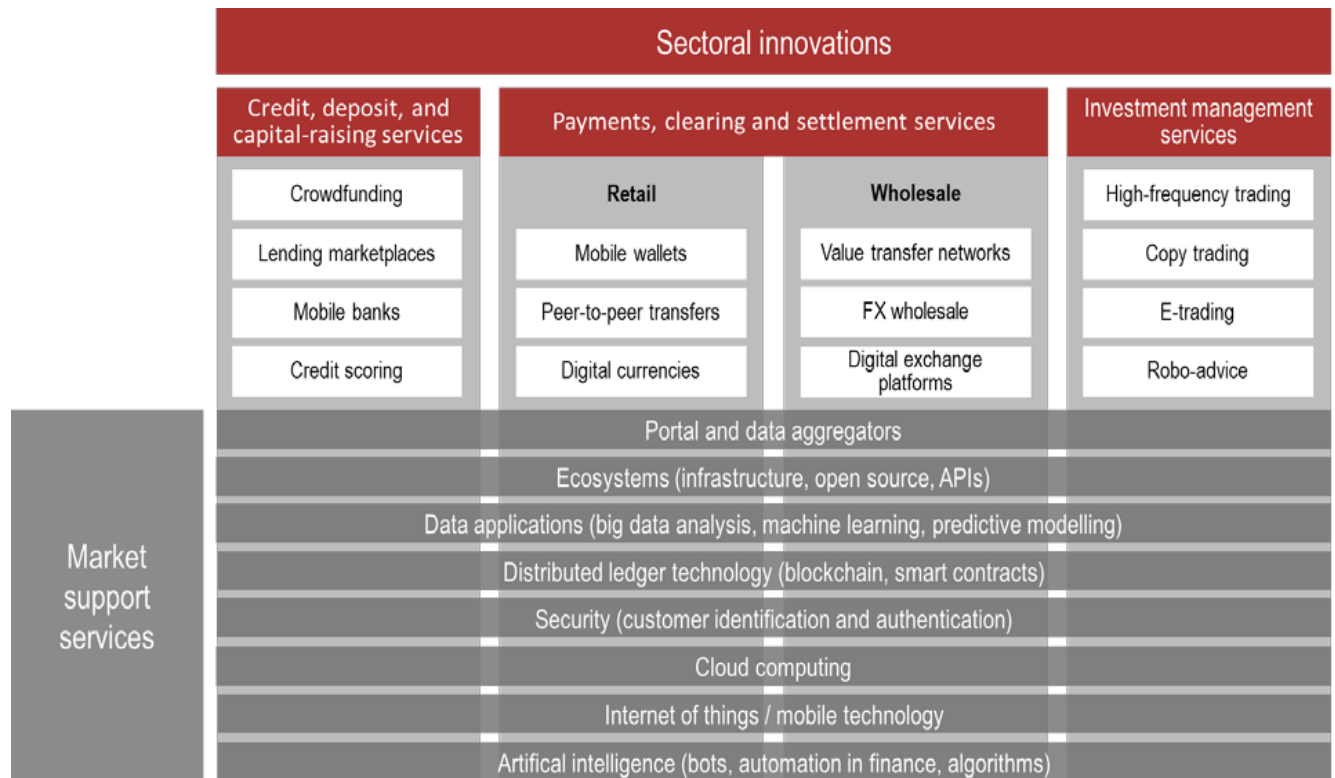
source: *Bank for International Settlements 2018 report(www.bis.org)*

5- Risks and opportunities for both consumers and banks

The rapid change in fintech; forecasting that the potential impact on banks and their business models challenging, While some market observers estimate that a significant portion of banks' revenues, especially in retail banking, is at risk over the next 10 years, others claim that banks will be able to absorb or outcompete the new competitors, while improving their own efficiency and capabilities. (McKinsey & Co, *Global Banking Annual Review*, 2015).

Figure 2: lists the new opportunities and risks identified for banks and the banking system based on a survey of existing publications on Fintech

	Risks	Opportunities
Impact on Consumer sector	* Data privacy * Data security * Discontinuity of banking services * Inappropriate marketing practices	* Financial inclusion * Better and more tailored banking services * Lower transaction costs and faster banking services

Impact on banks and banking system	* Strategic and profitability risks * Cyber-risk * Increased interconnectedness between financial parties * High operational risk – systemic * High operational risk – idiosyncratic *Third-party/vendor management risk * Compliance risk including failure to protect consumers and data protection regulation * Money laundering – terrorism financing risk * Liquidity risk and volatility of bank funding sources	* Improved and more efficient banking processes * Innovative use of data for marketing and risk management purposes * Potential positive impact on financial stability due to increased competition * Regtech

Source: Basel Committee on Banking Supervision, Feb. (2018). Sound Practices: Implications of fintech developments for banks and bank supervisors. *Bank for international settlement.*

5-1 Challenges and Risks due to innovation:

Any innovation creates change. This change translates into risk. Therefore, it is important to understand that different innovations create different types of risks (Abernathy, 1978).A number of challenges remain. The first is the digital divide: young versus old; poor versus rich; rural versus urban. A second problem is with security and privacy. This concerns privacy, hacking, and fraud. Finally, there are issues of discomfort and mistrust (Ashta and Paquerot 2018)

The behavioral changes, with the technological advancement, are redesigning the clients of financial institutions toward becoming "supreme beings of the digital universe" or "omniclients." Interactions with such client s are increasingly more demanding because traditional service schemes can no longer be applied. (Hutapea 2020)

5-2 Social empowering and behavioral changes

The different nature of the new client than before has shaped the new services paths, which the technology-enabled client is armed with tools to not only communicate and satisfy the service needs but also to evaluate the quality of the relationship with a financial institution. (Kotarba, 2016)

- Clients are becoming creators of products and services as they can digitally browse

   through

   a large pool of competitive offers and information, they naturally use the "herd power"

   (Prahalad and Ramaswamy 2004).

- They are creating their own private or public circles of followers, and then community

   opinions become the starting/ ending point of client journeys, as they are becoming

   "the judge of good and evil" by "liking" or "hating," therefore, promoting/ demoting

   across mass audiences. (Kotarba M. 2016)

5-3 The strategic options and challenges available to banks and CRM

In a fast changing and a permanent innovating world, several high-impact marketing practices may be important for many banks in terms of preserving and sustaining their customer base. CRM in retail banking is under significant pressure related to changing client behaviors. Therefore, it has to address: (Kotarba M. 2016; McCormick et al. 2014)

- Modulation of the technology and social behavior into the strategic business

   improvement

- Obvious digitalization strategy, including a permanent evaluation of market trends and

   developments in the FinTech industry.

- Development business approach for empowering setup of alliances or partnerships in

   vertical and horizontal models.

- Market Segmentation basing on sensitivity of technological and social matters,

   "omni-client" score showing the strength of individual preferences.

- Directing the infrastructure environment toward higher agility of IT, client

   intelligence functions, and design of client centric solutions with high availability and

   mobility.

- Setup of the digital office and the digitalization officer to develop and manage the

  digital roadmap with dynamic priority allocation for resource management.

- Investing in the omni-channel and omni-clients business models must be balanced

  with the primary value chain offered by the financial institution.

- Omni-channel service integration, with full mobility and online presence,

-Community linkage (catering to families/social circles/business–private relationships),

- 360º client view including profitability, preferences, change dynamics, contact history,

- Personal data security with antifraud, identity theft protection, and fast resolution,

- Scheduled and event-based notifications and alerts.

The migration of banking services to the digital space started a multidimensional revolution with the most important factors as follows: (Baran and Galka, 2016)

- Separation from the branches, reducing the dependency of core transactional services on the client advisor's skills,

- Front-to-back office transformation, creating direct relationships of clients with back

  and headoffice processes, without the necessity to use the branch,

- Automation of base transactions,

- Introduction of 24×7 operations on the technical (infrastructure) and business level

  (e.g., contact center with full accessibility),

- Increase of the digital security domain to assure proper authentication, authorization,

  and nonrepudiation, and launch of simple automated advice.

The big question now is will banks be able to capture the value?

The Scenarios available for banks: Collaborate, Compete, or Close

(Ozcan, & Santos, 2015; Weigelt & Miller, 2013; Xue et, al 2011)

- Freeze response: wait and see how the challenger develops.

- Fight or compete through making radical sustaining innovations.

- Large Banks eventually buy out the startup FinTech if it is showing potential to

  outgrow the fringe.

- Competition may be with Big Tech companies, which are bigger than banks.

- Strategic alliances with FinTech companies to create recombinant innovations and

   jointly provide services.

Where banking sector moved toward two core strategies: (1) Omni channel and (2) business partner integration.

The Omni-channel is a business and technical architecture approach where all access channels of the client journey are synchronized to allow ease of services access, where clients were being offered different ways of communication with the service provider, for example, via branches, agents, call center, or electronic banking. (Komulainen, & Makkonen, 2018). Therefore the integration of channels with intelligent devices such as sensors, trackers (e.g., geolocation), and transmitters and "Internet of Things" or "Internet of Everything" (Goldman Sachs Global Investment Research, 2014; Scott et al,. 2017)

6- RegTech and the Reconceptualization of Financial Regulation

The rapid evolution and development of FinTech demands a similar evolution and development of RegTech. Following the 2008 Global Financial Crisis, legislative changes and technology innovations are profoundly altering the nature of financial markets, services, and institutions. Particularly in the context of regulatory monitoring, reporting, and compliance, information technology is used. also RegTech refers to technological solutions to regulatory processes which allows for better and more efficient risk identification and regulatory compliance.

The focus of RegTech has been on the digitization of manual reporting and compliance processes, which resulted in cost savings to the financial services industry and regulators. (Arner et al. 2016)

Regtech could address a wide array of requirements related to regulatory reporting, financial crime, operational risk (including cyber-security and fraud detection), consumer protection and data protection regulation.

Another potential use of regtech includes risk data reporting capabilities. During the financial crisis, firms were unable to aggregate risk data and perform analytics to aggregate risk exposures in response to events in a timely fashion. These failures influenced the BCBS's compilation of the *Principles for risk data aggregation and reporting*. Regulators have placed increased expectations on firms to be able to accurately and completely aggregate risk data, with a view to improving their risk management and facilitating supervisory requests, such as supervisory stress testing. Use of AI, advanced data analytics and other emerging technologies could improve firms' ability to provide coherent and timely risk data.

7- Conclusion and Recommendations

Overall, 2021 was a very promising year for FinTech, and the current trends will almost surely grow in popularity as 2022 unfolds. Traditional financial institutions and emerging FinTech companies should keep an eye on these developments in order to get a competitive advantage over the competition and maintain their customer base while aiming to grow in an increasingly digitised world.

We have to hedge against the operating risks stemming from financial innovation, like safety of deposits from moral hazard, security in payments, data transfers and privacy considerations.

The bankers and financial institutions is melting and coping with this change requires them to figure out their strategic choices to meet such threat to their survival (Kotter & Rathgeber, 2006). Therefore, banks will have to invest in digital engagement to ensure long lasting relationships with the client, in addition to establish a monitoring system with digitally oriented Key Performance Indicators (KPIs) that will measure the impact of digitalization on value propositions. (Kotarba, M. 2016)

In the coming years, bankers will have look at FinTech startups as partners rather than competitors. (Augustine, 2017)

This is where developing a banking platform will come in handy and result in better client satisfaction. Bankers should work towards new business models where they own the client relationships and pull together FinTech resources from around the globe to generate the most value for the end client.

Banks will have to invest in digital engagement to ensure long lasting relationships with the customer. As the banks recognize this skill gap that stops them from transforming to meet the potential presented by technology – they are beginning to invest significant amounts into banking technologies they seem most relevant for their business models.

Further, the evolution of the banking industry makes it imperative that technology becomes a "core competency" with enterprise-wide engagement. The technology focus cannot be limited to the top alone, or even to an IT department cutoff from the rest of the operations.

In the coming years, bankers will have look at FinTech startups as partners rather than competitors. Remember that a bank can be the biggest customer for a FinTech company and can help them reach a newer customer base.

Banks have to take in to account the gap between current technological infrastructure and desired technological to apply fintech solutions According to Regtech, which could reached by focusing on cybersecurity and human skills improvements related to financial technology.

About demographic factors, bank units have to classify and train its employees on financial technology trends by allocating budgets for workshops and session's centers to achieve integration between current case and the desired skills effectively.

Banks have to consider difference in characteristics between each other's, to adopt processes and plans fit to every bank unit case, for applying fintech solutions efficiently.

References

Abernathy, W. J., & Utterback, J. M. (1978). Patterns of innovation in technology. *Technology Review*, 80(7), 40– 47.

Abramova, S., & Böhme, R. (2016). Perceived benefit and risk as multidimensional determinants of bitcoin use: A quantitative exploratory study. In 2016 International Conference on Information Systems, ICIS 2016.

Addai, B., Ameyaw, B., Ashalley, E., & Quaye, I. (2015). Electronic banking and customer satisfaction: Empirical evidence from Ghana. Journal of Economics, Management and Trade, 9(3), 1–8.

Agyemang-Badu, A. A., Agyei, K., & Kwaku Duah, E. (2018). Financial inclusion, poverty and income inequality: Evidence from Africa, Spiritan International Journal of Poverty Studies, 2(2), 1–19.

Al Hammadi, T., & Nobanee, H. (2019). FinTech and Sustainability: A Mini-Review. *Available at SSRN 3500873*.

Alwi, S., Alpandi, R. M., Salleh, M. N. M., & Najihah, I. (2019). An empirical study on the customers' satisfaction on Fintech mobile payment services in Malaysia. International Journal of Advanced Science and Technology, 28(16), 390–400.

Amin, M. (2016). Internet banking service quality and its implication on e-customer satisfaction and e-customer loyalty. International Journal of Bank Marketing, 34(3), 280–306.

Arner, D. W., Barberis, J., & Buckey, R. P. (2016). FinTech, RegTech, and the reconceptualization of financial regulation. *Nw. J. Int'l L. & Bus.*, *37*, 371.

Arner, D. W., Buckley, R. P., & Zetzsche, D. A. (2018). Fintech for financial inclusion: A framework for digital financial transformation. *UNSW Law Research Paper*, (18-87).

Ashta, A., & Biot-Paquerot, G. (2018). Fintech evolution: Strategic value management issues in a fast changing industry. Strategic Change, 27(4), 301–311.

Augustine, B. D. (2017). Healthy Paranoia is good for banks facing FinTech disruption. In GulfNews: November 14, 2017.

Baber, H. (2020). Impact of Fintech on customer retention in Islamic banks of Malaysia. International Journal of Business and Systems Research, 14 (2), 217–227.

Barbi, M., & Mattioli, S. (2019). Human capital, investor trust, and equity crowdfunding. *Research in International Business and Finance*, *49*, 1-12.

Baran, R. J., & Galka, R. J. (2016). Customer Relationship Management: the foundation of contemporary marketing strategy. Routledge.

BCBS, B. (2018). Sound Practices: Implications of fintech developments for banks and bank supervisors. *Bank for international settlement*.

Biais, B., Bisiere, C., Bouvard, M., & Casamatta, C. (2019). The blockchain folk theorem. *The Review of Financial Studies*, 32(5), 1662-1715.

Biais, B., Foucault, T., & Moinas, S. (2015). Equilibrium fast trading. *Journal of Financial Economics*, 116(2), 292-313.

Brogaard, J., Hendershott, T., & Riordan, R. (2014). High-frequency trading and price discovery. *The Review of Financial Studies*, 27(8), 2267-2306.

Budish, E., Cramton, P., & Shim, J. (2015). The high-frequency trading arms race: Frequent batch auctions as a market design response. *The Quarterly Journal of Economics*, 130(4), 1547-1621.

Burtch, G., Ghose, A., & Wattal, S. (2013). An empirical examination of the antecedents and consequences of contribution patterns in crowdfunded markets. *Information Systems Research*, 24(3), 499-519.

Chaboud, A. P., Chiquoine, B., Hjalmarsson, E., & Vega, C. (2014). Rise of the machines: Algorithmic trading in the foreign exchange market. *The Journal of Finance*, 69(5), 2045-2084.

Chang, T. C., & Chen, Y. L. (2018, August). Fintech puzzle: The case of bitcoin. In *2018 Portland International Conference on Management of Engineering and Technology (PICMET)* (pp. 1-6). IEEE.

Chemla, G., & Tinn, K. (2020). Learning through crowdfunding. *Management Science*, *66*(5), 1783-1801.

Chen, K. C. (2020). Implications of Fintech Developments for Traditional Banks. *International Journal of Economics and Financial Issues*, *10*(5), 227.

Chen, X., You, X., & Chang, V. (2021). FinTech and commercial banks' performance in China: A leap forward or survival of the fittest? *Technological Forecasting and Social Change*, *166*, 120645.

Cheng, S. F., De Franco, G., Jiang, H., & Lin, P. (2019). Riding the Blockchain Mania: Public Firms' Speculative 8-K Disclosures. *Management Science*, 65(12), 5901-5913.

Chiu, J., and T. Koeppl. 2019. Blockchain-based settlement for asset trading. *The Review of Financial Studies*, 32:1716–53.

Cong, L. W., & He, Z. (2019). Blockchain disruption and smart contracts. *The Review of Financial Studies*, 32(5), 1754-1797.

Cornelius, P. B., & Gokpinar, B. (2020). The role of customer investor involvement in crowdfunding success. *Management Science*, *66*(1), 452-472.

Dahlberg, T., & Mallat, N. (2008). Mobile payments service development—Managerial implications of consumer value perceptions. Helisinki: Helsinki School of Economics.

Darolles, S. (2016). The rise of Fintechs and their regulation. Financial Stability Review, 20, 85–92.

Dimbean-Creta, D. O. (2017). Fintech–already new fashion in finance, but what about the future? *Calitatea*, *18*(S3), 25.

Du, S., & Zhu, H. (2014). Welfare and optimal trading frequency in dynamic double auctions (No. w20588). *National Bureau of Economic Research*.

Du, N., Li, L., Lu, T., & Lu, X. (2020). Prosocial Compliance in P2P Lending: A Natural Field Experiment. *Management Science*, 66(1), 315-333.

Duarte, J., Siegel, S., & Young, L. (2012). Trust and credit: The role of appearance in peer-to-peer lending. *The Review of Financial Studies*, 25(8), 2455-2484.

Easley, D., O'Hara, M., & Basu, S. (2019). From mining to markets: The evolution of bitcoin transaction fees. *Journal of Financial Economics*.

Fang, Z., Zhang, J., & Zhiyuan, F. (2014, November). Study on P2P E-finance platform system: a case in China. In *2014 IEEE 11th International Conference on e-Business Engineering* (pp. 331-337). IEEE.

Ferreira, F., & Pereira, L. (2018, June). Success factors in a reward and equity based crowdfunding campaign. In *2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)* (pp. 1-8). IEEE.

Foucault, T., Hombert, J., & Roşu, I. (2016). News trading and speed. *The Journal of Finance*, 71(1), 335-382.

Foley, S., J. Karlsen, and T. Putnins. 2019. Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies? *The Review of Financial Studies*, 32:1798–853.

Griffin, J. M., & Shams, A. (2018). Is bitcoin really un-tethered. Available at SSRN 3195066.

Hasbrouck, J., & Saar, G. (2013). Low-latency trading. *Journal of Financial Markets*, 16(4), 646-679.

Herzenstein, M., Dholakia, U. M., & Andrews, R. L. (2011). Strategic herding behavior in peer-to-peer loan auctions. *Journal of Interactive Marketing*, 25(1), 27-36.

Hendershott, T., Jones, C. M., & Menkveld, A. J. (2011). Does algorithmic trading improve liquidity?. *The Journal of Finance*, 66(1), 1-33.

Hoffmann, P. (2014). A dynamic limit order market with fast and slow traders. *Journal of Financial Economics*, 113(1), 156-169.

Hutapea, R. S. (2020). The effect of financial technology (fin-tech) on customer satisfaction level (a case study on SMEs). In International seminar of science and applied technology (ISSAT 2020) (pp. 668–674). France: Atlantis Press.

International Monetary Fund, IMF Policy Paper: FINTECH: the Experience so Far, JUNE 2019,P:25

Iyer, R., Khwaja, A. I., Luttmer, E. F., & Shue, K. (2016). Screening peers softly: Inferring the quality of small borrowers. *Management Science*, 62(6), 1554-1577.

Isibor, A. A., Omankhanlen, A. E., Okoye, L. U., Achugamonu, B. U., Adebayo, M. E., Afolabi, G. T., & Ayodeji, O. E. (2018). Impact of electronic banking technology on customers' satisfaction and economic growth in Nigeria. International Journal of Civil Engineering and Technology, 9(12), 536–544.

Kemunto, E. R., & Kagiri, A. (2018). Effect of Implementation of FINTECH Strategies on Competitiveness In The Banking Sector In Kenya: A Case Of KCB Bank Kenya. *European Journal of Business and Strategic Management*, *3*(3), 29-40.

Kim, K., & Hann, I. H. (2019). Crowdfunding and the democratization of access to capital—An illusion? Evidence from housing prices. *Information Systems Research*, *30*(1), 276-290.

Kotarba, M. (2016). New factors inducing changes in the retail banking customer relationship management (CRM) and their exploration by the FinTech industry. *Foundations of management*, *8*(1), 69-78.

Kotter, J. P., & Rathgeber, H. (2006). *Our iceberg is melting: Changing and succeeding under any conditions*. New York, NY: St. Martin's Press.

Kammoun, S., Loukil, S., & Loukil, Y. B. R. (2020). The Impact of FinTech on economic performance and financial stability in MENA zone. In Impact of Financial Technology (FinTech) on Islamic Finance and Financial Stability (pp. 253-277). IGI Global.

Komulainen, H., & Makkonen, H. (2018). Customer experience in omni-channel banking services. *Journal of Financial Services Marketing*, *23*(3), 190-199.

Ky, S., Rugemintwari, C., & Sauviat, A., 2019. Is Fintech good for bank performance? The case of mobile money in the East African Community. The Case of Mobile Money in the East African Community, June 5, 2019. Hal-02155077.

Lin, M., Prabhala, N. R., & Viswanathan, S. (2013). Judging borrowers by the company they keep: Friendship networks and information asymmetry in online peer-to-peer lending. *Management Science*, 59(1), 17-35.

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

(McKinsey & Co, *Global Banking Annual Review*, 2015).

Mamonov, S., & Malaga, R. (2018). Success factors in Title III equity crowdfunding in the United States. *Electronic Commerce Research and Applications*, *27*, 65-73.

Mankins, M., Harris, K., & Harding, D. (2017). Strategy in the age of superabundant capital. *Harvard Business Review*, *95*(2), 66-75.

McCormick, H., Cartwright, J., Perry, P., Barnes, L., Lynch, S., & Ball, G. (2014). Fashion retailing–past, present and future. *Textile Progress*, *46*(3), 227-321.

Michels, J. (2012). Do unverifiable disclosures matter? Evidence from peer-to-peer lending. *The Accounting Review*, 87(4), 1385-1413.

Misati, R. N., Kamau, A., Kipyegon, L., & Wandaka, L. (2017). Is The Evolution Of Fintech/Digital Financial Services Complementary to Bank Performance In Kenya. *European Journal of Business and Management*, 2222-1905.

Milian, E. Z., Spinola, M. D. M., & de Carvalho, M. M. (2019). Fintechs: A literature review and research agenda. *Electronic Commerce Research and Applications*, *34*, 100833.

Ozcan, P., & Santos, F. M. (2015). The market that never was: Turf wars and failed alliances in mobile payments. *Strategic Management Journal*, **36**(10), 1486– 1512.

Prahalad, C. K., & Ramaswamy, V. (2004). *The future of competition: Co-creating unique value with customers*. Harvard Business Press.

Pagnotta, E. S., & Philippon, T. (2018). Competing on speed. *Econometrica*, 86(3), 1067-1115.

Phan, D. H. B., Narayan, P. K., Rahman, R. E., & Hutabarat, A. R. (2020). Do financial technology firms influence bank performance?. *Pacific-Basin finance journal*, *62*, 101210.

Putri, W. H., Nurwiyanta, N., Sungkono, S., & Wahyuningsih, T. (2019). The emerging fintech and financial slack on corporate financial performance. *Investment Management & Financial Innovations*, *16*(2), 348.

Ryu, H.-S. (2018). Understanding Benefit and Risk Framework of Fintech Adoption: Comparison of Early Adopters and Late Adopters. In Proceedings of the 51st Hawaii International Conference on System Sciences. Hawaii International Conference on System Sciences.

Rosavina, M., Rahadi, R. A., Kitri, M. L., Nuraeni, S., & Mayangsari, L. (2019). P2P lending adoption by SMEs in Indonesia. *Qualitative Research in Financial Markets*.

Scott, B., Loonam, J., & Kumar, V. (2017). Exploring the rise of blockchain technology: Towards distributed collaborative organizations. *Strategic Change*, **26**(5), 423– 428.

Siek, M., & Sutanto, A. (2019, August). Impact analysis of Fintech on banking industry. In 2019 international conference on information management and technology (ICIMTech) (Vol. 1, pp. 356–361). Indonesia: IEEE.

Singh, R., Malik, G., & Jain, V. (2021). FinTech effect: measuring impact of FinTech adoption on banks' profitability. *International Journal of Management Practice*, *14*(4), 411-427.

Suharti, E., & Ardiansyah, T. E. (2020). Fintech Implementation on the Financial Performance of Rural Credit Banks. *Jurnal Akuntansi*, *24*(2), 234-249.

Tang, H. 2019. Peer-to-peer lenders versus banks: Substitutes or complements? *The Review of Financial Studies*, 32:1900–938.

Todorof, M. (2019, July). FinTech on the dark web: The rise of cryptos. In *Era Forum* (Vol. 20, No. 1, pp. 1-20). Springer Berlin Heidelberg.

Weller, B. M. (2018). Does algorithmic trading reduce information acquisition?. *The Review of Financial Studies*, 31(6), 2184-2226.

Vallee, B., and Y. Zeng. 2019. Marketplace lending: A new banking paradigm? *The Review of Financial Studies*, 32:1939–82.

Weigelt, C., & Miller, D. J. (2013). Implications of internal organization structure for firm boundaries. *Strategic Management Journal*, 34(12), 1411– 1434.

Wei, Z., & Lin, M. (2017). Market mechanisms in online peer-to-peer lending. *Management Science*, 63(12), 4236-4257.

Worku, G., Tilahun, A., & Tafa, M. A. (2016). The impact of electronic banking on customers' satisfaction in Ethiopian banking industry (the case of customers of Dashen and Wogagen banks in Gondar City). Journal of Business & Financial Affairs, 5(2), 1000174.

W´ojcik, D., Ioannou, S., 2020. COVID-19 and finance: market developments so far and potential impacts on the financial sector and centres. Tijdschrift Voor Economische en Sociale Geografie 111 (3), 387–400.

Wonglimpiyarat, J. (2018). Challenges and dynamics of FinTech crowd funding: An innovation system approach. *The Journal of High Technology Management Research*, *29*(1), 98-108.

Xue, M., Hitt, L. M., & Chen, P. -Y. (2011). Determinants and Outcomes of Internet Banking Adoption. *Management Science*, **57**(2), 291– 307.

(Zavolokina Suryono, R. R., Purwandari, B., & Budi, I. (2019). Peer to peer (P2P) lending problems and potential solutions: A systematic literature review. *Procedia Computer Science*, *161*, 204-214.

Appendix: The Case of Egypt

Egypt, there are an increasing number of finTech start-ups, driven by the collaborative efforts of the Egyptian government, the Central Bank of Egypt (CBE) and the stakeholders to upgrade payment systems and convert the economy to be cashless. The drivers of finTech in

Egypt are numerous and varied between its large economy, young population and plentiful skilled human capital. Accordingly, Egypt has a huge potential to flourish its business in the realm of finTech. Actually, the utilization of finTech in the financial sector contributes by 1.6% to the GDP.

Focus areas:

- **Payment System**:

The payment system had been attracting the investments and initiations. In this regards, the national payment scheme "Meeza" had been launched in December 2018, reaching 500,000 issued cards since its take-off. Meeza cards are now accepted across all 12,000 ATM machines and 76,000 POSs across Egypt.

-**Mobile Wallets**:

the service had been first licenced by the CBE in 2013, since then number of mobile payments were introduced to the market. Vodafone Egypt was the first to launch its mobile wallet, Vodafone Cash, in cooperation with the Housing & Development Bank in June of 2013. The other two carriers, Etisalat and Mobinil, have coordinated with the National Bank of Egypt and Emirates NBD, respectively, to launch Flous (money) and MobiCash. The NBE, meanwhile, has independently launched its own mobile money service, Phone Cash, in cooperation with MasterCard, Fawry and the Egyptian Banks. It is worth noting that in Egypt, the law dictates that cell phone providers can only offer mobile transfers through a bank. Currently, more banks had joined in providing the service, among them: QNB Al Ahli- E wallet, CIB E-wallet, Alex bank Ma7fazty, United Bank Digital Wallet, Banque Misr Wallet…e.t.c

In addition, in April 2018, Egypt's first **blockchain-focused** incubator opened in collaboration with Egyptian firms as Novelari (an Egyptian accelerator) & zk Capital (Blockchain investment fund). In this regards and in line with Egypt's national digital transformation strategy, the National Bank of Egypt has joined enterprise software firm R3's global blockchain, an initiative of over 200 financial services firms comprising technology companies, banks, trade associations and regulators, according to bank officials. The R3 global network started as a consortium of banks looking to use blockchain technology, recently broadening its ambitions by proposing its distributed ledger technology (DLT) platform, used to link together a wide range of businesses.

The new technology will enhance instantaneous processing of transactions across multiple distributed databases efficiently and securely.

On the other hand, **bitcoin is banned** in transactions since it had no monetary cover by the

Central Bank of Egypt (CBE). In fact, in December 2017, the Head of the Egyptian Financial Supervisory Authority (EFSA) stated that the trading of bitcoin is illegal in Egypt.

The Ecosystem: Examples of facilitating CBE laws, initiatives and undertaken

collaborations;

- In February 2017, the President issued legislation to establish the National Council for payment reflecting the support of the state to the less cash transformation. Furthermore,

an e-commerce law, and several economic regulatory reforms had been issued to respond to the development in digital credit lending and crowdfunding.

- The Central Bank of Egypt has licensed 7 banks to provide QR code acceptance. Consequently, the 13 million customers registered on mobile money, will be able to do digital merchant payments.

- The Central Bank of Egypt released the Contactless Payment Regulation, allowing NFC payments & Wearables to be used for the first time in the Egyptian Market.

- In 2016, the CBE released new regulations for cashless payments using smartphones by

introducing mobile wallets

- **Number of major initiatives were announced by the CBE**, including.

• **Launching the finTech & innovation strategy**, with more than 30 initiatives directed towards Egypt's digital transformation

• **Launching the regulatory sandbox**; within which finTech companies can experiment their

innovative finTech solutions in a live & relaxed regulatory structure.

• **Creating the finTech HUB**; in collaboration with the Greek Campus, the FinTech hub aims to connect all FinTech ecosystem.

• **Launching the finTech portal**, a virtual gateway to the FinTech Hub. This online platform is now live and ready to be accessed by anyone who's interested to be connected virtually to Egypt's finTech ecosystem from anywhere across the globe.

- It is worth mentioning that the Central Bank of Egypt has committed, in 2018, to dedicating 1 billion EGP towards finTech innovation investments in the finTech Fund.

Collaborative examples among the stakeholders of the ecosystem;

- The Egyptian government and the CBE are working closely with ministries and other governmental authorities to develop and encourage fintTech companies to integrate into the financial system. In February 2017, the President issued legislation setting up the National

Council for Payment. Its members include the President, the head of the CBE and the head of the Financial Supervisory Authority. Its role is to promote the move towards cashless payments (as mentioned earlier).

- The launching of the Mobile wallets was the main exemplar of the collaboration among the stakeholder comprised of; the CBE, the National Telecom Regulatory authority, the banks and the mobile operators. The service reaped its benefits of the relatively high mobile penetration in Egypt.

- The experience of NBE joining the enterprise software firm R3's global chain initiative includes numerous stakeholders of 200 financial services, firms, technology companies, central banks, regulators and trade associations.

- The Ministry of Finance has proceeded with mandating electronic payments for government fees above EGP 500 since the 1st of May 2019. In response to that and under the supervision of the Central Bank of Egypt, the banking sector managed to install 16,000 POSs at governmental entities that provide public services, with more than 31 million cards now accepted on those POSs.

Source:

- Egyptian Bank Institute report 2022