UNIVERZITET U SARAJEVU
EKONOMSKI FAKULTET

ZAVRŠNI RAD

FINTECH INDUSTRY RESPONSE TO THE COVID-19 PANDEMIC

Sarajevo, juni 2024. DEVLETA ŠABIĆ

U skladu sa članom 54. Pravila studiranja za I, II ciklus studija, integrisani, stručni i specijalistički studij na Univerzitetu u Sarajevu, daje se

IZJAVA O AUTENTIČNOSTI RADA

Ja, Devleta Šabić, studentica drugog (II) ciklusa studija, broj index-a 5045-74533 na programu Menadžment, smjer Finansijski menadžment – engleski jezik, izjavljujem da sam završni rad na temu:

FINTECH INDUSTRY RESPONSE TO THE COVID-19 PANDEMIC

pod mentorstvom prof. dr. Azre Zaimović izradila samostalno i da se zasniva na rezultatima mog vlastitog istraživanja. Rad ne sadrži prethodno objavljene ili neobjavljene materijale drugih autora, osim onih koji su priznati navođenjem literature i drugih izvora informacija uključujući i alate umjetne inteligencije.

Ovom izjavom potvrđujem da sam za potrebe arhiviranja predao/predala elektronsku verziju rada koja je istovjetna štampanoj verziji završnog rada.

Dozvoljavam objavu ličnih podataka vezanih za završetak studija (ime, prezime, datum i mjesto rođenja, datum odbrane rada, naslov rada) na web stranici i u publikacijama Univerziteta u Sarajevu i Ekonomskog fakulteta.

U skladu sa članom 34. 45. i 46. Zakona o autorskom i srodnim pravima (Službeni glasnik BiH, 63/10) dozvoljavam da gore navedeni završni rad bude trajno pohranjen u Institucionalnom repozitoriju Univerziteta u Sarajevu i Ekonomskog fakulteta i da javno bude dostupan svima.

Sarajevo, 7. 5. 2024. Potpis studentice:

ABSTRACT

In fast paced environment that we are currently living in, the technological advancements around the globe altered the way financial technologies are being used. Digital development affects businesses and individuals altogether. Financial technology has gained great interest in academic research. Therefore, this thesis intends to gather relevant literature, and offer agenda for future research. The pandemic COVID-19 occurrence and spread contributed to the Fintech usage. Digital transformation experienced blooming due to the increased mobile devices usage, as well as the emergence of financial and blockchain technologies, together with artificial intelligence. This study presents the factors and impacts on Fintech industry caused by the pandemic COVID-19 that spread all over the globe. Study aims to show the consequences that pandemic created on various Fintech segments. With intention to examine more in detail the Fintech companies' response on the pandemic COVID-19 spread, the systematic literature review was chosen as the methodology. Apart from the aforementioned, the aim was to improve the knowledge about financial technologies as well as to analyze the readiness and rapidity of financial technologies to possible crises.

Previously defined goals of the study served as the guide through the systematic literature review, which was concluded with the schematic presentation of the study. The study presents the most important segments of financial technologies, their status and response to the pandemic, together with the effects and consequences caused. By using a bibliometric analysis, together with a systematic literature review, this study analyzes a chosen set of scientific papers and articles downloaded from Web of Science database. Based on the aforementioned analyses, seven subheadings, more precisely segments of the financial technologies, were selected for detailed analysis. With the purpose of gaining further insight into the chosen literature, scientific articles were reviewed and presented in the paper, with some agendas for future research.

Keywords: Fintech, COVID-19 pandemic, digital transformation, mobile banking, blockchain, P2P, regulation, technologies

SAŽETAK

Živimo u okruženju koje se mijenja nevjerovatnom brzinom. Tehnološki razvoj širom svijeta je uticao na način kako se finansijske tehnologije danas koriste. Digitalni razvoj sveukupno utiče na biznise ali i na pojedince. Finansijske tehnologije su stekle veliko interesovanje akademskih istraživanja. S tim u vezi, ova teza teži ka prikupljanju relevantne literature, kao i pružanju smjernica za daljnja istraživanja. Nastanak i širenje pandemije COVID-19 je doprinijeo korištenju finansijskih tehnologija. Tehnološki napredak širom svijeta promijenio je način na koji se finansijske tehnologije koriste danas. Načinu korištenja je također doprinijeo nastanak i širenje pandemije COVID-19. Digitalne transformacije doživjele su svoj procvat uz povećanu upotrebu mobilnih uređaja, kao i nastanak finansijskih te blockchain tehnologija, kao i vještačke inteligencije. Ovaj rad prikazuje faktore i efekte koji su uticali na finansijske tehnologije nastali pojavom pandemije, COVID-19, koja je zahvatila čitav svijet. Rad nastoji da prikaže ishode pandemije na različite segmente finansijskih tehnologija. Sa ciljem da se detaljnije istraži uticaj odnosno odgovor finansijskih tehnologija na širenje pandemije COVID-19, sistematski pregled literature je odabran kao metodologija rada. Pored navedenog, namjera je bila i unaprijediti znanja o finansijskim tehnologijama te analizirati spremnost i brzinu reakcije finansijskih tehnologija na eventualne krizne periode.

Definisani ciljevi rada su bili vodilja kroz ovaj sistematski pregled literature koji je zaključen shematskim prikazom samih rezultata rada. Rad predstavlja najznačajnije segmente finansijskih tehnologija, njihovo stanje te odgovor na pandemiju, prouzrokovane efekte i posljedice. Koristeći bibliometrijsku analizu, praćenu sistematskim pregledom literature, ovaj rad analizira odabrani set naučnih radova dostupnih na Web of Science bazi radova. Na osnovu navedenih analiza, sedam podnaslova, odnosno segmenata finansijskih tehnologija, odabrano je za detaljnu analizu. Sa ciljem sticanja daljnjeg uvida u literaturu, naučni radovi su pregledani i prezentirani u radu.

Ključne riječi: Finansijske tehnologije, pandemija COVID-19, digitalna transformacija, mobilno bankarstvo, blockchain, P2P, regulacija, tehnologije

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AI – Artificial Intelligence
ASEAN – Association of Southeast Asian Nations Countries
ATMs – Automated Teller Machines
BFSI – Banking Financial Services and Insurance
BIS – Bank for International Settlements
CARES Act – Coronavirus Aid, Relief, and Economic Security Act
DFI – Digital Financial Inclusion
ECF – Equity Crowdfunding
EY – Ernst & Young
FA – Fintech Adoption
FSB – Financial Stability Board
FTPs – Fintech Products
GDP – Gross Domestic Product
GDPR – General Data Protection Regulation
GF – Green Finance
GFI – Global Fintech Index

GI – Green Innovation
ICOs – Initial Coin Offerings
ICT – Information and Communications Technology
IMIs – Islamic Microfinance Institutions
KPMG – Klynveld Peat Marwick Goerdeler
MFS – Mobile Financial Services
MGI – McKinsey Global Institute
MMT – Monetary Market Transactions
P2P – Peer-to-peer
PPP – Paycheck Protection Program
PSCE – Panel-Corrected Standard Errors
R&D – Research and Development
SARS-CoV-2 – Severe Acute Respiratory Syndrome Coronavirus 2
SEM – Structural Equation Modeling
SMEs – Small and Medium Sized Enterprises
SOEs – State-owned enterprises
S&P – Standard & Poor's
UNIDO – United Nations Industrial Development Organization
USD – United States Dollar
USAA – United Services Automobile Association
VAR – Vector Auto Regression
VTM – Virtual Teller Machine
WHO – World Health Organization
2SLS-IV – Two-Stage Panel Least Squares-Instrumental Variables
2SGMM – Two-Step System Generalized Method of Moments

1. INTRODUCTION

Traditionally, conventional banks have been considered the key players in the financial world. However, they got disrupted in their performance by two global events that influenced the entire financial system. Those events are the global financial crisis and the development of the financial technology or digital finance ecosystem or simply said Fintech. As a result of those global events, the financial world faces various changes. Bearing previously written in mind, Fintech represents a developing segment within the financial industry. Nowadays, Fintech plays a massive role in the dynamic financial world, and it even increased its presence since the occurrence of the COVID-19 pandemic. Nevertheless, since the Coronavirus outbreak in 2019, tremendous shocks have impacted both societies and economies worldwide. Those disruptions resulted in technological embracement. The entire world has been faced with one of the most significant pandemics ever. Chan *et al.* (2021) discuss that the emergence of the pandemic has caused extraordinary volatility in financial markets, and investors are now dealing with heightened uncertainty.

Fintech plays a huge role in the dynamic financial world, and its presence has increased since the COVID-19 pandemic. Fintech, as defined by the Financial Stability Board (FSB, 2019), "represents 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". Having that in mind, Fintech improves traditional financial services and enables faster access to finance.

As per Thakor (2020) the goal of fintech is to find less expensive ways to get around financial contracting frictions, as well as reduce the cost of financial services in order to promote consumer welfare. Evidence suggests that Fintech history starts as early as 1866 (M.M. Alshater, 2022). According to Consumer International (2017) the development of Fintech has differed into three phases:

- 1866 -1967 – trans-Atlantic cable and telegraph
- 1967 – 2008 – online banking and ATMs
- 2008 onwards – use of high-tech characteristics

Those three phases have been characterized by their own features, for instance, phase one was specific for trans-Atlantic cable and telegraph as a means of financial communication. Furthermore, phase two integrated technology into financial products and services. Additionally, phase three encompassed high-tech characteristics resulting in a competitive environment for financial participants, i.e. financial institutions.

As mentioned by Haddad *et al.*, (2019), the Fintech market developed in the US, initially. Nevertheless, the adoption of Fintech was faster in Asia. As stated by Bhatt *et al*., (2022), consistent with Global Fintech Adoption Index by Ernst & Young (EY), Asia holds the first place worldwide in the adoption of Fintech, spearheaded by China and India. India is in second place, with adoption rate of 87%, contrasting the international average of 64%. Taking into consideration the past development of Fintech in technologically advanced countries like China, the United States of America, and the United Kingdom, a surge in research articles is anticipatable.

The emergence of financial technology has transformed the manner in which financial services are conceptualized, distributed, and utilized over the last ten years. The extensive use of mobile devices in conjunction with the internet and data accessibility, fastened the wide-reaching digital alteration of economies. Imposed lockdowns during the COVID-19 pandemic enhanced the digitization of financial services, i.e. conversion of analog data into digital format (Bhatt *et al*., 2022).

COVID-19 has been recognized as the main digital driver however it ended with the creation of numerous challenges (Maiti *et al.*, 2022). About those challenges and new digital opportunities created, we will write more in detail in the systematic literature review. Our research is more extensive in scope and character since it examines all pertinent and published works that address compliant new technological solutions with an emphasis on the COVID-19 effect.

The methodology of this paper utilizes both bibliometric analysis and a systematic literature review on Fintech and COVID-19's effect on digitized financial services. Combining these methods, we are in a position to gain a comprehensive perspective on the subject, which allows us to identify trends for future research. This is how the remaining content of the master thesis is structured: Section 1 brings together the definition of the problem together with the objectives of the thesis and research question. Section 2 introduces the Bibliometric Analysis. Section 3 presents a Systematic Literature Review. In section 4, we present the future research agendas. Finally, in sections 5 and 6 we provide the final remarks for this master thesis.

1.1. Definition of the problem

Since the Coronavirus outbreak in 2019, tremendous shocks have impacted both societies and economies worldwide. This outbreak shaped a disastrous effect on worldwide civilizations. COVID-19 was proclaimed as a large-scale contagion, by The World Health Organization (WHO, 2020), in March 2020. Along with that, WHO announced that the virus has expanded to 190 out of 233 worldwide nations (Yan and Jia, 2022). Roughly 80 million COVID-19 cases were registered globally, following 1,8 million fatalities, with this number intensifying as each day passed (Yang *et al.*, 2022).

Nevertheless, the rising death toll and human fatalities, COVID-19 also created a substantial influence on the global economy. The epidemic transmission decreased the financing in the banking sector, creating the financial institutions more susceptible, aggregating the bank operational risks, as well as sinking banks' profits and effectiveness (Yan and Jia, 2022).

Notwithstanding the fact that COVID-19 weakened various industries worldwide, one particular industry faced upsurge, i.e. Fintech rose in growth (Yan and Jia, 2022). However, financial technology was also greatly affected by the pandemic occurrence. Because numerous Fintech businesses developed very quickly, they contributed to global economic expansion (Chen *et al.*,2021).

Furthermore, it is essential to analyze the bearing effect of COVID-19 on the Fintech industry. Various scientific papers and research articles put a special emphasis on the Fintech response to the COVID-19 disturbance of the entire world. This master's thesis aims to impart the already established scientific research.

In accordance with Abdul-Rahim *et al.* (2022), financial technology, or the abbreviation Fintech, enabled customers to conduct financial transactions without the requirement for physical presence in the actual world. Despite that, financial technology offers pretentious consumers, corporations as well as governments, computerized solutions. Bearing in mind the fact that governments imposed social distancing and restricted physical movement, Fintech undergoes immense acceptance.

Those new enforced rules for social distancing led toward the digitalization of financial services (Bhatt *et al.*, 2022). However, regardless of the Fintech adoption rate, COVID-19 resulted in disruptions within financial markets. The pandemic shaped new challenges and issues whose effects still need to be explored. Taking this into consideration, a number of scientific articles and studies put special emphasis onto COVID-19 effect on financial markets. For example, Goodell (2020) in his paper argues that future financial research will be greatly shaped and influenced by COVID-19 and its impact.

In different countries, different yet almost similar restrictions were declared. Due to those limitations, various tactical policy alterations, for financial industries, appeared. With this in mind, Hasan *et al.* (2021) emphasized how COVID-19 pandemic improved digital financial services in Europe. Usage of conventional payment systems was quickly shifted to usage of cashfree payments. Offline payments were replaced with online ones in a few months (Hasan *et al.*,2021).

Being faced with "new normal" i.e. lockdown life, many people understood how Fintech actually facilitated their life during the pandemic. Consumers were constrained to financial technology usage and they became accustomed. With a great number of new customers, Fintech services and Fintech industry in general, is turning into an appealing and competitive industry (Le, 2021).

Despite the fact that Fintech is becoming a competitive industry, the efficacious partnership between traditional banks and Fintech products is fundamental in delivering appropriate answers for new settings that COVID-19 caused (Chen *et al.*, 2021). However, expansion of financial technology and online payments led to upward interest for mobile gadgets and smartphones, as the access to financial services has been eased since COVID-19 restrictions emerged (Nathan *et al.*, 2022).

Yang *et al.* (2022) argues that those countries with greater Fintech adoption will be in a more favorable position for enabling the appealing business climate in the times of crises, such as pandemic, rather than those countries that have lower Fintech application rate. However, there are some papers that try to investigate whether or not Fintech will result in disturbance of traditional ways of banking, or on the other hand, will reinforce existing banking markets. That was the objective of the paper written by Murinde *et al.* (2022).

At the same time, some authors tried to examine the effect which COVID-19 caused on digital-only banks. They tried to explore whether pandemics resulted in a positive or negative impact on digital-only banks and their performance (Katarzyna Schmidt-Jessa, 2022). Furthermore, particular papers focused on investigating the firm value taking into consideration the impact of COVID-19 onto their performance. Yang *et al.* (2022) found out that there is a negative relationship between the firm value and the intensity of pandemic.

Besides the above mentioned, some authors put an emphasis on the comparison of lending procedures by traditional banks and Fintech lenders throughout the pandemic. After the analysis and comparing procedures, authors found out that Fintech businesses are more probably in a better position to enlarge their credit admission to novel customers, after the contagion commence (Bao and Huang, 2021). Other authors found out that adopting financial technology in Association of Southeast Asian Nations countries (ASEAN) will lead toward banking stability that consequently drives the economic as well as financial strength during the period of emergencies, such as pandemics (Banna and Alam, 2021).

Ling *et al.* (2021) claims that the pandemic occurrence is a black swan case on a global scale. They tried to inspect the COVID-19 effect on financial restraints and mitigating effects of Fintech. Great number of authors examined the impact of COVID-19 on financial markets, traditional banking and economies in general, through their articles and papers.

Focus is mostly on adopting the digital improvements and enabling their wide usage in human everyday life. Pandemic COVID-19 brought outburst that resulted in technological transformations between 2020 and 2021. It drove the digital entrepreneurship crosswise many areas worldwide to concentrate on dissimilar challenges (Modgil *et al.*, 2022).

Stock market prices got fluctuated due to the pandemic occurrence that impacted the financing behavior of both businesses and individuals. Those fluctuations also altered the trading performance of investors. In addition, the anti-pandemic procedures levy considerable restraints on the flow of factors thereby affecting the financial market (Ling *et* *al.*, 2021). Financial markets worldwide responded negatively and in such pessimistic manner, to the COVID-19 pandemic, that has not been noticed since the 2008 financial crisis. The United States S&P 500 Index suffered worst value drop in one day, considering the market history (Ullah, S., 2022). Above presented and other topics will be explored more in detail in the next segments of the thesis.

1.2. Objectives of the thesis and research question

The main goal of this master's thesis is to examine the impact which COVID-19 left on the entire financial technology industry. With the intention to develop a broader comprehension of the consequences created by the pandemic, we will try to identify the positive and negative effects that Fintech encountered.

The key objectives of this master's thesis are as follows:

- To deliver an extensive literature review on COVID-19's effect on Fintech
- To examine preceding empirical research on Fintech during the period of the COVID-19 pandemic
- To provide both positive and negative impacts which the pandemic created on the entire Fintech industry
- To research the influence of the pandemic occurrence and its spread on customers' preference towards Fintech usage
- To offer a scenario for further research and examination of Fintech

The primary aim of this analysis is to severely examine the foregoing research to determine Fintech's accurate COVID-19 response as well as to track how Fintech has changed over the years. According to the outlined research problem which was expressed as an examination of the Fintech market reaction towards the emergence and spread of the COVID-19 pandemic, subsequently research question was defined as "How and in what manner did the Fintech industry respond to the occurrence of the COVID-19 pandemic?". According to the research question, the remainder of the study has been directed.

To address our main research question, previously mentioned, we focused on a specific subset of financial research. Articles from reliable databases were selected. Yet those databases were chosen due to their trustworthiness and wide scope of documents. To find out the answer to the main study question, a qualitative content analysis was performed. This analysis aimed to obtain an answer or insight regarding the main research inquiry.

1.3. Methodology

During research, a typical literature review holds significant importance. It is commonly accepted that progress in knowledge relies on the foundation established by previous studies. The primary aim is to examine existing academic research studies to identify any deficiencies. By studying certain collections of literature, it becomes possible to address new studies while also laying the groundwork for new theories. As this master thesis represents an individual literature review, the main goal is to deliver an extensive literature review considering empirical research, earlier performed. Master thesis study will be founded on qualitative analysis. Two main methods used are systematic literature review and bibliometric analysis.

1.4. Expected scientific contribution of the work

To the author’s knowledge, this is the first literature review that has taken into consideration different segments within Fintech industry such as Fintech adoption rates, Fintech in different countries, Fintech in Islamic Finance, regulatory aspect of Fintech, Technology based funds and Fintech lending with respect to the pandemic COVID-19. This study could contribute to the knowledge of financial technologies and their development during and post COVID-19 period. Besides, the thesis could help financial professionals gain insights for further research.

1.5. Limitations

Having in mind the fact that this research contributes to the understanding of how Fintech reacted to the COVID-19 pandemic, several drawbacks must be mentioned. First of all, only articles and review articles were chosen for the literature review, therefore books and similar publications were neglected. Additionally, only articles available in English language were selected, yet others were omitted. Exclusion of these papers could provide insights for future research. This thesis combined bibliometric analysis with systematic literature review. For a future research analysis, various altered methodologies could be used. Furthermore, future researchers could incorporate the Fintech industry development in Bosnia and Herzegovina and its progress post COVID-19.

2. BIBLIOMETRIC ANALYSIS

With the intention to analyze the content of citations, a bibliometric analysis will be performed.This analysis is employed to explore the subject of interest delving into more detailed segments. Through bibliographic analysis, we will look into the citation analysis, most frequent keyword sas well as most influential authors and publishers.

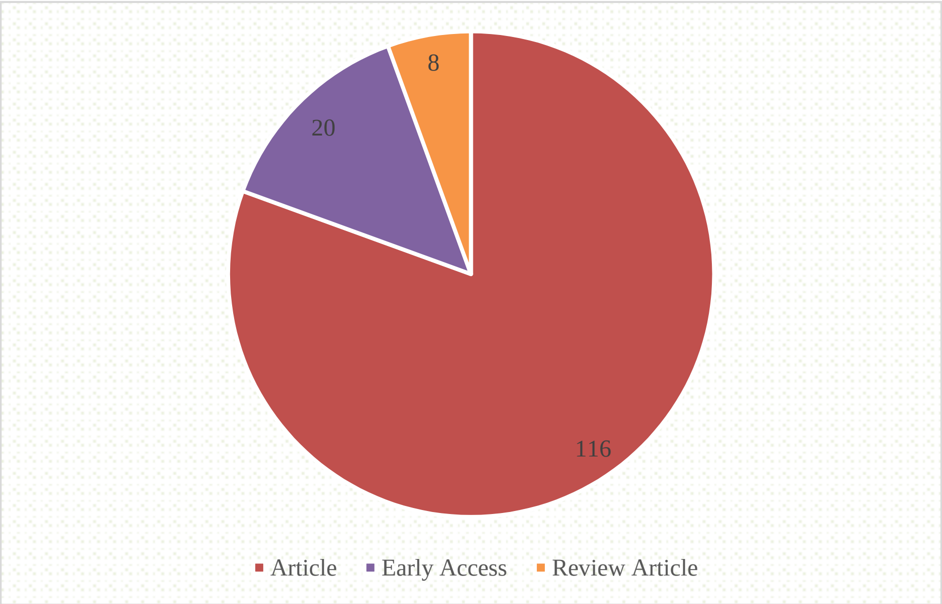
To gather relevant information for this master's thesis, we utilized Web of Science database. This was the primary database for conducting this part of the master thesis analysis. This database encompasses a wide range of subjects within the social sciences and humanities. With the aim to collect as much relevant literature as possible, the following sources are being used: scientific papers and research articles. VOS viewer will be utilized for bibliometric and bibliographic analysis.

To ensure a comprehensive search, rather than using a narrow search term, we utilized an extensive search string across the abstract, title, and author keywords of a database of papers. This search string was as follows: “fin*tech” AND “covid*” abstract OR “fin*tech” AND “covid*” title OR “fin*tech” AND “covid*” author keywords.

This initial search generated 144 results. With the aim to facilitate bibliographic analysis, those papers were downloaded from the Web of Science database. This step was undertaken to further screen and evaluate the required materials.

This base of 144 results consisted of different document types, presented in the figure below.

Figure 1. Document types

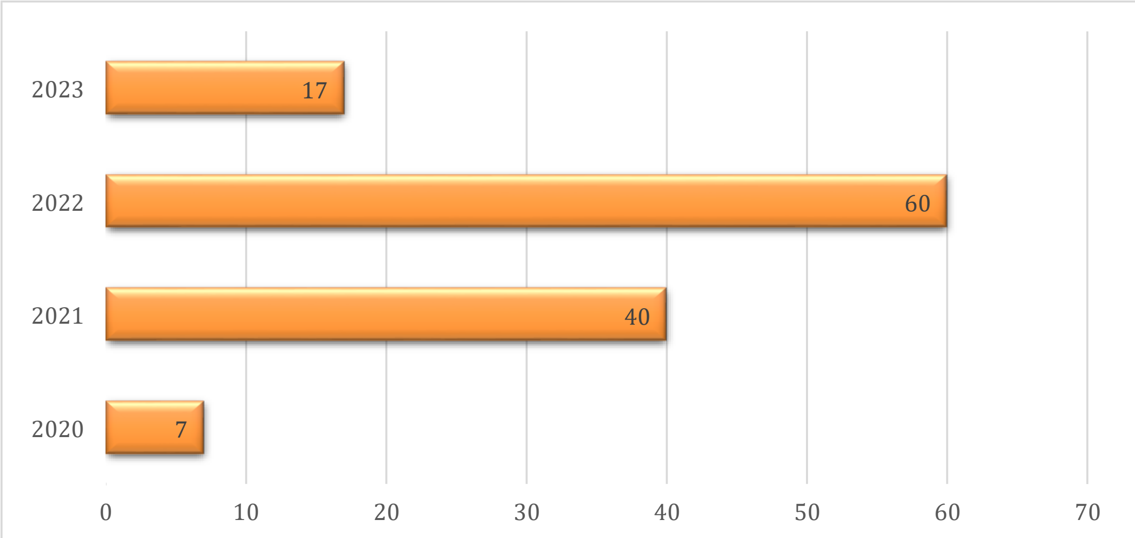


Source: Author’s work

As it can be seen from the graph above the majority of this base were articles, 116 of them, while 20 were early access, and 8 review articles. After the first initial screening of the documents, 20 articles were excluded due to irrelevancy and we continued our analysis by assessing 124 articles.

Figure 2 demonstrates the headway of publications related to the COVID-19 effect on Fintech, accessible through the Web of Science database. Evidently, publications within this area have experienced a notable increase over the observed period of time. The interest for the subject matter grew over the years, as from 2020 only 7 articles were published to 60 being published in 2022. Because of the fact that article search was in June 2023, until that point 17 articles from 2023 were available.

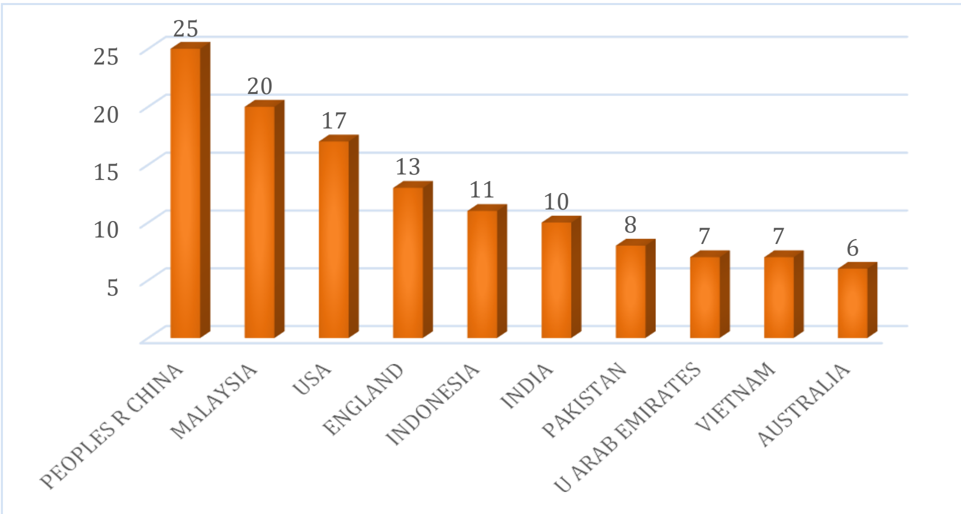
Figure 2. Number of studies over the years



Source: Author's work

The figure below shows the top ten countries associated with articles from the downloaded database. As can be seen from the graph, the three leading countries are The People's Republic of China (25 articles), Malaysia (20 articles), and the United States of America (17). The rest of the countries are not shown on the graph as they only have 5 or fewer articles published.

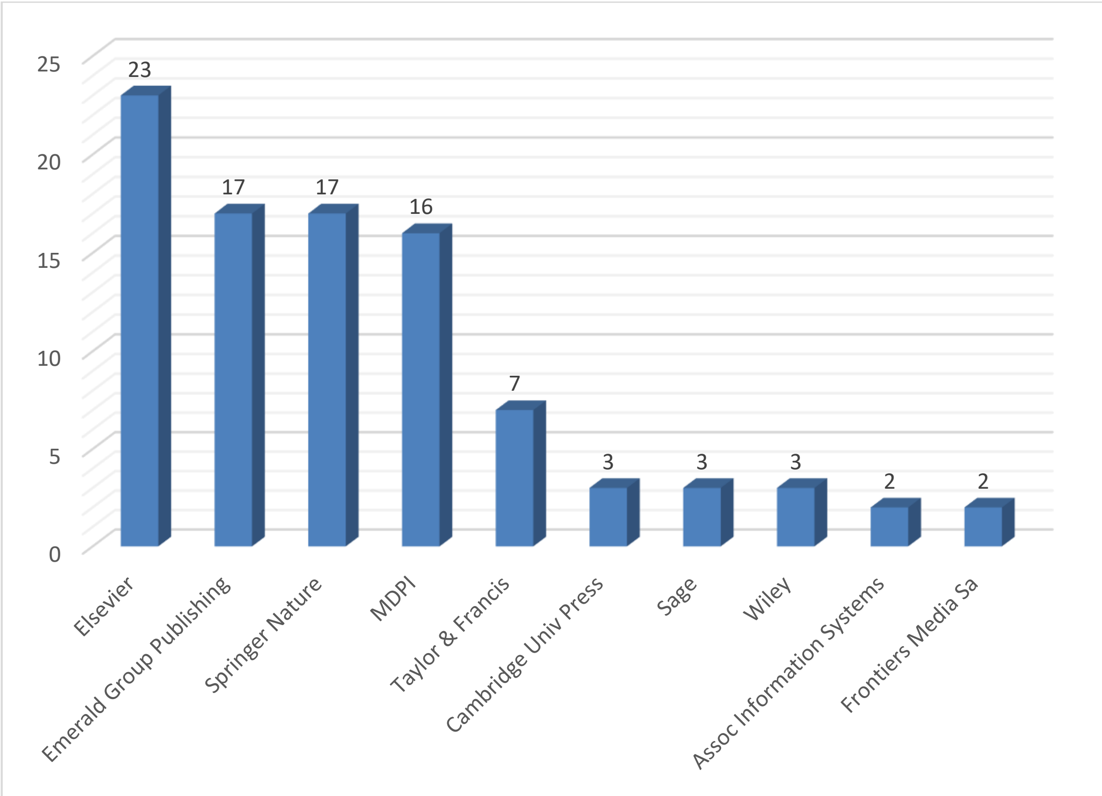
Figure 3. Top 10 countries publishing on COVID-19 effect on Fintech



Source: Author's work

The 124 articles that were further evaluated are spread out among various publishers. The figure below shows the top 10 publishers that have published 93 of the total articles studied. Elsevier is the most efficient one, publishing 23 articles which represent 18.55% of the total. It is followed by Emerald Group Publishing. After the pandemic occurred, and the beginning of a “new normal” life, the COVID-19 effect became the subject of consumer curiosity. That is why it provides a reason for the presence within the realm of these journals. Other publishers are Springer Nature, MDPI, Taylor & Francis, and additional.

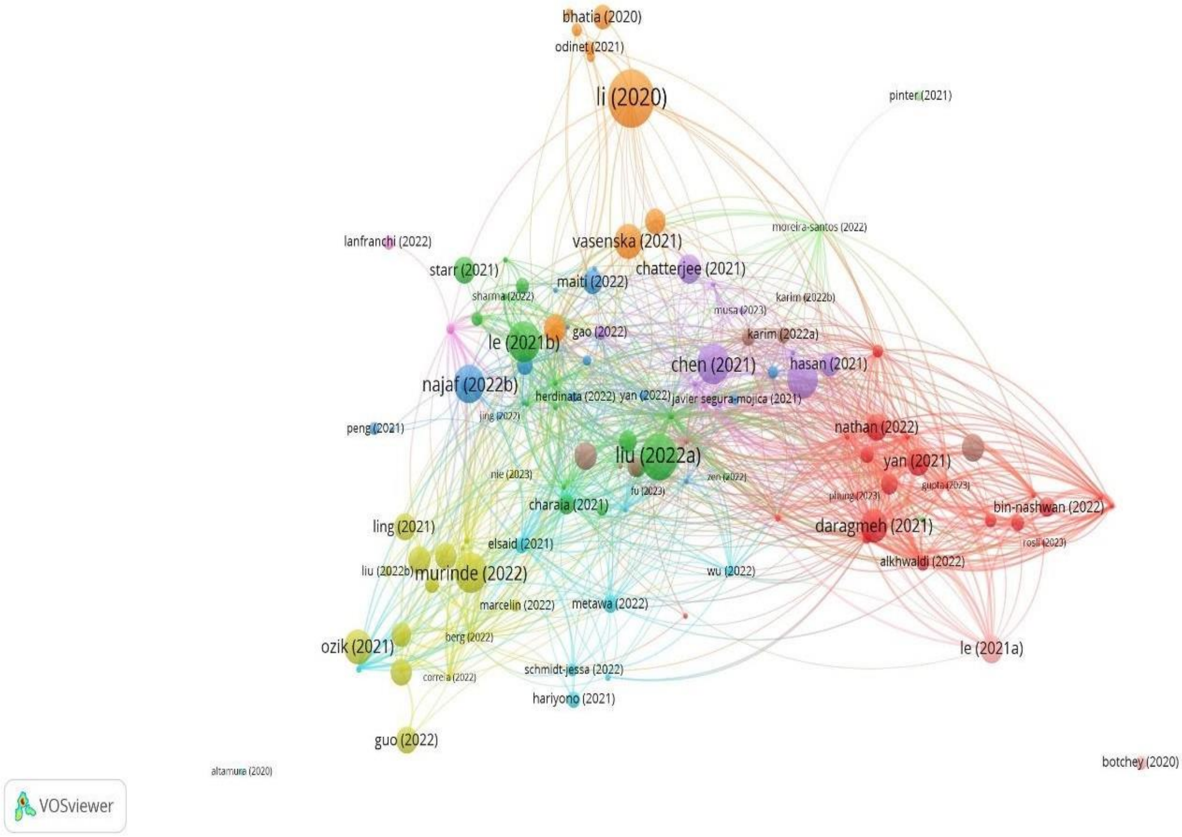
Figure 4. Leading journals publishing about COVID-19 effect on Fintech



Source: Author’s work

The citation count quantifies the number of citations a given document has received over a period of time. A document that received a higher number of citations is regarded as being more influential and productive compared to others (Goyal, 2020). According to Tsay, citation is the best method to map the influence of a research publication. In order to ascertain the most influential articles related to COVID-19’s effect on Fintech, using VOS Viewer an analysis was conducted on the network of articles. The author’s citation network and citation frequency are visible on the Figure 5. As it can be seen from the Figure below researchers are shown as nodes. These nodes are our subject of interest. Relationship between the items is depicted by the links. The strength of the connection between the nodes is actually showing the strength of the bibliographic coupling. However, VOSviewer is not exhibiting the intensity of the relations because the significance of the nodes is displayed by their size. As it can be concluded, the work is more important as the size of the node is greater.

Figure 5. The most influential authors

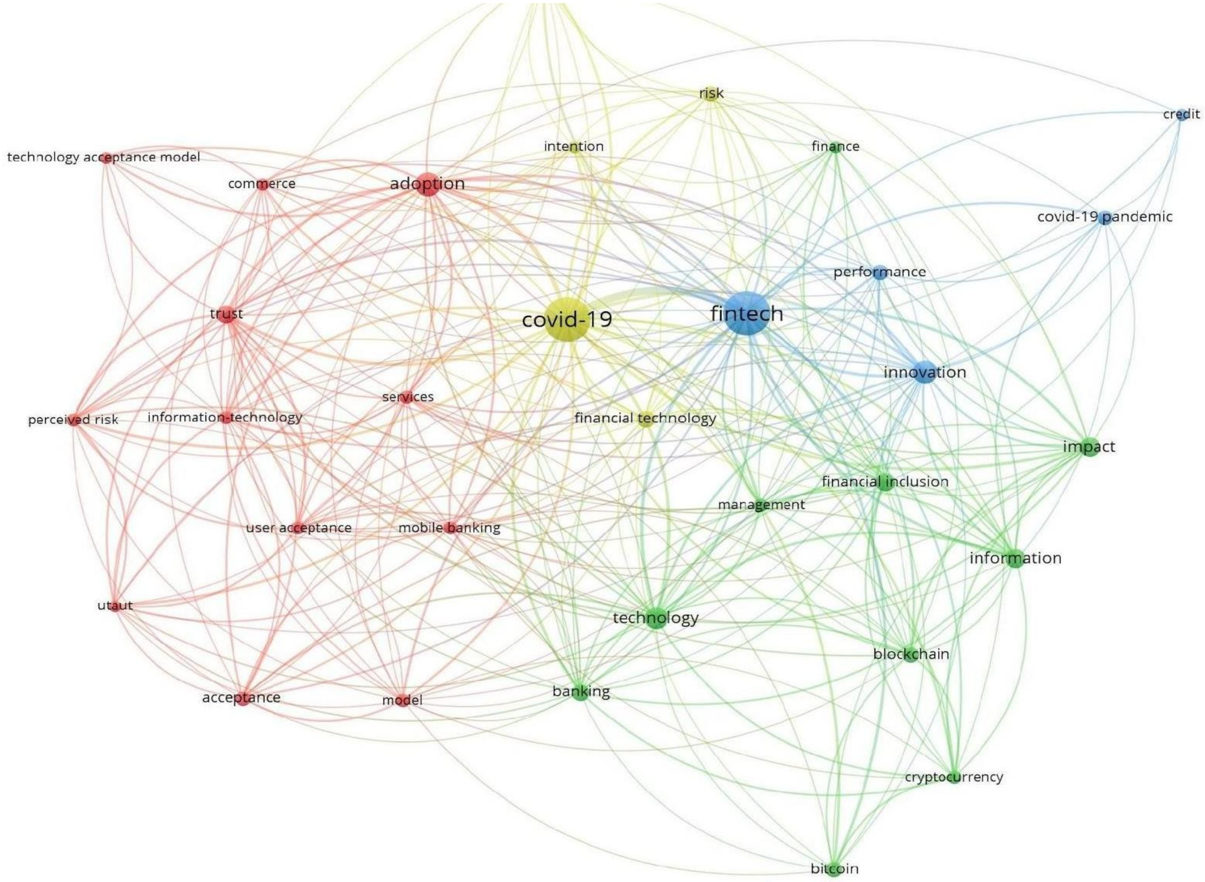


Source: Author's work

According to Comerio and Strozzi (2018), the author keyword represents the themes of research articles. Utilizing the VOS Viewer, a comprehensive keyword analysis was conducted with the aim to examine the predominant themes related to the thesis topic. A total of 124 articles generated a collection of 69 keywords.

As for the analysis and the minimum number of occurrences of a keyword which was set as 5, of the 690 keywords, 32 meet the threshold. The term "fintech" appears as the most utilized word, appearing 67 times. The second most frequently used is "covid-19", with 65 occurrences. The other two noteworthy keywords are "adoption" with 19 occurrences and "innovation" with 18 occurrences.

Figure 6. Network of keyword co-occurrence



Source: Author's work

Figure 6 displays the most frequently used keywords. These 32 keywords that meet the threshold are represented within four clusters, depicted in different colors, showing 296 links with 708 as total link strength. The size of the bubble implies the frequency of usage of a certain word, more precisely larger bubbles represent more frequent usage.

A figure above also shows that the words Fintech and COVID are the ones with the strongest link between each other. First cluster includes twelve items such as acceptance, adoption, commerce, information-technology, mobile banking etc. Second cluster entails ten items for instance banking, blockchain, finance, financial inclusion, technology. Cluster number three involves five items for example covid-19 pandemic, credit, fintech, innovation and performance. Finally, cluster four contains items such as covid- 19, financial technology, intention, pandemic and risk. Clusters characterize the collections of carefully connected items. They are being formed based on the similarity between the papers. Additionally, developed clusters represent the networks concerning various research areas, that authors elaborated on.

3. SYSTEMATIC LITERATURE REVIEW

With the intention to assess the chosen literature for the thesis subject, a systematic literature review was conducted. In this systematic literature review, we opted to analyze those studies that look into the Fintech industry's response to the COVID-19 pandemic. Consequently, the selection of the papers was carried out based on these established criteria. The inclusion and exclusion criteria for the literature used in a systematic review are as follows:

Inclusion criteria:

- The papers are exported from the Web of Science, Google Scholar and Science Direct databases,
- The papers encompass the terms "Fintech" and "COVID", which appear at the same time and/or in the title, and/or abstract, and/or keywords,
- The papers are written in the English language

Exclusion criteria:

- The papers are not written in the English language,
- The papers are not relevant to the thesis research question,
- The papers do not meet the desired relevance

A systematic literature review will be conducted based on appropriate scientific papers obtained from databases such as Web of Science, Google Scholar and Science Direct. Those databases are wide-ranging, concealing stores of the social sciences. Data spanning the years 2000 to 2023 were analyzed during the search, which was done in June 2023.

Downloaded articles underwent an assessment process based on the review of their abstract. Out of 124 articles, 19 of them, that were not available for access were excluded from the sample as well as the articles written in another language than the English language. At the final stage, 34 of the articles were excluded due to doubt about their relevance for the study. The most important search criteria were the alignment of the articles with the topic of this master thesis. Of those articles, 71 of them focused on the Fintech and COVID-19 impact on its performanceand they were selected as the final sample for bibliometric analysis. After carefully selecting articles for systematic literature review analysis, we arrived at the number 71 relevant articles to be used for the systematic literature review.

Arriving at the ultimate sample of articles, led to a thorough examination, after which 7 key domains were detected. These fields include: 1. Fintech adoption rates and digital transformation, 2. Fintech in different countries, 3. Fintech in Islamic Finance, 4. Regulatory frameworks for Fintech, 5. Fintech user experience, 6. Technology-based funds, 7. Fintech Lending.

In section one we will assess how the Fintech industry fast-tracked its digital transformation due to the pandemic occurrence. We will also evaluate the usage of digital financial services and their adoption rates. These two will present the case studies of Fintech applications in different countries worldwide. Section three will be focused on Fintech in Islamic banking i.e. how Islamic Fintech establishments maintain the accordance with Sharia values and standards. We will also inspect how Islamic microfinance organizations acted in providing financial support during the pandemic. Section four will present the regulatory frameworks that Fintech experienced throughout the pandemic. Additionally, the challenges that Fintech firms faced, due to the varying guidelines and procedures. Fintech user experience, in domain five, will explore how customer satisfaction and perceived trust altered during the period of the pandemic. Moreover, the concept of financial inclusion will be investigated as to how Fintech responded in providing access to underprivileged communities. The sixth section will focus on the role of technology-based funds, such as blockchain and decentralized finance all through the Fintech reaction to the pandemic. Lastly, final topic aims to gain a better insight into the lending dynamics, taking into consideration the challenges created by the pandemic.

Many would agree with the fact that the COVID-19 pandemic is among the most important crises in contemporary history. The pandemic commenced in central China, city Wuhan in 2019. Opposite to the global financial crisis that began in 2008, with exogenous characteristics, to which many economists agreed with, pandemic is characterized as endogenous and likewise could be projected (Wojcik and Ioannou, 2020).

“COVID-19 is a highly contagious acute respiratory virus (SARS-CoV-2) transmittable through physical contact with infected humans or objects, including banknotes and coins.” (Abdul- Rahim *et al.*, 2022). Confronting this unaccustomed worldwide situation that affected the entire population resulted in new fear unlocked – fear of getting infected. As studies revealed, this fear altered the individual consumer and purchasing behavior by shifting its expenditures in the direction of online platforms (Abdul-Rahim *et al.*, 2022). According to Erel and Liebersohn (2022), in 2020 COVID-19 produced worldwide economic shrinkage of 3.5%, symbolizing a crisis of supreme magnitude.

Taking into consideration the importance and the influence that pandemic created, on society as well as the financial world, numerous studies were undertaken with a focus onto COVID-19 effect on financial markets (Le *et al.*, 2021). Among the first who contributed to the subject matter was Goodell (2020) who claimed that COVID-19 would have a significant effect in determining future finance research.

Fintech amenities contribute in many aspects, some of them are decreasing expenses, boosting the employment rate, influencing the condition of financial services, lessening the transaction costs, making the everyday both personal and professional life simpler, and proposing the approach to finance via microfinance and crowd-funding (Abdul-Rahim *et al.*, 2022). However, certain topics will be presented in the following pages with the aim of assessing the issues which pandemic imposed onto the Fintech industry.

3.1. Fintech adoption rates and digital transformation

The pandemic occurrence significantly impacted and changed human everyday life, influencing the financial world and firm's abilities to survive and reinsure their growth. According to Xia *et al.* (2022) those companies, that are positioned in districts where soaring digital finance applications can be found, come across scarcely any loss and they recuperate better from the COVID-19 effects. It has been obvious that digital finance helped companies to easily overcome the COVID-19 pandemic.

Digital Finance

Digital finance syndicates digital information technology together with customary financial services, thereby delivering businesses admission to financial services across digital channels. Furthermore, using contactless and digital means for business loaning can encourage social distancing actions accordingly to help to lessen the COVID-19 expanse. Having this in mind, implementing the digital finance that supports remote interfaces can be advantageous particularly in the process of advancing the convenience and capacity of financial services for the period of COVID-19 pandemic (Xia *et al.*, 2022). Over and above that, throughout the time of pandemic, digital finance also enabled alternative financing options for companies, resulting in widen means of approach toward finance.

As denoted by Buchak *et al.* (2018), digital finance is in a position to expertly handle the demand disturbance as well as homeowner's loan applications. In addition to the abovementioned, as indicated by Iyer *et al.* (2016), digital finance could help the moneylenders to assess the borrower's profile in a more detailed and errorless procedure by applying the third-party assessments as well as social network information. All of this results in lessening the credit risk evaluation.

The paper written by Xia *et al.* introduces the point that digital finance is in a position to form enterprises capacity to acquire outermost financing, with respect to upgrading the corporate resilience to the COVID-19 pandemic. Fintech firms are supplying services including data processing, crowd-funding, cloud computing, delivery platforms, with which they complement and support traditional financial intermediaries. Having in mind the difficult conditions under which many enterprises found themselves in the course of pandemic, Fintech companies positioned themselves as alternative guarantee sources. The analysis showed that digital finance assists in the process of creating corporate resilience through the pandemic (Xia *et al.*, 2022).

The pandemic of COVID-19 dared countless industries to turn their operations toward digital ones, if they plan to survive. Because of the uprising digital adoption throughout the pandemic,vast number of opportunities arose for ambitious entrepreneurs to go into the market.

Henceforward, the study by Modgil *et al.* (2022) concentrates on acknowledging the developing parts and technologies in favor of digital entrepreneurship. As authors denoted, the contagion COVID-19 prejudiced the digital engagement of number of participants, i.e. customers, employees, and companies. This digital transformation would last even longer, but the pandemic furthered it, especially during 2020 and 2021 (Modgil *et al.*, 2022).

Global e-commerce experienced substantial growth for the period of January to June in 2020, approximately 35.5%. This directed the Fintech industry to create digital products, and develop applications, that will lead toward more enhanced customer experience (Diana Moreira-Santos *et al.*, 2022). Furthermore, regular everyday mobile transfers resulted in an upward shift from 21% to 26%, as a consequence of imposed measures by governments. Besides, these shifts caused undesirable outcomes, for instance spread of fraudulent actions, for example stealing of credit card banking information with aim of redirecting money.

Perceived Benefits and Risks

Some articles focused their research on the subject matter such as whether the Fintech adoption is influenced by perceived benefits and risks, also how the human fear related with COVID-19 pandemic impacts the Fintech adoption. Furthermore, authors investigated in what way Fintech adoption influences sustainability.

As denoted by Abdul-Rahim et al. (2022), the results of their research showed that the degree of perceived benefits influences the adoption of Fintech, while perceived risk plays insignificant role. Furthermore, the anxiety of COVID-19 controls the correlation amongst the perceived benefits and Fintech adoption whilst interceding the connection between perceived risk and Fintech adoption. Moreover, the adoption of Fintech has a remarkable outcome on sustainability.

Fintech offers financial opportunities for underprivileged consumers that are low in income and have limited access to banks. By doing so, they enhance financial inclusion by providing the appropriate financing to those who need to expand their economic activities. Those opportunities are theoretically valid but their full effect cannot be experienced in reality as the Fintech adoption rates are still low (Abdul-Rahim et al., 2022).

Despite their benefits and opportunities, Fintech is accompanied by disadvantages and controversies as well. Authors state that Fintech is connected with cyber-security risks, which can be perceived as privacy breach, vulnerable data security, financial losses as a result of potential frauds, scams, ambiguous legal status, unavailability of proper regulation. Those controversies rose due to the unsuitable use and abuse of data, which is most common nowadays, in the new digital era that we live in.

Financial technology or Fintech has features such as lesser expenses and lesser information asymmetry compared to those of traditional banks. With such characteristics Fintech is preferable for those entities that are missing enough collateral in fixed assets (Gao, 2022).

Changes in Consumer Behavioral Patterns

However, as the pandemic intensified and the number of infected people rose to unimaginable scale, governments had to impose strict measures in order to prevent further spread of the virus. Governments actions and measures led to enormous adoption of Fintech services. It can be argued that the pandemic changed the consumers' behavioral patterns and surged the Fintech adoption rates. Studies revealed that the fear of potentially getting infected changed the behaviorof consumers resulting in a shift toward the online purchasing platforms (Abdul-Rahim *et al.*, 2022). In other words, consumers forget about their fear regarding the Fintech usage due to the fear of getting infected.

During the period of the pandemic, the banking industry was forced to introduce the measures that included the Fintech adoption and Green Finance, with intention to comfort their business operations but also strengthen their environmental performance (Guang-Wen *et al.*, 2022). Despite the aforementioned advantages of Fintech adoption, Siddik and Guang-Wen (2022) concluded that, throughout the time of pandemic, Fintech and Green Finance foster the environmental sustainability of financial institutions by applying the eco-friendly alterations for instance digital and mobile banking. Furthermore, literature showed that Fintech services, to a great extent, contribute to green economic growth via green investment.

Nevertheless, the global Banking and Financial Services and Insurance (BFSI) had to change their landscape and embrace the digital transformation, as a consequence of the COVID-19 pandemic impact. In other words, pandemic initiated the data integration (Maiti *et al.*, 2022). “Figures show that in every second each person creates 1.7 MB of data which amounts to 2.5 quintillion bytes of data approximately that are generated by humans every day.” Having this in mind, the financial industry or commonly termed Banking, Financial Services and Insurance (BFSI) uses huge amounts of data to process their activities. Due to the pandemic occurrence, the BFSI service suppliers are undergoing the process of alteration from conventional business models to digital transformation. Nowadays, BFSI represents the core of the economy as they play heart in the process of allocation of resources and the flow of funds (Maiti *et al.*, 2022).

The happening of the pandemics could trigger shifts in consumer behavior. While banks may leave branches open in various countries, individuals, especially non-millennials, switched their finance preference to digital banking services, thereby reducing their visits to branches and Automated Teller Machines (ATMs). Furthermore, after the pandemic started to stabilize, i.e. when restrictions and social distancing rules were removed, many consumers remained loyal to digital financial services (Wojcik and Ioannou, 2020).

Though the Fintech ecosystem demonstrated its ability to transform the financial sector, the demand for financial technology services reliant on the worldwide economic undertakings was meaningfully wedged by the pandemic COVID-19 (Le *et al.*, 2021). Regarding the businesses' adoption rates of financial technology, (Diana Moreira-Santos *et al.*, 2022), argues it depends upon the level of trust in Fintech. Furthermore, the adoption of financial technology services is at some point, supportively and meaningfully, impacted by the awareness of image and reputation, together with the characteristics of Fintech services.

Fintech companies market valuation

Major Fintech firms gained the market valuation that almost surpasses a trillion USD, that is exceeding the value of greatest Wall Street six banks. Fintech companies represent an innovative and developing industry, because new products, applications, financial services as well as business models are being introduced, due to Fintech technological and financial progresses (Khakan Najaf *et al.*, 2022).

As stated by Najaf *et al.* (2022) Fintech adoption rate intensified due to the fact that Fintech companies function on a substantial scale, bringing the value from economies of scale. Therefore, it is not unexpected to see that Fintech companies are usually bigger than non-Fintech. Perhaps, differentiation is chosen as a major competitive strategy used by Fintech companies, more willingly than cost leadership.

Nonetheless, with an affirmative experience related with Fintech usage, the trust level for consumers of mutually conventional institutions, Fintech and Bigtech companies, has increased beyond 50% (Chemmanur *et al.*, 2020). Additionally, the mixture of reduced trust in traditional financial institutions, accompanied with financial crises and the augmented mobile apps usage, formed favorable occasion and opportunity for financial technology companies that provide financial services via mobile devices, smartphones and other technological gadgets.

Fintech serves as a new market player, therefore affecting and transforming the financial services in different approaches that are bringing advantages, directly and indirectly, to customers. By using the newest technologies to produce novel products, that are cost-effective, Fintech supplement the conventional financial institutions and service providers by bringing the quicker and more transparent services, with enhanced customer experience, that, at the end, bring profit to everyone (Lyons *et al.*, 2022).

Fintech firm funds

As denoted by Liu *et al.* (2022), the pandemic harshly impacted small businesses, putting swollen challenges in their access to conventional ways of financing. Even supposing the small businesses switch to Fintech lending, it is of great importance to take into consideration the fact that even credit supply could drop for the period of crises.

Notwithstanding the fact that anxiety created by the COVID-19 pandemic decreased the investments together with economic expansion, that same pandemic encouraged the Fintech firms to enthusiastically search for funds. In accordance with KPMG's Pulse of Fintech 2021 report, extraordinary amount of Fintech transactions directed the global investments to $210 billion in 2021, covering 5684 deals, that contains venture capital, M&A, private equity. Borderless financial partnership is result of this trend that digital financial services are adopting (Wu and Kao, 2022).

According to Khakan Najaf *et al.* (2021) the delivery of traditional banking services or credit facilities levies strict rules as opposed to the Peer-to-peer (P2P) lending platforms, i.e. online banking system. The difference is especially visible during the period of crises such as pandemic COVID-19. However, notwithstanding the fact that banks offer online loan service, still they lack the online loan verification mechanisms, that is stopping banks from delivering loans for the period of pandemic COVID-19. As a result, customers or borrowers favor P2P more than traditional banks throughout the pandemic.

Remittances

Research results published by Emara and Zhang (2021) proved that there is a noteworthy nonlinear connection between developments in digitization and the arrival on remittances. Precisely, authors indicate that advancements in digitization intensifies the remittances influx, consequently resulting with increased level of collected remittances stock. Nevertheless, once specific digitization index is overpassed, additional advancements may result in decreasing returns as penetration rises.

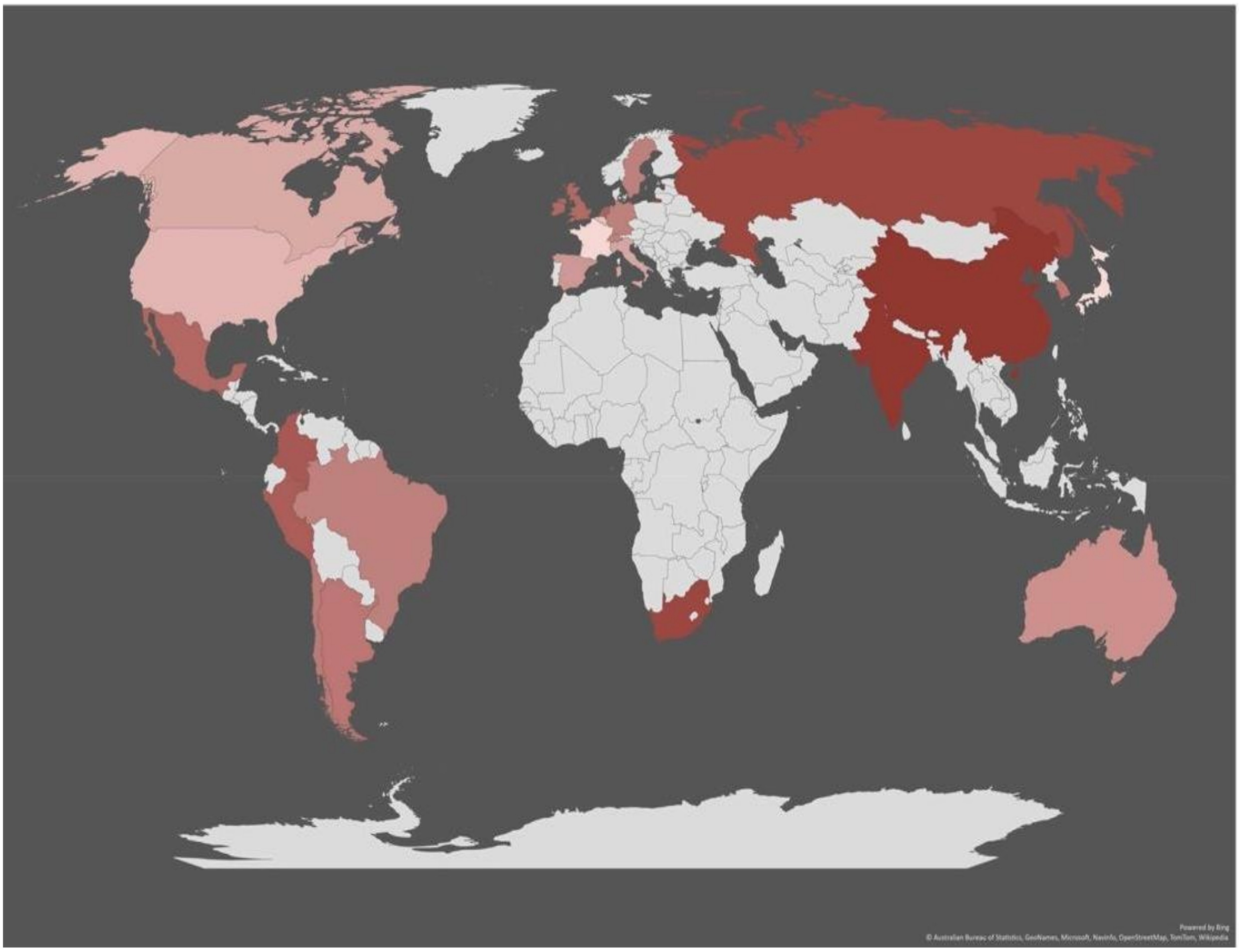
Adoption rates

It has been predicted by the financial specialists that COVID-19 pandemic fast-tracked the acceptance and adoption of financial technologies, more precisely digital banking services by 3 to 10 years (Yan *et al.*, n.d.). Due to the COVID-19 pandemic outburst, the practice of using the financial technology applications rose by 72%. Utilization of Fintech applications as well as online banking services further developed as a great number of customers started to work from home, i.e. remotely (Ya-Chih Yang *et al.*, 2022).

However, the conventional business models faced direct influence caused by pandemic COVID-19, whilst traditional business models experienced indirect effect via Fintech (Yan and Jia, 2022). As Katarzyna Schmidt-Jessa (2022) denoted, the digital-only banks feedback to pandemic was not instant and direct. Alternatively, traditional banks promptly entered into the area of electronic banking, therefore delivered user-friendly and practical applications to their customers.

Despite the fact that there is an excessive societal move and swing in the direction of digital services utilization, this does not imply that digital-only banks incline to succeed. In the following figure it can be seen how a considerable number of countries demonstrate a high adoption rate. Presented figure that was assessed by Global Fintech Adoption Index has been introduced by Ernst & Young (Victor Murinde *et al.*, 2022).

Figure 7. Global Fintech Adoption Index



Source: Murinde, V., Rizopoulos, E., & Zachariadis, M. (2022). The impact of the FinTech revolutionon the future of banking: Opportunities and risks. International Review of Financial Analysis.

Furthermore, Micro Small and Medium sized enterprises will easily overcome the challenges of crises and problematic periods such as the pandemic, as fast and easy as they adopt Fintech services. As stated by Gao (2022), this is due to the fact that financial technology services are quicker, more cost-effective, and more well-organized because they can easily get in touch with those households that are low in income, as well as to small and medium sized enterprises.

In the table below the most noteworthy articles, related with this subheading, will be presented.

Table 1. Fintech adoption rates and digital transformation - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Xia *et al.*, (2022)	Authors aim was to study the effect of digital finance on corporate resilience, for the duration of pandemic.	Quantitative methods analyzing the stock prices of Chinese firms, measuring the digital finance responsibility.	Results showed that those countries that have more developed digital finance adoption face lessened damages and undergo fasterhealing from the pandemic.	Study focused on Chinese listed firms,with limited date span.
Yan *et al.*, (2021)	Purpose of the research article was to examine the function of mobile financial services in theprocess of developing resilience during the pandemic.	Theoretical model based on Unified Theory of Acceptanceand Use of Technology. The Structural Equation Modeling that includes data from MFS users from Bangladesh, collected from structured questionnaire survey.	Finding disclose how social influence, trust and value affect users' purpose to utilize the MFS for the duration of COVID-19 pandemic.	Research study focused on Bangladeshi customers therefore results cannot be generalized.
Maiti *et al.*, (2022)	The intention of the research study was to improve understandingof the influence of the pandemic worldwide Banking, Financial Services, and Insurance sector.	Analysis of global BFSI sector by usingthe hype cycle framework.	Results displayed how the pandemic COVID-19 encouraged innovations in different parts of BFSI sector.	The limitations of this research study are not openly specified.

Wojcik and Ioannou, (2020)	Purpose of this article was to deliver knowledgeable explanation regarding the existent and possible COVID-19 effect on financial markets, centers and industries.	Wide-ranging literature review andanalysis of existing literature based on qualitative approach.	Findings include some COVID-19 impacts om financial scenery. This entails stoppage of novel financial regulations, alliance of firm levels withfinancial sectors. Usage of new financial technologiesis anticipated to increase.	Possible limitations may entail doubts thatare connected with longstanding effects of active and developing event, for instance the pandemicCOVID-19.
Le (2021)	The idea behind this article was to forecast the aspects that affect the tendency of Fintechusage as a consequenceof new usual behavior in the wake of COVID.	Structural Equation Modeling and Mechanical Turk (MTurk).	Findings indicate that key factors of Fintech adoption comprise role of trust, data security, privacy, staff skills, perceived usefulness.	Data solely collected within the USA.
Khakan Najaf *et al.*,(2022)	Authors' purpose was to search the financial performance and corporate governance feature of Fintech businesses as well as inspection of appropriateness of corporate governance quality index.	Ordinary Least Squares Estimation used for data collectedfrom businesses observation time period from 2010 to 2019.	Findings imply that financial technologies companies because of economics of electronica platforms, outperform thetraditional businesses. Results show that Fintech firms have greater corporategovernance quality that non-Fintech companies.	Foremost limitation denoted is the misspecification of the models where accounting metrics are employed as dependent variables.
Wu and Kao, (2022)	Purpose of this article was to search for opportunities together with challenges of new financial technologies –Fintech in Southeast Asian banking sector.	Literature review	Southeast Asia has become a leader in the Fintech adoption, taking into consideration the upsurge inmobile payments.	Research study not very broad as it is mainly focused on sustainable development within Fintech and Human resources.

Emara and Zhang, (2021)	This research article aimed to investigate theassociation among the development in digitization and the stream of payments thatcame as a result of pandemic restrictions.	Broad measure of digitization that used Fintech as a proxy and utilized System Generalized Method of Moments panel estimation methodology for the data from 2004-2018, for 34 emergingcountries.	Findings indicate that thereis a nonlinear relationship among the development ofdigitization and the influx of remittances. Therefore, increased digitization improvements lead to increased remittances inflow, up to certain threshold level.	The limitations of this research study were not explicitly denoted.
Gao (2022)	Purpose of this article has been on investigating the small business activities and the role of Fintech in the course of pandemic.	Regression analysis with statistical measures.	Results indicate that pandemic restrictions andFintech have undesirable effect on new firm formation. Longer the crises, damaging the firmregistration procedures.	Data limitations have been mentioned as drawbacks.
Victor Murinde *et al.*, (2022)	Authors aim to reassessthe growing literature on financial technologies and Fintech services with focus on opportunities and risks for traditionalbanks.	Data from 115 worldwide countries from previous 16 years were used for statistical computingmeasures of key indicators.	Findings specify how Fintech is not going to substitute the traditional banks, due to banks' progress and advancementof their own financial technology platforms and collaborations with Fintech.	Limitations not openly expressed.

Source: Author's work

As it can be seen from the table above the most influential articles regarding the first topic are showed in a way that the most important segments are highlighted. By creating a tabular the purpose, methodology, findings and limitations can be observed in more clear way. In total ten articles were presented that used different methodologies with the aim of achieving their articles' purposes. From the presented articles, few summaries can be drawn:

- Countries that are characterized with greater financial technology acceptance underwent faster healing process followed by decreased impairments and harmful effects
- Different social factors such as perceived value and trust impacted the individual users' determination for using Mobile Financial Services (MFS) throughout the pandemic
- As a consequence of pandemic numerous innovative ideas and activities came to life within the fragments of BFSI - Banking Financial Services and Insurance sector
- Pandemic endorsed improved partnership between the companies and financial sector participants resulting in greater usage of financial technologies
- Fintech adoption rates were mostly influenced by the elements such as privacy and trust issued, data security and perceived usefulness
- Financial technologies companies reveal developed corporate governance feature therefore outpacing the conventional businesses
- Development of new businesses is negatively affected by the pandemic limitations
- Traditional banks are expanding their businesses within the field of Fintech by cooperating with Fintech companies and by creating their specific financial technologies

3.2. Fintech in different countries

In this section, we will present the case studies of different countries and how their digital finance companies reacted to the pandemic. We will start with Asian countries, i.e. articles that put special emphasis on the country's response to the global economic downturn caused by the pandemic.

Asian countries

Xia *et al.* (2022), analyzed one country, that is China, which they regarded as one appropriate to explore cross-country digital finance on corporate resilience. Although digital finance encountered appreciable spread in China, still there are areas within the country that vary with the levels of digital finance applications.

Authors conclude that firms located in regions with higher levels of digital finance experience fewer losses in stock price and recover more quickly, indicating that digital finance can enhance corporate resilience to the COVID-19 pandemic. This article investigates the digital finance effect on corporate resilience, expressed through a sample of Chinese firms. It is well known that China's financial system is largely supervised by the government. Having that in mind, lending is greatly affected as banks favor granting the state-owned rather than non-state-owned enterprises. With that being written, the non-state-owned enterprises (SOEs) are underprivileged as they have less amount of government subsidy and could be treated unfairly when trying to get mortgages (Brandt and Li, 2003). This article registered that digital finance can help those enterprises affected by pandemics by alleviating the seriousness of deprivation. In other words, those firms with soaring digital finance levels are irrepressible to the COVID-19 pandemic. It can be concluded that it is of great importance to flourish the digital finance implementation in the future.

However, in terms of market size as well as digital breakthroughs in both domestic and international trade, China has now surpassed the United States as a major actor in the world economy. Although Chinese producers were categorized as impersonators, nowadays novel and advanced business models are being developed that cannot be equally matched and compared with those developed in the West. Examples of those business models include Ant Financial and WeChat, along with worldwide supply networks (Li *et al.*, 2020:3). Moreover, supply chain coordinators like Li & Fung Ltd. (2018) have begun to re-envision their business domains as requiring transaction turn around speed, new business models, and innovations, and seamless, end-to-end platform digitalization for supply chain effectiveness. This increasingly applies to other Asian nations: South Korea, Japan, and India. In order to enhance their participation in global value chains, Asian countries should take advantage of development opportunities related to technology and digitalization.

The nations of East Asia, South Asia, and Southeast Asia, for the period of earlier few years, endorsed the developments in the digital economy, exceeding the improvements in the Western nations thereby encouraging the combination of traditional economic activities with digital technology (Ali *et al.*, 2018; Taglioni and Winkler, 2016). Even as they have been dealing with rising labor costs, slowing trade exports, and slower economic growth, Asian countries and the development of their collective digital economy in the area have benefited greatly from these global developments.

Nowadays, Asian manufacturing industries have become the focus of business transformation and technology infrastructure upgrades. Afterwards the financial crisis from 2000s, the manufacturing industry from Asia positioned itself as a suitable one for reforming the developments. Those modifications concerned the instable structure and restoration the competitive advantage. The involvement of different segments from digital economy creates valuable variations in manufacturing production, such as intellectual machines, contemporary communication, cloud computing and big data (Li *et al.*, 2020:4).

Three major areas in Fintech innovations that are relevant for Asia, according to Li *et al.* (2020), are: achieving transparency of transactions (which can be enabled by the blockchain mechanism), creating and safely using digital currencies, and introducing smart contracts. Four blockchain hubs have been identified in Asia, based on the presence of tech firms with

Research and Development (R&D) commitments to blockchain projects, the national digital and regulatory framework, the popularity of their markets for funding and capital raising by going beyond initial coin offerings (ICOs), and the demand for such technology (Lim *et al.*, 2019).

Process automation and cost reduction in financial institutions also are benefiting from blockchain, as illustrated by the results of a South Korean survey (Oh and Shong, 2017). Equity crowdfunding also is becoming easier with blockchain, by using low-cost registration of stocks and shares, simple transfers of crowdfunding equities, peer-to-peer transactions by investors and entrepreneurs, the involvement of funders through voting, as well as support for regulatory activities (Zhu and Zhou, 2016).

Fintech products – digital currencies, smart contracts, mobile banking

Digital currencies are a building block in the shift to a digital economy. The Bank for International Settlements (BIS, 2015) has suggested that digital currencies can serve different roles related to money and exchange mechanisms. First, they act as assets whose value is determined by supply and demand, similar to commodities like gold. Second, they offer a P2P exchange mechanism for the transfer of value based on the operations of distributed ledgers, which track and validate a digital currency's value and provide a complete historical, digitally encrypted transaction record typically in blockchain form (e.g., via Bitcoin, Litecoin or Ethereum, or other digital currencies) (Wang *et al.*, 2019, c). Two recent surveys on the applications of smart contracts by Chinese researchers deserve discussion. Wang *et al.* (2019, b) identified three areas of interest: contract vulnerabilities, limitations of the blockchain technology for building smart contracts, and privacy and legal issues. Zheng *et al.* (2020) took a life cycle-oriented view and highlighted the potential for studies on the creation, deployment, execution, and completion of smart contracts. Other authors have paid particular attention to vulnerability issues, with research focused on repeated payments related to the same contract – the "reentrancy attack" problem (Liu *et al.*, 2018). The main goal of this study was to examine the effect of Fintech products, abbreviated as FTPs, on the performance of Chinese commercial banks. The essential data was collected by using a quantitative method together with self-questionnaire that were dispersed to both employees of Chinese commercial banks and to customers. The analysis involved usage of the structural equation modeling technique.

The outcomes of this analysis revealed that the perceived usefulness, i.e. PU of the Fintech products exhibits positive and substantial impression on customer satisfaction, improved bank's service quality, enhanced employee work efficiency as well as minimal prospects of bank employee assistance. Besides, the perceived difficulty, that is PD, onto the Fintech products (FTPs), has had an undesirable and destructive influence on customer satisfaction and decreased expectations of assistance. Remarkably, study confirmed that there is a positive and important connection between perceived difficulty and the banks' service quality and banks' work efficiency, connotating that the advancements of service quality and the banks' work efficiency can lessen the inadequacies of Fintech products. This research is the fundamental study that provided the understanding of Fintech products, therefore helping the commercial banks in China (Chen *et al.*, 2021).

Wang *et al.* (2020) concluded that FTPs play a vital role in facilitating a bank's risk-taking behavior to achieve that bank's main corporate objectives, absorbing and maintaining customers by providing quality and timely service, as well as reducing customer costs and increasing bank profitability. Although COVID-19 is transforming how businesses use digital technology overnight, which will make an investment in FTPs more attractive (Wojcik and Ioannou, 2020)., a holistic and integrated approach between the components of business processes, people, and technology is required to maximize investment return and successful corporate performance (Yang *et al.*, 2009).

Chen *et al.* (2021) recognize at least three developing trends in FTPs being gradually unleashed in China: ATM (automated teller machine), VTM (virtual teller machine), and mobile banking. Throughout the imposed pandemic measure that is lockdown, the accessibility of cash in public still stays the crucial worldwide. Having this in mind, the ATMs have a pivotal role in providing the cash to the customers and extensive banking services, in those situations when customers want to escape face-to-face interactions especially for the duration of the COVID-19 pandemic.With that being said, it is valuable to emphasize that the ATMs are important self-service station (Chen *et al.*, 2021:6). Having ATMs on side, as an addition to all the features and functions that ATM has, a VTM also assists the customers in the activities such as opening and closing the bank account, currency conversion, deposit certification issuance, etc. From 2013, banks for instance Bank of China, Everbright Bank, and Minsheng Bank, all presented VTMs in their operations to lessen the busy ques in their banks' branches, thereby advancing customer experience. As soon as the Fintech boomed, greater than 30 Chinese banks accepted the VTMs in 2019 (CNINFO, 2019). Furthermore, additional VTMs utilization is probable in the post pandemic period (Chen *et al.*, 2021:6).

Mobile banking is the most mature FTP in Internet finance, but its demand and growth for financial services among Chinese customers are far from slowing. In 2019, mobile banking sites averaged 326 million visits per month in China (CIW Team, 2019) – a 10.9% increase compared to 2018. There was a 200% jump in new mobile banking registrations.

In comparison, mobile banking traffic rose 85% when the government imposed a lockdown in April 2020 due to COVID-19, according to Fidelity National Information Services (FIS). Laukkanen (2017) commented that mobile banking allows customers to access various financial services via smartphones. For example, in the Bank of China mobile app overseas version, apart from the common services (e.g., branch finder, balances, transfer and remittance, and accounts overview), the app also provides lifestyle services (e.g., prime student service, financial consultation, mortgage information and tips to avoid coronavirus scams) and wealth management (e.g., global accounts and currency converters). In the same Bank of China mobile banking app, aside from the banking services available in the overseas version, other daily life services are also available in the Chinese version. For example, a customer can use live chat, manage utility bills, select and top-up social media memberships, call a taxi, check medical insurance, do differentiated product matching, purchase restaurant vouchers and more (Chen *et al.*, 2021:7). Though finance companies, such as Alipay, familiarized the consumers with phone applications, almost all commercial banks in China initiated the Financial Technology Platformsor FTPs, thereby weakened the market share. This circumstance enables banks to transition their basis to online ones, so in that way they ensure competitiveness to handle the pandemic COVID-19. Accordingly FTPs developed as a beneficial means for harmonizing the conventional banks and online financial businesses (Chen *et al.*, 2019:10).

Currently Vietnam is undergoing prosperous period of time, characterized with rapid growth, with almost 55% of the population consuming smartphones and almost 52% utilizing the internet. Those percentages make Vietnam a country capable for fintech development. Having previously mentioned in mind confirms the fact that the number of fintech companies in Vietnam has increased from 40 companies at the end of 2016 to almost 150 by the end of 2019. The outbreak of pandemic additionally fortified the expansion of electronic payments. On the other hand, the growth of fintech brings several safety intimidations because the legal framework for fintech in Vietnam is still in early stage (Khoung *et al.*, 2022). With the COVID-19 pandemic impeding traditional banking activity, the number of Fintech companies operating in the Vietnamese market has grown significantly. Fintech is a prospective sector of the digital transition that lowers expenses while improving user usefulness. Fintech industry flourished in 2020, in specific sectors, for instance Payments, that accounted for 33% of market share, at the second place is P2P lending with 15.5%, whilst Blockchain/Crypto account for 13%, furthermore Point of Sale together with Wealth Management account for 7%. In accordance with Fintech and Digital Banking, Asia Pacific 2020 report, mobile transactions are predicted to upsurge by 400% from 2020 to 2025, together with number of eight leading banks, which are projected to rise by 50%. This prompt growth of accounts and transactions levies enormous burden onto the contemporary banking system (Khoung *et al.*, 2022:3).

According to Khoung *et al.* (2022), among young people in Vietnam, “number of people who were using fintech was 161 (accounting for 72.85%), while 56 people never used fintech (accounting for 25.34%), and 4 people had used fintech but were currently not using it (accounting for 1.81%)”. The study showed the following benefits of using fintech in Vietnam: convenience, economic benefits and seamless transactions, but on the other hand, it recognizes the following risks: Operational Risk, Security Risk, Legal Risk, and Financial Risk. Also, social influence has a positive impact on consumers; they use fintech as a result of being introduced to it by others or by observing those around them. Consumers have a high degree of faith in fintech platforms and service providers. In the era of the COVID-19 pandemic, new consumers have a more precise awareness of the benefits that fintech brings, but because the study was deployed in the early stages of the epidemic, they are still unable to evaluate all the sets. Despite the benefits, the risks still exist, even in epidemics.

To promote fintech, a very significant factor is technical and financial literacy of citizens. This is confirmed by the fact that Vietnam has a comparatively small concentration of financial literacy, only 24%, yet has elevated level of unbanked populace that is 69% (Jeyakumar *et al.*, 2022:3). Fintech contributes significantly to the democratization of money in society and the increased financial resilience of local communities. People who had no prior experience with digital banking are now tech-educated and able to manage their accounts digitally, which is a clear indication of the impact that fintech has played, particularly during the COVID-19 pandemic. Due to limitations on people's physical mobility during the COVID-19 epidemic, a large number of people began to have access to financial transactions via mobile phones. This included receiving government cash payments via their devices.

The increased importance of fintech is visible not only in Vietnam, but in the ASEAN region aswell. Singapore is one country that holds the lead position in the number of fintech companies within the ASEAN region, enticing even more investments than other countries, bookkeeping the $379 million in 2020.

Indonesia is on the second spot that attracted investments in the same year in amount of $180 million. Furthermore, Vietnam’s Fintech development is rising and showing improvements in different segments. Since 2020, Vietnam possesses 141 businesses that offer Fintech services. Even though being moderately new to Fintech world, Vietnam’s fintech firms, that is Fvndit, managed to gather $30 million for fintech undertakings (Jeyakumar *et al.*, 2022:4). The resultsof research performed by Jeyakumar *et al.* (2022) say that there is a negative correlation amongstVietnamese users that have greater financial literacy and the adopting of Fintech in Vietnam.

This inverse link may suggest that Fintech in Vietnam can help bring about financial inclusion by enabling previously unattainable technologies to be used for financial transactions by those with lower financial knowledge. Given that they may already have good access to traditional financial facilities, it is also possible that Vietnamese with greater levels of financial literacy donot view Fintech as a crucial instrument for their financial operations. Additionally, results show that user innovativeness has a positive impact on Fintech adoption in Vietnam. This research also proves that respondents' financial health during the COVID-19 has changed, with a rise in the habit of saving money and an increase in people becoming more conscious in finance and consumption behavior.

South Korea has introduced different methods of government regulation policies regarding network usage in the financial sector, in order to maintain high security level and to protect the users. South Korea is the only country that uses network segregation that is institutionalized. South Korea has lawfully executed a policy of network segregation, that clearly commands the separation, blockage, and prohibits the access to external networks, that includes the internet, from inside business systems associated with interior network as stipulated in the Regulation on Supervision of Electronic Financial Businesses. Network segregation refers to splitting the information and communications technology (ICT) lines of financial businesses into inner networks for business processes and external networks, that is internet. This parting goal is to preclude the cyber dangers and information leak. This has been presented in 2013 as asupplement measure to the network hack incident (Choi and Jin, 2021:4164).

Baltic and Caucasian states

Fintech had a massive influence on Small and Medium sized Enterprises, or commonly known SMEs, but also Fintech had a vital role in the fourth industrial revolution (Chang *et al.*, 2020). Furthermore, the outburst of COVID-19 pandemic contributed towards the Fintech promotion, offering inimitable opportunities for credit access in countries where Fintech is popular and already well-established, along with creating demand in those countries that did not embraced Fintech that much (Charaia *et al.*, 2021:360).

There are many distinct indicators that are crucial for growth and development of Fintech around the globe, as well as within continents and countries like the Baltic and Caucasian states. Nonetheless, it already enjoys a strong foundation, with 57% of people worldwide using the internet, 69% having bank accounts, and almost one-third of all people making purchases or paying bills online (Charaia *et al.*, 2021).

Innovative digital technology adaptation and the emergence of fintech companies in the Caucasus region are already progressing, but these developments have advanced far more quickly in the Baltic States. In developing countries, such as Georgia, Armenia and Azerbaijan, clients still prefer traditional forms of banking.

However, numerical facts demonstrate that the expansion of internet and online banking services, for instance the number of active users, number of account holders at financial institutions, as well as the performed financial activities, etc. is better enhanced in Baltic States, contrasted with South Caucasian. Simultaneously, the alteration between the Baltic States and South Caucasian states is considerable, as Estonia represents the frontrunner, the country that participates in absolute terms, as well as in total percentage of entire population, partaking the abovementioned activities. It is certain that the pandemic will increase those percentages and numbers in the coming years, due to all new imposed rules and procedures (Charaia *et al.*, 2021:365).

Caucasian nations have a lot of work in the future to develop the fintech foundation first, to be prepared for its emergence. Fundamental advanced framework, creative regulation and expansion of the monetary market and its items, will be essential to obtain the most extreme outcomes from fintech advancement in Georgia, Armenia and Azerbaijan. Baltic states are already well developed, and that development was indeed noticeable during the pandemic.

Those countries that imposed strict lockdown measures experienced higher transactions all the way through fintech companies, that led to higher activity performances (Charaia *et al.*, 2021:369). The Baltic States serve as a well exemplar for Georgia, Azerbaijan, and Armenia in fintech development direction, by presenting greater levels, enlarged disbursements, and raised high-tech exports (Charaia *et al.*, 2021:369).

India

COVID-19 pandemic in India has resulted in significant changes in financial habits of citizens. At the same time, three-quarters of Indians shifted to electronic payments (Capgemini Research Institute, 2020). India has one of the highest fintech adoption of around 87% (Ernst and Young, 2017) and an increasing number of fintech loan app downloads during the pandemic (Fu and Mishra, 2022). The result of Savitha's and Hawaldar (2022) research, half of the respondents in India using fintech services less than five times a month and the purpose were to pay for essential goods during the pandemic.

According to report by Morgan Stanley, the number of Internet users in India will grow up to 914 million by 2027, thus making substantial chances for online market space, that includes the software solutions, applications, and entries that encourages businesses and tackles the public (Modgil *et al.*, 2022).

Malaysia

Malaysia had the plan to change the financial segment of the country into a cashless society, however Fintech adoption was at low levels before the pandemic occurred. Nevertheless, as concluded by authors cited in (Abdul-Rahim *et al.*, 2022) it is hoped that the cost savings due to the transformation, would proceed in 1% worth of the country’s GDP. Authors investigated the Fintech adoption in Malaysia, but the research was limited to internet banking only, which is characterized as more secure than other Fintech services.

Bangladesh

In Bangladesh, as a consequence of COVID-19 pandemic outbreak, mobile financial services achieved a positive trend as the number of transactions executed via MFS reached 307.3 millionin March 2021, contrasted with the data form the period earlier than the pandemic (Yan *et al.*, n.d.). Furthermore, the main reason for MFS acceptance in Bangladesh, especially during the period of pandemic, is credited to factors such as simple access, cost efficiency, quick service distribution, superior security. Reasons for using Mobile Financial Services contain savings, shopping purposes, money allocations, education etc.

United States of America

Regarding the United States of America, one special program was introduced with intention to help small businesses. That program is the Paycheck Protection Program, known as PPP, that was introduced in 2020. It offered loans to small firms, and eligible nonprofit organizations. It has been recorded that more than 5.1 million loans circulated across 5,460 financial institutions, resulting in $525 billion being accepted (Isil Erel and Jack Liebersohn, 2022). This program, PPP, was one of the most substantial economic incentives in the history of the United States. Furthermore, Cross River Bank, Celtic Bank, and WebBank, were three leading online banks that provided over 90% of PPP loans, collaborating with Fintech nonbanks.

Lyons *et al.* (2022), in their research paper investigated the Fintech expansion and demand for savings, borrowings and remittances. In conducting their research study, they used the Global Fintech Index (GFI), that is known as the world's worldwide positioning of Fintech ecosystems. This index functions as an industry benchmark that evaluates the countries taking into consideration the criteria that is the scope of their fintech ecosystems together with their business environment. By using this index, cross-countries comparisons could be made. Those countries that are in emerging stage are the ones that are well set to transform the process of financial technology progression. With those developments, affordable and secure contact with excluded populace can be stipulated.

Table 2. Fintech in different countries - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Li *et al.*, (2020)	Authors' purpose was tostudy and examine the Asian digital economy, its background and opportunities.	A research commentary.	Asian countries should restore their current business activities to enhance technological advancements that bring opportunities for digital improvements.	Limitations are notclearly mentioned.
Chen *et al.*, (2021)	The purpose of this article was to inspect theeffect of financial technologies products ontraditional banks functioning in Republic of China.	Structural equation modeling techniquesbased on quantitativeapproach and questionnaires.	Findings disclose that there is a need to improvethe knowledge of Fintechproducts on non-financialfunctioning.	As denoted by the authors this study's limitations relates to survey method as it isproblematic to generalize and spreadout to considerable populace. Results are valid only for commercial banks in China.
Khoung *et al.*, (2022)	The reason behind thisarticle was to comprehend the aim of using Fintech services between Vietnamese youth, followed by COVID-19 pandemic.	Partial Least SquaresStructural Equation Modeling Analysis supported by Smart PLS software.	Findings indicate that the perceived benefit significantly affected theintent of using Fintech, tracked by perceived belief.	Limitations are mentioned as focus group being youth fromVietnam, and small quantity of observations, therefore generalizability may deteriorate.
Charaia *et al.*, (2021)	This article purpose was to investigate the tendencies of digitalization in Georgia, Azerbaijan, and Armenia, together with Baltic States, with objective of lessening a financial gap for SMEs.	With intention to compare Caucasian and Baltic states, comparative analysishas been used.	Findings of the paper specify how SMEs are dealing with credit restrictions via conventional financial institutions, however thatis being changed as financial technologies are creating more financialopportunities.	Limitations include statistical data as absent for compared countries as well as deficiency of financialtechnology literature for Caucasian states.

Savitha and Hawaldar, (2022)	Purpose of this article was to explain the issuesthat define consumers' intent to utilize the budgeting applications from the time when pandemic COVID-19 occurred.	Partial Least Square Regression, PROCESS macro technique based on data from cross- sectional survey.	Findings show that application engagements positively affect the consumers intention to utilize the budgeting apps.	Limitations of the study are presented as such that variables consumed are changingtherefore various others variables could be usedfor potential future research studies.
Nathan *et al.*, (2022)	Purpose of this research article was to study the financial literacy, adoption of Fintech, as well as the effect which pandemic disaster left on consumers in Vietnam.	Mall intercept technique togetherwith research interview has beenused to collect the data that was later analyzed via IBM SPSS software and multiple linear regression model.	Findings show that the observed usefulness, trustetc. are connected with Fintech adoption in Vietnam, whilst at the same time financial literacy has been regardedas not meaningfully associated with Fintechadoption.	This research study undergoes limitationsin terms of great datasample collection because of respondents' absencefor the period of COVID-19.
Nguyen *et al.*, (2022)	Authors' purpose when writing this research article was to examine both positive and negative sides of banking technology uprising. Additionally, the functions and standards of Fintech has been analyzed.	Qualitative methodology togetherwith analysis methods.	Findings imply that financial technologies empower the banks to advance their operations while at the same time look after possible threats and risks. Risk management plan needs tobe prepared beforehand.	Limitation of this studyis that there is absence of the proposals regarding the undesirable features of technologies.
Choi and Kwak, (2021)	Purpose of the study wasto examine the issues related to remote working conditions that arose due to network segregation policy operated in South Korea.	Qualitative research.	Findings of this research paper indicate that undistinguishable application of network segregation causes delaysin new financial improvements. Therefore,deregulation of network segregation policy is necessary.	The limitations of thisstudy were not clearlymentioned.

Source: Author's work

Germany is the lead country in the process of digitalization nations' digital economy at 55.9%, whilst on the second place is Great Britain with 53.6%, outpacing the United States with 53.3%. Amongst the Asian countries, the hierarchical order positioned China as a leading one, ended globally as a sixth one with 29% share. However, the G20 countries demonstrate the uppermost share of digital economy production value. Within the segment of industrial digitalization, with 41.8% Germany holds the top most placement, tracked by South Korea at the second place with 41.3% of industry value, respectively followed by Japan and China, with 29.6% and 18.0% (Li*et al.*, 2020:4).

3.3. Fintech in Islamic Finance

This domain entails four articles that concentrate on Fintech in Islamic banking, with special emphasis on the effect that COVID-19 had on Islamic banking. Having in mind the impact that pandemic created on the entire financial industry, weakening various business sectors, Islamic banking also got disturbed.

Islamic banking

On the other hand, Islamic finance, especially Islamic banking proved its firmness and strength, during the Global Financial Crisis, 2007-09 (Ahmed *et al.*, 2015). Articles examined in this section, investigated the Islamic finance employment of Fintech during and after the pandemic COVID-19. Islamic Fintech has the same characteristics and is principally indistinguishable with an exceptional Sharia application, as well as compliance with Islamic principles and Islamic institutions (Alshater *et al.*, 2022). The usage of the word "Islamic" viewpoints to make a distinction relating the traditional and shariah-obedient Fintech operators. With respect to the numerous disparities between the two systems, the discrepancy is reasonable. For instance, one of the most successful business models, profit interest-based P2P lending, is primarily prohibited because of riba, that is foremost exclusion in Islamic finance (Alshater *et al.*, 2022).

As reported by the Islamic Finance Development Report from (2019) Islamic finance reached a $3 trillion industry value, indicating rising demand and creating further developments. It can be concluded that the Islamic banking system positioned itself as the only one of its kind economic systems that uniformly takes into consideration the welfare of both stakeholders and whole societies, intending to produce enhanced livelihood for Muslims and minorities (Karim *et al.*, 2022). C.Lee and Teo (2015) outlined the five Fintech bases, which are "low-profit margin, light asset, expandability, innovation, and easy compliance". All of the mentioned principles are consistent with sharia principles. Fintech experienced a serious upsurge, particularly in main developed financial systems, such as the USA, UK, China, and Germany. This led to boosted research in the field of Fintech from diverse aspects (Alshater *et al.*, 2022). Consequently, the relatable literature intensifies rapidly. Conversely, the literature about Islamic Fintech features is subjected to deliberate publishing pace. Keeping that in consideration, only four revised articles, out of 71, were chosen as relevant to the subject matter of this thesis. The following table recapitulates the chosen literature.

Table 3. Fintech in Islamic Finance - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Alshater *et al.*, 2022	Islamic Fintech Development from 2017 to 2022	Bibliometric andcontent analysis	Fintech incorporation intoIslamic finance leads toward uplifting underserved communities,upsurge in economic and social progress, support ofSMEs. Fintech adoption offers government participation in financial inclusion, overcomingcrises.	Merely exploitedpapers listed in Scopus database.
Karim *et al.*,2022	This research aims to look into the influence ofIslamic fintech on the Islamic banking sector using the perspective of stakeholders in the aftermath of the COVID- 19 outbreak.	A quantitative approach based onself-administered questionnaires.	According to the results, participants expressed robust attention to Islamic banking and fintech, especially in the period during and after the pandemic of COVID-19.	The study wasfocused on the Pakistani data solely.
Banna *et al.*,2022	This study investigates how Digital Financial Inclusion (DFI) influences the stability ofthe Islamic banking sector in the face of COVID-19.	Panel-Corrected Standard Errors (PSCE), Two-Stage Panel Least Squares-Instrumental Variables (2SLS-IV), and Two-Step System, Generalized Method of Moments (2SGMM) approach.	The conclusions indicate that boosted acceptance ofDFI improves the stabilityof Islamic banking, leading to a reduction in the default bank risk of thereviewed region.	This study's results cannot be generalized as they neglect the engagement of all Islamic banks operating countries, concerning the absence of DFI data.
Aziz *et al.*, 2022	This study offers a practical examination of the COVID-19 impact onthe sustainability of entrepreneurship, with a focus on the female perspective. Moreover, the study covers the role of Islamic FI in sustaining businesses throughout the pandemic duration.	A qualitative studybased on semi- structured interviews.	The results disclosed that adverse outcomes of the pandemic were not possible to evade for women entrepreneurs, still,some female entrepreneurstried to mitigate the effectsof the pandemic assisted by Islamic microfinance institutions.	This study focuseson women entrepreneurs in Pakistan thus the effect of the pandemic has beenglobal.

Source: Author's work

The review article written by Alshater *et al.* (2022) classifies the chosen literature as follows:

- Financial technology – Customer perception of Islamic FinTech and Islamic FinTech's current development and its impact on Islamic finance institutions
- Islamic FinTech and distributed ledger technology – Cryptocurrency and Blockchain
- Financial inclusion, and
- Islamic FinTech and deposit-lending – P2P Lending and Crowdfunding

The authors managed to depict a thorough literature review that examined Islamic Fintech through content analysis, using Systematic Literature Review and the PRISMA method. The authors publicized that Fintech incorporation into Islamic finance leads toward uplifting underserved communities, upsurge in economic and social progress, and support of small and medium-sized enterprises. Moreover, Fintech adoption offers government participation in financial inclusion, and overcoming crises, for instance, COVID-19. Nevertheless, "the lack of laws, legal regulations, and the lower financial literacy become the primary obstacles preventing the development of Fintech in Islamic finance (Alshater *et al.*, 2022). Despite the presented results, this research review highlights the fact that Sharia's obedience to cryptocurrency and blockchain persists indecisive, tending to discard cryptocurrency as a transactional instrument.

In the research article by Karim *et al.* (2022) authors look into the influence of Islamic fintech on the Islamic banking sector using the perspective of stakeholders in the aftermath of the COVID-19 outbreak. The authors gathered the data by applying a quantitative approach based on self-administered questionnaires. Data collected includes the responses from 1000 respondents coming from seven different categories of stakeholders, that are somehow, explicitly or implicitly, related with Pakistani Islamic banking and finance. Those stakeholders were characterized as with various backgrounds, such as managers of Islamic banks, advisers of Islamic Law, members of local communities, employees, savers, and customers (Karim *et al.*,2022).

Taking into account the results, survey participants showed a huge admiration towards the Islamic banking and Fintech, principally in the aftermath of the pandemic. They advocate that Islamic banks should not be regarded as profit-making institutions. By contrast, their contribution to society exceeds merely profit maximization. The pandemic affected societies worldwide, however Islamic banking stood out, and differentiated itself in providing aid and distinctive support methods for the underprivileged. As denoted by Rabbani *et al.* (2021) "Zakat, Sadaqah, Qardh-al-Hassan, have initiated a light of hope for the communities overall and embraced them wholeheartedly."

Performing the factor analysis and the Kruskal-Wallis test, the author concluded that stakeholders enhanced the societies, by pursuing the Islamic banking guidelines, in the course of pandemic. Karim *et al.* (2022) discovered the function of Islamic banks that participated in improving the societal status by offering different instruments, products and services.

The study by Banna *et al.* (2022) authors investigated how Digital Financial Inclusion (DFI) influences the stability of the Islamic banking sector in the face of COVID-19. Furthermore, Digital Financial Inclusion connects the contemporary innovative methods with traditional Financial Inclusion, with the aim to simplify banking processes by offering the remote approach to financial services by way of using the electronic gadgets. Including the Islamic banks with their digital financial services would lead to justifiable economic growth. This has an effect in the process of safeguarding the financial resilience, especially in the course of pandemic, such as COVID-19 (Banna *et al.*, 2022).

Cited by Banna *et al.* (2022), DFI is a novelty that eradicates the requirement for physical attendance at the financial institutions' headquarters. In its place, in-person visits to financial institutions can be replaced with virtual visits through electronic gadgets that have a connection to the Internet. This leads toward positive impacts on banking functioning and constancy. According to the World Bank Group, 2013, the acceptance of DFI has skyrocketed given that almost 50% of the inhabitants worldwide own a mobile phone. With the aforesaid Islamic banks started the process of digitizing their activities by the use of DFI.

Digital Financial Services, or DFS, were influenced by COVID-19 pandemic in terms of quick and comprehensive realization with aim to preserve the stable countries economic flow (Banna *et al.*, 2022). It may be concluded that those Islamic banks that integrate Digital Financial Services, are in a better position to safeguard a greater stage of financial steadiness, during the period of monetary stagnation similar to COVID-19. Otherwise, the greater percentage of DFI adoption ensures Islamic banking stability amidst lessening banks' credit risk.

The article written by Aisha Aziz *et al.* (2022) provided a practical examination of the COVID-19 effect on the resilience of entrepreneurship, with an emphasis on the female perspective. As the pandemic hit almost every segment of the business process, entrepreneurs were not excused from the COVID-19 shock. Nonetheless, by acquiring applicable procedures, the governmental regime could augment the entrepreneurs' financially viable contribution.

As expressed by Hassan *et al.* (2020) a great number of Islamic scholars supposes that the financial distress, initiated by global pandemic, could have been precluded if Islamic ecosystem was in place, because the traditional financial system acted as ethically unresponsive. As the entire world faces a new normal, it can be concluded that digitization is crucial for sinking costs and boosting competence. As the authors terminated participation in Islamic Microfinance Institutions or IMIs can help the female entrepreneurs to deal with pandemics severe impacts. This study supports women in accepting the Islamic finance as their funding source. Finally, the outcomes indicated that the crises can be moderately predicted as soon as business entrepreneur study how to react and behave to known or foreseen risks (Aisha Aziz *et al.*, 2022).

3.4. Regulatory frameworks for Fintech

The regulation is interposed to the development of Fintech and endures to influence its features and insinuations (Wojcik, 2021). The financial world underwent augmented costs and shaped chances for innovations resulting from the financial regulation carried out post 2008 (Arner *et al.*, 2016).

It is fundamentally challenging to obtain sense of balance amongst endorsing innovation and preserving market integrity, as well as attaining aforementioned through modest and well-defined instructions. Fintech is in a position in which it exaggerates the challenge of financial regulation by distorting the margins of the financial sector, creating new products, and handling enormous amounts of information (Brummer and Yadav, 2019). According to Buckley *et al.* (2019a) and Magnuson *et al.* (2018) the presence of economies of scale, scope, and networks within Fintech can cause oligopolistic and monopolistic market structures, giving rise to institutions considered as too-big-to-fail and too-interconnected-to-fail.

Regulation

According to the World Bank, regulation is predominant in industrialized countries, i.e. those countries that depend on contribution from industry experts and researchers. On the contrary, in developing countries, regulation is concerned with financial inclusion and encompasses the partnership with establishments, for instance the World Bank. Rendering the authors Buchananand Cao (2018) the primary regulatory sandbox for Fintech companies' aim is to examine market innovation with customers whilst being under rough conditions as well as supervised by regulatory specialists. This originates from 2016, the United Kingdom. The mentioned sandbox method spread worldwide.

As the financial technology has been subject to the regulation, the same applies to the technology that is being subject of regulation via Regtech. It is defined as “the use of technology, particularly information technology, in the context of regulatory monitoring, reporting and compliance” (Arner *et al.*, 2017). Regtech intersects with Fintech regulation. It is of great importance to check whether humans or machines are better in the process of screening and monitoring, or commonly known as “man-vs-machine”. As cited by Berg (2022) authors validate that human loan officers are in a position to lessen the default rates by 50%, compared to lending decisions that are founded on bank-internal ratings. Furthermore, Costello *et al.* (2020) delivered analogous discoveries, presenting that a mixture of machine-generated credit model with human interference advances the loan results compared to the machine-generated credit model.

Digital business brings risks

According to Jiang *et al.* (2022), afterward the rapid digital finance development, countless threats hit conventional financial institutions. Digital finance goes together with risks such as “legal policy risk, business management risk, network technology risk, monetary policy risk, and money laundering risk.”

However, the greatest impact has the monetary policy risk, that carries threats for financial stability and monetary policy. This risk determines the undesirable outcomes that are brought by digital finance on both money supply and demand, together with transmission mechanism of monetary policy. Subsequently, this deteriorates the function of monetary policy in encouraging effective macro-control as well as real economy.

Having aforementioned in mind, regulatory frameworks of digital finance must be developed and in force. Henceforth, the main objective of digital finance regulation stays the safety, related with pandemic COVID-19. Moreover, the imperative mission is to involve the digital finance into the framework of monetary regulation (Jiang *et al.*, 2022).

In spite of Fintech development throughout previous periods of time, incomplete and insufficient evidence related with corporate governance on Fintech’ companies success brings uncertainty (Khakan Najaf *et al.*, 2022). Therefore, authors Najaf *et al.* (2022) concluded, after performing their research analysis, that Fintech companies unveil greater corporate governance in accordance with their defined indexes, yet compared with non-Fintech firms. Besides, authors investigate whether Fintech companies depend more on internal corporate governance paralleled with non-Fintech companies. Results showed feeble indication that, compared with non-Fintech companies, Fintech businesses engage superior dependance on internal business governance.

Regulatory measures

Regarding the legal and regulatory matters, Chemannur *et al.* (2020) cited that the regulators are dealing with challenges of creating a regulatory structure that is adaptable enough to support innovation while being transparent, at the same time, to uphold the financiers’, individuals’ and the markets’ sureness. Additionally, financial supervisors together with central banks are trying to balance between challenges of financial stability and innovation.

Concerning the regulatory aspects of Fintech, one remarkable accomplishment related with cybersecurity represents the passing of novel European Payment Services Directive (PSD2). That innovative step helped the endorsement of competition and secured payments crossway Europe. Also, the General Data Protection Regulation, or commonly known as GDPR, together with e-Privacy Regulation were founded within European states (Diana Moreira-Santos *et al.*, 2022).

Governments should be the first one to react properly and offer early practical responses together with control actions, to unfavourable effects such as of pandemic cases. By offering such measures they could safeguard the financial markets from undesirable deterioration in possible forthcoming crises (Ullah, S., 2022).

The pandemic COVID-19 is causing the socio-economic modifications that necessitate various regulatory practices that will challenge the several social and economic aspects of pandemic. Those regulatory measures oblige tactical viewpoint, more willingly than occasional supervising measures. Those regulatory aspects confront three sections: 1. Public health, 2. Economic recovery, 3. Regulatory effectiveness and efficacy (Costantino and Pompella, 2021).

Furthermore, Costantino and Pompella (2021) stated that COVID-19, despite the societal and economic influences, also mentioned as "pandemization of the economy", delivers opportunities for those that provide regulatory measures as well as policy makers, to recuperate their functionsin guaranteeing the stability and expectedness while at the same time push technology innovation within banking and finance. Pandemization of economy demands convincing and trustworthy supervisors and regulators who are proficient enough to deliver honest information and guidelines, whilst directing trustworthiness via construction of new policies.

Supervision

As said by Botchey *et al.* (2020), the supervision of altogether financial operations of one country is responsibility of the central bank of that country. It is the Central Bank' duty to supervise the Monetary Market Transactions or commonly known as MMT. By doing so, it safeguards the monetary transactions, with respect to already established regulations.

At some stage in pandemic of COVID-19 with the intention to guard the underprivileged population, governments jointly with MMT suppliers and regulators, applied some actions that were intended to accomplish two comprehensive purposes (Botchey *et al.*, 2020):

- Constraining the transmission of the pandemic by fostering digital payments
- Lessening the financial inconvenience of individuals using digital payments by means of – surrendering P2P transaction dues, backing the mobile money agents, relinquishing trading fees

However, according to Khakan Najaf *et al.* (2021) Fintech P2P lending has lesser amount of imposed regulatory mechanisms, therefore financial technology P2P reveal more quickness and reaction than the conventional banks.

Fintech P2P lenders are trying to exploit invention that enables them to propose effectual solutions thank the banks. On the contrary, traditional banks are subject to firm and rigorous rules and procedures, whose loan review procedures are considered as lengthy. Consequently, consumers altered their preferences towards Fintech P2P lending services, that are known as ones with rarer restrictions and shorter loan review processes.

Table 4. Regulatory frameworks for Fintech - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Wojcik (2021)	To review examination onthe real and possible outcomes of financial technologies with highlighting financial regulation, stability, sector, and inclusion.	Literature review	Author concluded that financial technology proposes opportunities not just for financial geography but also social, environmental andphysical geography.	Limitations not evidently mentioned.
Jiang *et al.*, (2022)	To investigate the effect ofdigital finance on the efficiency of monetary policy.	Spatial econometricmodel with numerous subindexes. China used as case study.	The interface betweendigital finance and monetary policy is crucial in endorsing economic growth.	Research study focused on China as arepresentative, therefore the findingscould not be generalized.
Ullah (2022)	Authors' purpose was toexamine the impact of COVID-19 on market returns in affected and emerging countries.	Generalized least square and panel quantile regressionmethods were usedto analyze the datafrom 30 markets.	Findings indicate that COVID-19 infected cases adversely affectmarket returns.	Study had a limited time period analyzedas well as sample of 30 countries. In addition, study reflects market returns as dependentvariables.
Costantino and Pompella (2021)	Purpose was to evaluate the regulatory robustnessinside the fintech sector, taking into considerationthe pandemic.	Used internationalranks and levels ofCOVID-19 pandemic cases, article verify strong infrastructure and systems to challengecrises.	Findings indicate that strength of systems can be destabilized by inadequate strategies and procedures as well as public sector involvement.	Limitations were notobviously denoted.
Botchey *et al.*, (2020)	Authors aim to investigatethe Fintech in emerging countries with focus on pandemic COVID-19 and Mobile Money Transactions as financial technology answer.	Machine learning algorithms, supportvector machines, gradient boosted decision trees and Naïve Bayes algorithms.	Findings disclose that usage of gradient boosteddecision tree displays positive results in forecasting the mobile money frauds.	Limitations of this study were not openlypresented.

Source: Author's work

The articles that were chosen to delve more in detail do not provide concrete Fintech regulatory aspects neither the consequences that pandemic created. Therefore, further research could be focused on financial technology regulatory frameworks. As it is well known, countries' political and financial systems can easily be disturbed by unusual events such as pandemic. Lacking insufficient strategies, policies and measures could damage the strength of a particular system. Same applies to financial technologies that are important part of country's financial system. Having this in mind, supervisory digital finance frameworks should be developed in order to safeguard the processes and ensure financial stability.

In accordance with World Bank (2020) proclamation, financial technology businesses state essential demand for regulatory encouragement, that includes licensing, quicker approval for novel actions and services, as well as fewer heavy supervision (Ya-Chih Yang *et al.*, 2022). Adverse reputation of Fintech sector arose because of the various financial issues and undesirable situations that were result of unregulated inventive financial institutions (KatarzynaSchmidt-Jessa, 2022).

3.5. Fintech user experience

With the intention to find out how and in what manner did the consumers adopt financial technologies, Shahzad *et al.* (2022) introduced a technology accepted model that incorporates the perceived usefulness, ease of use, user innovativeness, and trust as components of viewpoint using Fintech services as well as determination to use Fintech platforms.

Perceived usefulness, ease of use and innovation

The discoveries offered by authors show that consumer trust, perceived ease of use, and customer innovation meaningfully affect the approach concerning the adoption and the behavioral intention to utilize financial technology services through online platforms. Nevertheless, the perceived usefulness does not have a noteworthy impression on the attitude regarding the adoption and the social intention to use the online loan aggregator (Shahzad *et al.*,2022).

Financial technologies relate to inventive business models, technological applications, and goods and services that notably affect the financial market and the supply of financial services. Pertaining in mind the numerous advantages, such as upgrading the operational efficiency, proficiently well lowering operational costs, deranging established industry structures, allowing deliberate disintermediation, creating new opportunities for entrepreneurship, resulted in international attentiveness.

User-friendly services

As Guang-Wen *et al.* (2022) denoted, Fintech is captivating experts' interest as a rising number of consumers look for environmentally and user-friendly goods and services. With the application of Fintech services, financial institutions are in a position to accelerate the financial services. As stated by Forbes, the usage of finance applications increased 71% in 2019. Cited by Salz (2020). Furthermore, consumers acknowledged the gains of Fintech, that includes the low-cost transaction fees and greatly effective solutions, therefore a purpose of using technology-based financial services got increased (Le, 2021). Additionally, users comprehended how Fintech services ease their daily financial activities. This recognition may lead to suitability of using the financial technology services even after the pandemic. Therefore, adoption of Fintech results in retaining current users and enticing new ones.

Due to the imposed measures for COVID-19 spread prevention, human behavior changed to the degree of anxiety of going out, even for indispensable purchases. For that reason, consumers shifted their shopping patterns to online ones instead of going out. The online platforms that consumers started using provide safety by means of contactless delivery and payments. This new way of conducting the contactless deliveries and payments arose as a new normal and those that do not use those options are becoming outdated (Modgil *et al.*, 2022).

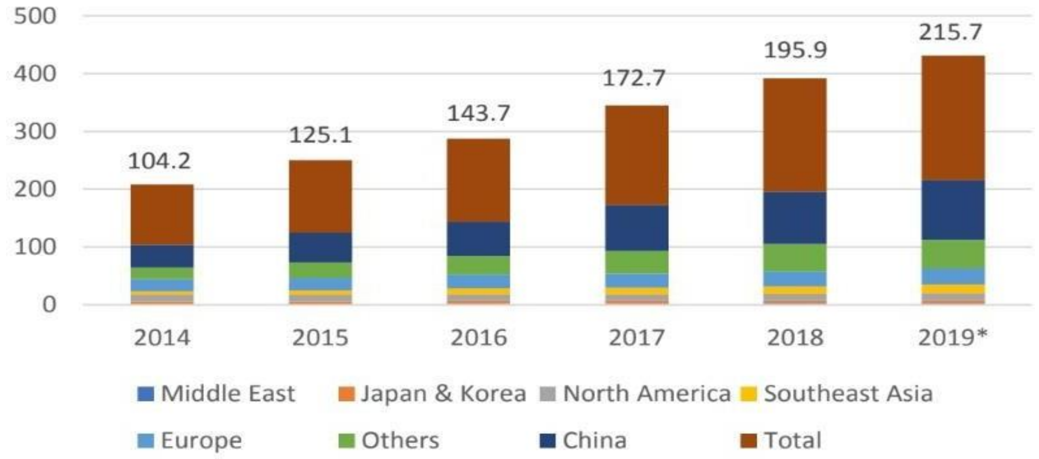
Primarily, Fintech uses the digital technology to widen both terrestrial and operational limitations of customary financial services. With the help of beforementioned technology, it basically transforms the conventional financing pattern for businesses (Yosepha, 2018). Furthermore, by applying financial technology, innovative financing channels are being provided that advances the feature of financial services of businesses. With this in mind, authors concluded that Fintech develops the businesses resilience in the course of industry distresses (Ling *et al.*, 2021).

Fintech advantages

In accordance with McKinsey Global Institute (MGI) the arrival of digital financial services resulted with around 95 million work opportunities, subsequently enhancing the GDP of developing economies by 6%. In the meantime, the COVID-19 pandemic outburst created extraordinary trials to economies worldwide, fast-tracking the progress of digital finance (Jiang*et al.*, 2022). The Fintech acceptance and accomplishment is merely not because of technological development but also due to the achievements that Fintech companies have in meeting societal needs. According to Khakan Najaf *et al.* (2022) the three key factors of success in Fintech venture are: the grade of customer-centricity, tactical collaboration with financial institutions as well as the originators preceding involvement in the financial services business.

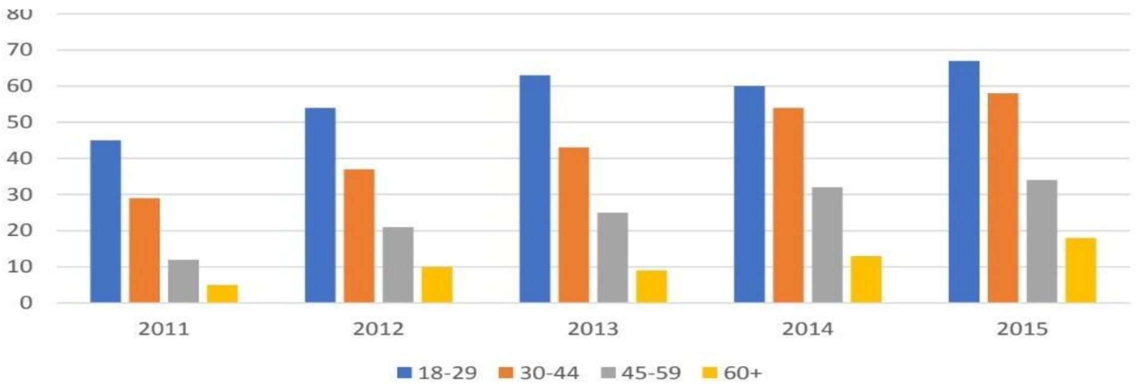
The augmented mobile smartphones usage together with heightened enhancement of internet speed led toward the incessant, present financial services delivery directly offered to consumers via their devices (Chemmanur *et al.*, 2020). Furthermore, reduced expense to financial services that has a tendency to prolong diminishing is also one of the reasons why Fintech adoption rate increases.With intention to provide consumers free access to financial information, Fintech companies utilized publicly obtainable data to design user-friendly interfaces. Fintech companies managed to do so by developing the mobile applications and employing big data analytics (Chemmanur *et al.*, 2020). Furthermore, Fintech firms brought revolution in terms of conducting simple banking operations, such as routine tasks that embrace the exclusion of physically going to bank branch, rather clicking on the mobile phone financial and banking applications. For instance, first mobile deposit was initiated in 2009 by the United Services Automobile Association (USAA), while completely online mortgages are being accessed through Rocket Mortgage, that is a service launched in 2016 by Quicken Loans. Certainly, mobile banking underwent considerable development, crossways different age clusters, especially in the preceding decade (Chemmanur *et al.*, 2020). In the following presented figures, the distribution of mobile applications downloads, presented by geographic region for the period from 2014 to 2019, can be viewed, together with the distribution of the percentage of mobile banking users.

Figure 8. The distribution of mobile app downloads by geographic region over 2014-2019



Source: Thomas J. Chemmanur, Michael B. Imerman, Harshit Rajaiya, and Qianqian Yu (2020). Recent Developments in the Fintech Industry. Journal of Financial Management, Markets and Institutions

Figure 9. The distribution of mobile banking users by age group over 2011-2015



Source: Thomas J. Chemmanur, Michael B. Imerman, Harshit Rajaiya, and Qianqian Yu (2020). Recent Developments in the Fintech Industry. Journal of Financial Management, Markets and Institutions.

Table 5. Fintech user experience - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Shahzad *et al.*,(2022)	Purpose was to study the issues affecting theFintech adoption.	Technology Acceptance Modelbased on survey questionnaires.	Authors publicized that consumers' apparent easeof use, trust, and innovativeness affect their approach to accepting the Fintech platforms.	Focus was solely on Portal MyAzZahra that might constraint the universalization ofthe findings. In addition, study did not look into psychological elements (social influences).
Le *et al.*, (2021)	Study purpose was intended to examine the spillover effects among financial assetsand Fintech stocks, throughout the pandemic period.	Empirical Analysis operated based on datafrom June 2019 to August 2020.Effect of COVID-19 on volatility transmission was assessed.	Results showed that the pandemic increased volatility spillover effects within various assets. USD and gold behavedas safe havens for the period of pandemic.	Study is limited to theperiod selected as well as certain assets examined.
Modgil *et al.*,(2022)	Authors aimed to study the effect thatpandemic had on digital entrepreneurship.	Qualitative approach based on semi- structured interviews.	Digital entrepreneurshipemerged opportunities within segments such astechnology, healthcare, entertainment, e- commerce.	The results are founded on the responds of interviewed participants so the qualitative methodscould levy some limitations.
Chemmanur *et al.*, (2020)	Purpose was to deliverassessment of contemporary developments and improvements in Fintech.	Comprehensive literature review together with analysisof recent Fintech developments.	Findings are focused on getting the insights in theFintech development processes emphasizing their competitive advantages.	Not unambiguously mentioned. Potentialin progress Fintech improvements may not be presented.
Diana Moreira-Santos *et al.*, (2022)	Performing a thoroughexamination of Fintech, during the COVID-19 time, with special focus on adoption factors.	Quantitative methodology based ona survey. Hypothesis testing, descriptive statistics, factor and reliability analysis, metric evaluation.	Research study provedprogressive effect on SMEs financial technology usage.	Research study is concentrated on SMEs in Portugal with low response rate due to pandemicdoubts.
Lyons *et al.*, (2022)	Purpose was to determine the relations amongst financial technologiesdevelopment and need for savings and borrowings, as well asremittances.	Cross-sectional data based on financial inclusion has been used for measures and descriptive analysis.	Results found out thatthere is a positive andstrong relationship among the Fintech improvement and financial inclusion.	Fintech developmentmeasure was built oncountry level sample.

Source: Author's work

Customers revealed their consciousness regarding the adoption of Fintech services. The percentage of 89% proves that consumers, around the globe, are conscious about the mobile payment platforms occurrence. Additionally, 82% are alert about non-bank money transfers enabled by financial technology (Diana Moreira-Santos *et al.*, 2022).

However, the improvements in accessibility to financial technology services does not end up with enlarged consumption, specifically by digital networks. In China and India, emerging countries, the increased number of digital accounts did not result in increased usage. Therefore, numerous mobile and banking accounts stay idle, i.e. inactive in terms of not depositing or withdrawing money, neither saving (Lyons *et al.*, 2022).

Even before the pandemic, contactless payments underwent fast revolution and development. Nevertheless, the current contactless payment adoption achieved high levels, because it proved that it stops the virus spread. Mobile Financial Services are arbitrated through mobile networks, that permits individuals to execute their financial transactions through their mobile gadgets. By using mobile phones for financial transactions execution, costs are being reduced (Yan *et al.*, n.d.).

3.6. Technology based funds

It is well known how the technologies associated with Industry 4.0 impacted the financial world and financial services. Aim of these digital technologies is to strengthen production efficiencies that represent the essential competitive supremacy in current, multinational markets (Abdul- Rahim *et al.*, 2022). Blockchain, Big Data, Internet of Things, Artificial Intelligence, machine learning, are all supported by financial technologies, i.e. Fintech, that enabled the users to conduct financial transactions in online space, that is not requiring the consumers to physically move and perform their transactions. Industry 4.0 and Fintech offered digital solutions, especially during the period of pandemic, to those that were altered – individuals, corporations and governments.

Blockchain

Nevertheless, blockchain also symbolizes the fiercest Fintech matter in the grand scheme of subjects. It is regarded as a groundwork system innovation, given that the automation of transactions and their documenting permits completely novel products and services, i.e. smart contracts, next extra customer-to-customer than business-to-customer processes, farther decentralized structural procedures, new yet more customer-data driven business models (Wojcik, 2021).

By applying the blockchain, green banking, and online banking - those innovative technologies, the banking industry enhances the sustainability process (Guang-Wen *et al.*, 2022). As cited in the article written by Guang-Wen *et al.* (2022), the financial technology like blockchain can enhance the capital flow in the direction of innovations that foster greater economic sustainability. As concluded by Cen and He (2018) Fintech encourages Green

Finance. Fintech connects advanced technologies like Big Data and AI, and by doing so it promotes the green economy. Additionally, Fintech adoption positively impacts green innovation, especially during the pandemic.

After the COVID-19 pandemic, the demand for safe-haven instruments increased, as investors turned themselves towards alternative asset classes, particularly to technology-based asset classes (Sharma *et al.*, 2022). As Fintech is known as the part of the financial industry that transformed the entire financial world, it positioned itself as a financial industry participant thatis characterized as efficient, evident, decentralized and user-friendly. The figures depicted in thearticle by Sharma *et al.* (2022), showed a piercing drop of the prices of all asset types, as a response to the COVID-19 event. In spite of this, the negative impact did not last long, yet ended with rapid revival. Authors concluded that there are diversification opportunities for those stakeholders that want to invest capital technology-based funds.

The research study by Ling *et al.* (2021) expresses that after the post-disaster financial services, fintech and conventional banks can accomplish the balancing purposes and roles. Beyond that, authors advocate that the technology-based funds have the capability to perform a role of financial stabilizer for the duration of crises. Blockchain is in a position to act as a provider of comprehensive solutions with intention to stop the feast of pandemic. As stated by Li (2021), blockchain can be pertained to clinical trial management, medical supply chain, contact and outbreaks tracing.

P2P financing

Ordinarily, P2P loans suggest no prior interconnectedness between lenders and borrowers. Whereas, the investment decisions are found on the evaluation of loan applicant's profile and the required loan characteristics (Cumming *et al.*, 2021). In this article, the author investigated the correlation between equity crowd-funding, peer-to-peer lending, and consumer bank loans, in addition to examining the relative collision of COVID-19 on each funding category. As denoted by the authors, results showed that P2P lending decreased even before the consumer bank loans. More precisely, P2P loan proportions in the USA decreased as the pandemic emerged, but before the genuine pandemic outburst in the USA (Cumming *et al.*, 2021). However, data implies that the CARES Act, i.e. the Coronavirus Aid, Relief, and Economic Security Act gave rise to bank consumer lending.

The obstructive effect on the COVID-19 crisis on consumer loans from banks is presented in the article and emphasizes the noteworthiness of the CARES Act in mitigating the crises. Yet, when differentiating bank lending with Fintech P2P, a huge contrast is revealed in terms of theeffect of COVID-19 on ECF and P2P lending compared to the traditional bank consumer loan market. Furthermore, the paper provides the literature by inspecting the relationship linking P2P lending and consumer bank lending. Although the P2P loans are issued to high-risk profiles of borrowers, the results present that P2P loans fell in total dollar value two months earlier than the fall in consumer bank loans in response to COVID-19.

The authors studied the interconnectedness between equity crowdfunding (ECF), P2P lending, and consumer bank loans. They assessed that ECF and P2P were significantly more firm at the beginning of the pandemic. Besides, they make available substitute financing sources for business persons. Despite this, they are still less significant than the consumer bank loan market. It is of great importance to define how does the financial technology P2P functions. Therefore, P2P lending platforms perform function of a modern financial intermediary that bonds the lenders with borrowers crossways different areas inside a country. With respect to high tech development and innovation, P2P lending provides loans that are characterized as low-cost ones. Popularity of P2P lending increased over the years, yet at the same time P2P platforms are concentrating on consumer loans (Khakan Najaf *et al.*, 2021).

Table 6. Technology based funds - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Abdul-Rahim *et al.*, (2022)	There are three purposes related with this article: examination of perceived benefits and risks concerning Fintech services adoption; studying the COVID-19 fear regarding Fintech adoption; discover whether Fintech enhance sustainability.	Structural Equation Modeling – SEM based on online survey - questionnaires	Authors found out that perceived benefits effect Fintech adoption,whilst perceived risk does not influence it; fear of COVID-19 controls the associationof perceived benefits and adoption rate; Fintech utilization embraces sustainability.	The study focused on Malaysian market solely.
Cumming *et al.*, (2021)	The purpose was to find outthe influence that pandemic left on lending, P2P platforms, and equity crowdfunding. Additionally,the reaction of aforementioned to thepandemic outbreak.	Quantitative analysisusing merged and aggregated U.S. datafrom May 2016 to June 2020.	Authors concluded thatCOVID-19 adversely impacted the bank lending processes, whilst at the same time P2P and ECF platforms showed superiorresilience.	Limitations connected withfinancial market dynamics.
Guang-Wen *et al.*, (2022)	The intention for writing this article was based on studying the relationship between FA, GF, GI, and EP, during the period of pandemic, taking into consideration the context offinancial institutions.	Structural Equation Modeling based ondata collected frombanking personnel from Bangladesh.	Key findings showed that Fintech adoption imposes great impact on GF, GI, and EP. In general, Fintech adoption has a positive environmental performance effect that contributes to sustainable economic development.	Sample size limited to Bangladeshi banking staff therefore findings may not end applicable to other countries.
Sharma *et al.*, (2022)	Authors aimed to investigate the broadeningopportunities with technology-based funds, with exceptional focus on Fintech, Robotics and Blockchain.	Quantitative analysisusing Vector Auto Regression Model. Inaddition, network analysis of volatility based on quantile VAR.	Authors identified the widening investing opportunities within technology-based funds for the period before and after the pandemic. The results show harsh drop in all asset prices.	Limitations notopenly stated. Nevertheless, potential limitations could result in data biases.
Khakan Najaf *et al.*, (2021)	Authors intended to study the impression of COVID-19 on the Fintech P2P lending determinants.	Classical methodologystudy was not used in this article, yet an empirical analysis of applicable data together with pool regression analysishas been used.	Findings designate enormous P2P platforms developmentdue to the pandemic outbreak. They served as an alternative credit option for borrowersseverely affected.	Authors could not collect the data after June 2020 due to absence of P2P required data.

Source: Author’s work

Technology based funds is a topic that needs further clarification and could serve as a topic for future research. However, authors that devoted their time to write about this subject found out that the pandemic destructively impacted the traditional banking procedures, that is lending activities. Consequently, Peer-to-Peer lending together with Equity Crowdfunding revealed superior resistance and stability, proving the effectiveness of alternative lending processes amidst the periods of instability. Additionally, Sharma *et al.* (2022) recognizes technology based funds investing opportunities for the periods before and after the pandemic. These opportunities could be further explored.

3.7. Fintech Lending

The entire world faced challenges and disruptions due to the impact of the COVID-19 pandemic.The same applies to the financial world and financial markets. Bearing this in mind, it is crucial to gain a more profound understanding of the lending dynamics, concerning the financial difficulties caused by the pandemic. As the government actions restricted the nations worldwide, the lockdowns restricted the economic activities as well. All undertaken actions left their mark on businesses and the entire international financial world.

Lending dynamics

As it is already known, Fintech lending represents the delivery of credit that is assisted by technology. The aim of this process is to ensure the improved borrower-lender interaction, by enabling improved user experience, or lenders' assessment and supervising of borrowers (Berg*et al.*, 2022). Authors focused on different segments regarding the lending market, but one particular segment is of great interest for this thesis, thereby we will delve into the segment that assessed Fintech lending for the duration of the COVID-19 pandemic (Goodell, 2020).

The article written by Nigmonov and Shams (2021) concluded that the likelihood of defaulting upsurges from 0.056 in the pre-pandemic stage to 0.079 in the post-pandemic stage. It can be inferred that the COVID-19 pandemic has had an enormous impression on the risk of defaulting, in the period between May and June 2020. Authors also found out that the scale of the influence of the pandemic is greater for those scored with lesser credit ratings and located in states whereFintech is not that greatly adopted. Due to the increased regulations procedures as a consequence of Global Financial Crises from 2008, market lending experienced advanced standards. Upsurge in market lending is mainly because of the rigorous traditional bank lending. However, during the crises, such as the COVID-19 pandemic, banks fear the risk of nonperforming loans and potential uttermost occurrence of bank run.

Studies observed that Fintech lenders are quicker in processing loan applications, compared with depository institutions such as banks, therefore advancing mortgage markets. The article by Isil Erel & Jack Liebersohn (2022), examined whether Fintech can supply its services to small companies, particularly those located in disadvantaged regions, i.e. consumers with low median income.

When consumers are lacking enough financial providers, in other words, when they do not have access to traditional financial institutions, then consumers turn to Fintech providers. As already known, admittance to bank credits is restricted during the period of crises, especially in those regions where banks do not have opened local offices. In situations like this, Fintech appears as a logical solution, since Fintech gets in touch with the consumer base rather than the banks who are limited with consumer bases inside their branches (Isil Erel and Jack Liebersohn, 2022).

Paycheck Protection Program

Authors agreed that Fintech lenders necessitate additional regulation procedures (Isil Erel and Jack Liebersohn, 2022). Furthermore, authors tried to find out if Fintech delivered more approaches to PPP loans in those regions that demanded them more. Additionally, it was revealed that traditional depository institutions, i.e. banks, were incompetent to distribute financial services to those consumers that come from various locations and demographics. In other words, banks were not that successful in providing PPP loans to those areas that were affected with severe economic impacts, contrasted to Fintech lenders, who did provide more PPP loans. More precisely, the reaction from Fintech service providers was ten times greater (Isil Erel and Jack Liebersohn, 2022).

Since traditional banks prefer to provide PPP lending in those regions with their branches, consequently they failed to reach those areas that were merely affected by the COVID-19 pandemic. Internal restrictions could possibly lead to an explanation as to why the traditional banks omit the adoption of technologies, even in situations when they wanted to adopt them.

Peer-to-peer lending

However, the lending process received a development that is utilized by fintech start-ups and that is peer-to-peer lending. It is fundamentally a platform that serves as an intermediary between the lenders and borrowers. Peer-to-peer (P2P) lending platforms are one such example, as they enable lenders to directly link to borrowers through an online platform with no regard to intertemporal smoothing. P2P loans are typically smaller and riskier and have higher interest rates than loans normally available from traditional intermediaries with stronger requirements for collateral and other restrictions (Roure *et al.*, 2019).

Fintech Peer-to-Peer lenders generally move into the macro loan market, that is not supplied by conventional loan providers. The lending performance by banks is knowingly prejudiced by financial crises together with monetary ambiguities, inspiring banks to modify their policies and tactics by focusing on higher liquidity and lessening the risky investments disclosure (Khakan Najaf *et al.*, 2021). Having in mind personal finance, individuals were in a position to consume Fintech P2P lending platforms to achieve quick and efficient relief loans, evading the long- lasting procedures of credit approval processes done by conventional banks (Ya-Chih Yang *et al.*, 2022).

As stated by Liu *et al.* (2022), Fintech lending, serves as another financing option, especially during the crises such as pandemic, although demand decrease controls the supply. Financial technology P2P lending matches the banks' traditional lending procedures as they both try to focus on those individuals who are omitted from using conventional banking services. As denoted by authors, Fintech P2P lending proposes loans that are not meeting the criteria of conventional banks, therefore making the P2P lenders not direct competitor to conventional banks as loan providers. Moreover, they argued that P2P lending does not meaningfully influence the business performance of traditional banks. In addition, many view Fintech P2P lending as an auxiliary service provider, observing how particular conventional banks accepted the Fintech ability and capacity and therefore executed it and accepted it or even capitalized in Fintech companies (Khakan Najaf *et al.*, 2021).

As stated by Khakan Najaf *et al.* (2021) a considerable upsurge was felt in P2P loan volume, for the duration of COVID-19, paralleled with P2P loan volume earlier than the pandemic. Moreover, those loans that were issued during the pandemic experienced an average rise in interest rates by 7% compared to the rates before the pandemic. Pandemic created such social perception that people started accepting longer-term, unverified loans with higher interest rate. All of this proves that COVID-19 created severe changes to Fintech P2P lending.

Fintech Lending Globally

In accordance with Berg *et al.* (2022) the United States is the first one to examine as they have a meaningful role in Fintech market, being the second largest lending market. For the past few years, the progress of Fintech lending in the United States exceeded the growth of traditional banking system. Rocket Mortgage has been the leading mortgage lender in the United States, confirming the fact that Fintech lending expanded substantially across the mortgage market. Besides, the development of Fintech is exemplified by the number of 43% of annual rate, that went to $31 billion in 2020.

Globally, China is the leader in Fintech lending, although the lending numbers are starting to decrease as a result of regulatory changes. In spite of this, the Fintech market share is likely to be greater in those countries with upper GDP per capita, countries characterized with lesser banking competition, and fewer rigorous banking regulation (Berg *et al.*, 2022). In those regions where banks have greater concentration of branches and where the profile of borrowers is constructed of older and well-educated individuals, there Fintech market share tends to be more developed. Aforementioned infers that the online process of gaining mortgages is farther appealing to knowledgeable borrowers (Berg *et al.*, 2022).

Debt financing

Regarding the debt financing, Ling *et al.* (2021) emphasized that the usage of Fintech actually lessens the expenses of debt financing. In addition, fintech's goal in facilitating the corporate financial constraints is longstanding. Fintech attains its goals by alleviating financial constraints via two aspects. Primarily, as the financial technology usage increases over time, subsequently the financial institutions are in a position to offer more prosperous and advanced products. Moreover, fintech updates the availability to corporate financing. What is more, the fintech's dependance on digital technology. Comprehensive enterprises credit history can be found. In succession, this diminishes the information asymmetry amongst the participants concerned, thereby settling the trust issues (Ling *et al.*, 2021).

According to Chemmanur *et al.* (2020) Fintech lenders handle the mortgage applications at 20% quicker percentage contrasted with former lenders. Moreover, authors argue that the cost of default is not increasing with the faster application processing rate.

The research paper written by Peng and Dong (2021) assumes that with pandemic acceptance and its standardization, the foster development of financial technology would lead to challenges for traditional banks and their online loan businesses. Authors highlights the significance of evolving and adopting the changes, as well as studying the loan opportunities in terms of lending concerning diverse consumer settings.

COVID-19 crises resulted in an enormous fall in external finance. This drop affects the innovators that are creating and developing new ideas and technologies (Cumming *et al.*, 2021). Lending markets are also impacted by the crises, but it is already known that bigger banks cope vastly superior during those periods of time (Cumming *et al.*, 2021)

In the table below, noteworthy articles associated with this subheading, will be elaborated.

Table 7. Fintech landing - Overview of the significant articles

Paper Info	Purpose	Methodology	Findings	Limitations
Nigmonov and Shams (2021)	To determine enhanced comprehension of the lending dynamics of a certain marketplace taking into consideration the financial difficulties.	Logit Regression Analysis	Findings indicate that there is an increase in the probability of default from 0.056 to 0.079 before and after the pandemic. COVID- 19 put higher risk on those borrowers with inferior credit ratings as well as those countries where Fintech adoption is minimal.	Focused on one lending platform (Mintos). Some inconsistencies were found in the analysis of COVID-19 risk. Contagion risk not included in the measurement of default risk probability. Analysis based on short time span, that is first wave of the pandemic.
Isil Erel and Jack Liebersohn (2022)	This article examined how did the Fintech react due to augmented demand for financial services, following the Paycheck Protection Program launch.	Systematic study based on quantitative methods	Authors' analysis concluded that Fintech is more adopted in areas with minority households, low income, less bank branches, as well as regions where pandemic effects were harsh. In addition, banks together with Fintech lenders delivered PPP loans to areas severely hit by the pandemic, however Fintech lenders response was ten times greater.	Study concentrated on the comparison between the Fintech and traditional banks' ability to provide financial services provided by government first lending program.
Berg *et al.*, (2022)	Article focused on lending in Fintech markets as well as arisingscientific literature on this subject matter with recommendations for further research.	Literature review	Fintech lending grew speedily, however in the U.S. still comprise minor portion of total credit. Progress of Fintech lendingis driven by improved ease and speed of use. COVID- 19 exposed Fintech weaknesses.	The review offered summary of the existingstate of Fintech lending only.
Peng and Dong, (2021)	Authors examined theinfluences and trials faced by the banking business, with specialfocus on online creditloans, taking into consideration the COVID-19 pandemic.	Qualitative analysis with practical observations	Authors found several problems related to online loan products, such as debt collection, mismatch of riskand income, bad loan ratio, issues with social responsibilities.	Limitations were not clearly stated howeverabsence of quantitative analysis as well as involvement of authors' own experience could impose certain limitations.

Goodell (2020)	Purpose of the article was to highpoint the important social and economic influence of pandemic COVID-19, mentioning the impacts on financial markets andinstitutions.	Not precisely defined, yet article draws upon existing literature.	Article contributed to the comprehension of social andeconomic effects of the pandemic.	Limitations were not precisely mentioned, however dependence on existing literature couldpossibly create biases.
Ling *et al.*, (2021)	Authors investigated the pandemic impact on financial constraints faced by the list of Chinese companies. Theytry to comprehend whether Fintech development diminishes undesirable COVID-19 effects.	Detail statistical and analytical methods employed were not closely elaborated.	The pandemic augmented the financial constraints forbusinesses however Fintech expansion has possibility tomoderate and mitigate the adverse pandemic impacts.	Article involves quarterlydata as well as particular measures that were used to evaluate the financial constraints.

Source: Author's work

Authors Nigmonov and Shams (2021) that wrote about the Fintech lending found that pandemic imposed greater risks for debtors that are characterized with lower credit scores and located in countries that have negligeable adoption of Fintech. Therefore, the default probability increased due to the COVID-19 pandemic. Despite that, Isil Erel and Jack Liebersohn (2022) concluded that Fintech moneylenders reacted faster in terms of provision of P2P loans in comparison with traditional banks. Furthermore, Fintech lending underwent speedy development, supported by the user-friendliness. However, Peng and Dong (2021) discovered some issues that could be potentially investigated in the future, with the aim of achieving Fintech lending improvements.

4. FUTURE RESEARCH AGENDA

It is evident that the pandemic has an influence on the financial systems of particular countries and even the entire world via impact on economic costs (Goodell, 2020). The COVID-19 pandemic could serve as a representative case for any potential future pandemics and crises. As an example of the negative effect on the economic activities, it would be preferable to anticipate and predict economic costs of those catastrophes at some scale.

Basically, the agendas for future research are the limitations originating from the analyzed articles. Therefore, following bullet points will present the starting points for possible forthcoming studies:

- Determine the main reasons guiding Fintech adoption rates, taking into consideration factors such as trust, security, privacy, as well as perceived usefulness
- Examine the pandemic effect on financial regulation together with the acceptance of innovative financial technologies, investigate the regulatory and supervisory practices and frameworks
- Investigate specific countries (with highest Fintech adoption) reaction to the pandemic and make a comparison between the observed countries
- Study the connection between the conventional banks and Fintech companies, explore their relationship in terms of competition and collaboration
- Explore the level of financial and digital innovation that pandemic stimulated, taking into consideration the longstanding influences
- Consider the tactics of raising awareness of Fintech importance between non-financial sectors
- Research the financing possibilities that Fintech creates for enterprises, consider how new technologies are restructuring the admission to finance
- Survey the impact of the COVID-19 on market returns and investor practices in the period post-pandemic.

This pandemic will make the decision-makers to think in advance about the alertness against potential crises and pandemics. The authors cited by Goodell (2020) estimate that the expected annual loss from COVID-19 pandemic risk would amount roughly 500 billion US dollars, either 0.6% of global income.

Many argued whether COVID-19 is unpredictable or not, and as concluded by Goodell, pandemics and crises like COVID-19 are foreseeable, as there are a vast number of research articles and academics that discuss the predictions of economic losses, as well as suggest the possibilities of pandemics. In other words, intense control, predictions and preparations for any possible crises will be regarded as a public good.

The most noteworthy findings and lessons learned are as follows:

- Pandemic endorsed digital development and advocated the Fintech usage
- Improvements in digital and financial technologies may ease the negative undesirable consequences that periods of crises can bring
- Fintech P2P lending serves as an alternative to traditional loan financing
- Mobile banking usage as well as online financial technologies experienced greater approval and usage
- Fintech smoothed financial aspects of individuals every day life during the pandemic
- Individuals preferred to use contactless ways of payments over cash and cards
- Traditional banks kept their central position regarding the transactions and payments
- Banks partnered with Fintech companies in order to expand their operations and services
- Pandemic drove innovation in the center of attention with the aim to create innovative solutions that will satisfy the need of both individuals and businesses

With aforementioned being said it has been remarked that the Fintech industry advanced the consumers to use its services for the period of pandemic COVID-19. On the other hand, with the aim to keep those consumers interested and loyal to Fintech services, providers must forecast the factors and reasons that improve the users' intention to use the services, in this manner sustaining the consumers in the long run (Le, 2021).

Additionally, the pandemic occurrence and the happenings from 2020 portrayed the fundamental function that state has, as well as the classified character of global finance (Wojcik and Ioannou, 2020). It is of great importance that governments have precisely defined steps and procedures that will be followed in cases of emergencies such as the pandemic. It is recommended by Ling *et al.* (2021) that nations ought to focus more onto the improvement of financial technology given that Fintech may possibly lessen the unfavorable influences of unpredictable crises as well as aid the government in the process of controlling financial institutions also businesses.

Fintech did not only affect traditional financial segments but also the creation of business models and work arrangements, therefore growing the duties and obligations of human resource management. Purposely, the uprising requirement for digital platforms, amidst the COVID-19 pandemic, caused the "always-on" working mode. Aforementioned redesigns the usual, traditional, working culture and creates new banking facilities. Therefore, the continuous Fintech development emphasized, especially during the pandemic period, that business capabilities could be improved, whereas different challenges arose for human resource management. With this in mind, further research could place greater focus onto this dilemma (Wu and Kao, 2022).

5. DISCUSSION

Having in mind our predefined research question that doubted the way in which Fintech industry would react to the COVID-19 pandemic, we can conclude that the pandemic endorsed digital development.

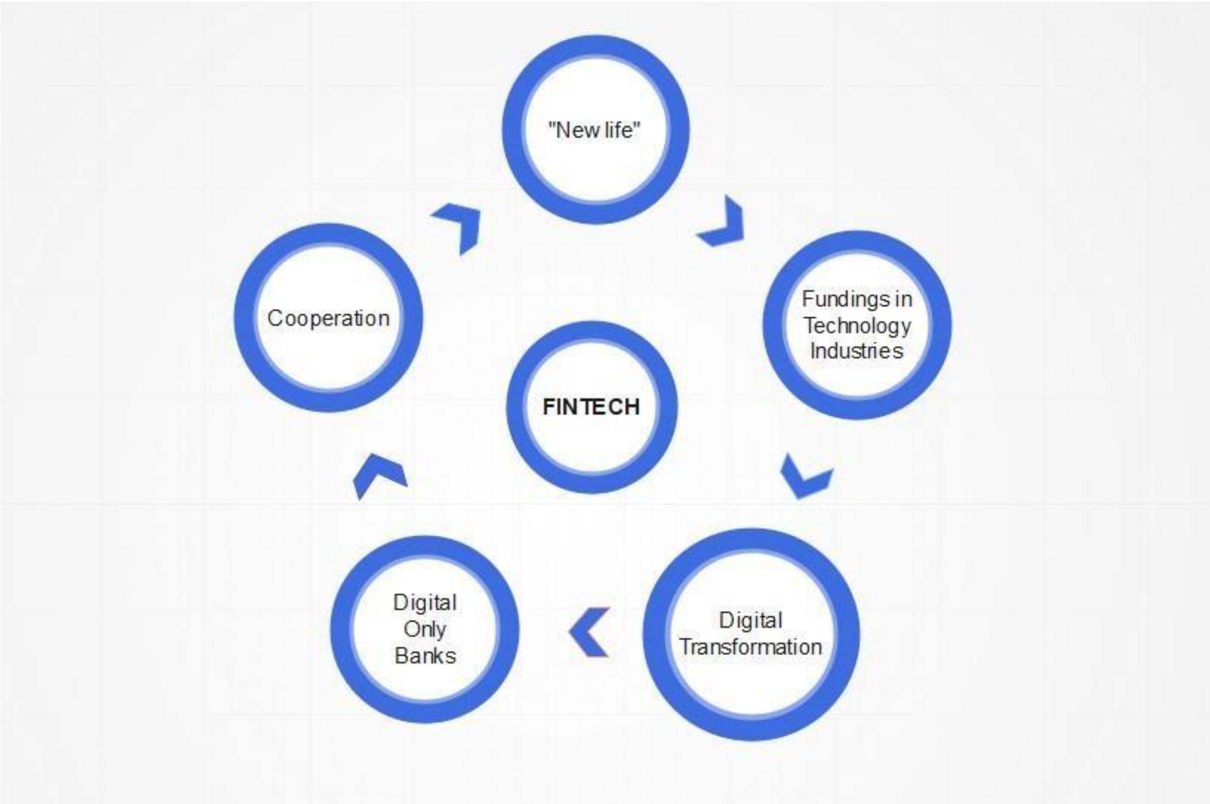
Therefore, enabling the Fintech to open its gates to vast number of individuals who got stuck in their everyday life, in terms of everything. According to United Nations Industrial Development Organization's report (UNIDO), the pandemic of COVID-19 acts as a key promoter of digital transformation. The interruptions created by such crises as pandemic are impacting the global mindset, that is now shifted towards finding the solutions to problems created by pandemic, with the aim of returning back to normal life as it used to be. Besides, because of those disturbances, extraordinary digital transformation occurred within short period of time, that has not been experienced before (Li, 2021).

Many found Fintech as a great solution tool to respect the social distancing instructions, imposed after the pandemic outbreak. Besides, conventional banking systems that were initially offline transformed to online platforms. This shift to online systems resulted in greater acceptance and usage of mobile banking and online financial technologies maintained by Fintech. Particularly, as narrated by Financial Times, Fintech experienced considerable investments, i.e. fundings in technology industry grew from $414 million in 2014 to $608 million in 2018 (Emara and Zhang,2021).

As stated by Damianos P. Sakas *et al.* (2022) the Fintech's market share undergoes annual growth. Considering the Statista predictions, Fintech's market values were $80 billion in 2017 and $92 billion in 2018, yet they are projected to grow to $188 billion this year. The pandemic COVID-19 caused various trials and disturbances to centralized payment system networks and the banking sector. Nevertheless, downfall was not an option, so companies were advised to observe the pandemic crises as a chance to restructure their online performance and benefit from current situation (Damianos P. Sakas *et al.*, 2022).

Since the pandemic COVID-19altered the e-businesses, motivating the users to accept latest consumption behaviors together with e-commerce solutions. Additionally, as there are always two sides of the story, therefore with the switch to Fintech services, many security issues arose. These information security occurrences triggered public interests (Yan and Jia, 2022). Figure below displays the schematic representation of COVID-19 impacts on Fintech industry. As it can be seen from the figure COVID-19 brought “new life” with its occurrence therefore forcing societies worldwide to adjust and react in a proper way in order to survive the crises. With this in mind, Fintech stood out to ease the financial aspect of human everyday life. Therefore, the fundings in technology industries, i.e. financial technologies increased, creating digital transformation and new financial opportunities for individuals and businesses.

Figure 10. Schematic representation of COVID-19 impacts on Fintech



Source: Author’s work

One particular example of those fundings in technologies industries would be Digital-only banks that received greater attention after the pandemic happening. However, Digital-only banks did not experience splendor days after the pandemic occurrence. In its place, pandemic drew attention to the weaknesses of digital-only banks, more precisely the inadequate groundwork and knowledge, together with absence of customer trust. However, the economic analysis performed on digital-only banks did not show none noteworthy financial form weakening neither upgrading (Katarzyna Schmidt-Jessa, 2022).

Due to the above-mentioned facts, cooperation between digital only banks and traditional banks was inevitable as in this period of time, the digital-only banks cannot operate separately, neither traditional banks can rely on their formerly ways of conducting business. However, financial technologies businesses are not in a position to substitute traditional banks. That is because Fintech companies lending abilities are controlled i.e. limited, since they are facing scarcity to central bank liquidity reserves. Therefore, Fintech firms co-occur and cooperate with traditional banks (Victor Murinde *et al.*, 2022). As a conclusion expressed by Katarzyna Schmidt-Jessa (2022), digital-only banks that survived the coronavirus pandemic, will experience optimistic long-standing insinuations.

6. CONCLUSION

This study systematically analyzed the Fintech industry response to the COVID-19 pandemic examining the literature set, sourced from the Web of Science database, comprised of scientific papers and articles published from 2020 to 2022. The study classified the seven segments that were analyzed more in detail. Those segments included Fintech adoption rates and digital transformation, Fintech in different countries, Fintech in Islamic finance, Regulatory frameworks for Fintech, Fintech user experience, Technology based funds, and Fintech lending.

By applying the thematic analyses on each subheading, we disclose that the involvement of Fintech and its' services in human daily life has great potential for uplifting both social and economic improvement. General Fintech adoption encourages the financial inclusion and easily creates solutions for unforeseen situations and crises, such as COVID-19, especially for those countries and societies that are underprivileged. Additionally, Fintech usage will help states overcome the distresses caused by crises such as the pandemic COVID-19. Nevertheless, absence of adequate regulatory practices, regulations and minor financial literacy represents the major difficulty in the process of fully embracing the Fintech. However, as stated by (Ya-Chih Yang *et al.*, 2022) "Fintech is leading the path forward to a new life: banking everywhere but never at a bank."

Despite the fact that this study delivers representation of Fintech industry response to the COVID-19 pandemic occurrence by means of bibliometric analysis and systematic literature review, nevertheless there are evident limitations. Hence, the literature chosen dates from 2020 to 2023. Therefore, the period analyzed is limited. Additionally, the selected keywords were specific for this kind of examination. In spite of this, for supplementary insight and comprehension, arrangement of different keywords could potentially be used. In addition, one more limitation is due to the fact that papers analyzed were downloaded solely from the Web of Science database.

This thesis showed that analyzing entire Fintech industry is not an easy task as there are number of financial industry segments that could be observed individually. Despite huge number of different articles and author's opinions one thing is definitely valid for the entire world, that is the fact that pandemic COVID-19 enhanced the acceptance of digital platforms and digital financial services. As the pandemic obliged societies to stay locked inside their homes and shutdown their businesses, they were pushed to switch onto the digital platforms in order to process their financial transactions. However, the move to online platforms intensified the need for Fintech and its services. Fintech acted in a proper way and served as an alternative way of financing, particularly for underprivileged societies.

Many innovative solutions arose with intention to satisfy the human needs, from mobile banking, P2P lending, investment applications, online wallets etc. In general, the pandemic disturbed entire financial world but at the same time created vast number of opportunities that advanced digital transformation and improved the innovation in terms of creation new Fintech solutions.

Aside all COVID-19 positive effects on Fintech, traditional banks got affected by the pandemic and increased Fintech usage. Therefore, banks will have to reallocate part of their resources to invest in their financial technologies' services, that will cause decreasing investments in the bank branches (Yan and Jia, 2022). Up till now, traditional banks as financial institutions maintained their central position and control of financial systems in terms of transaction settlement and clearing, that has been characterized as critical for financial system security. In addition, traditional banks are enthusiastically involved in innovation processes, with intention to modify their operations. Example of aforementioned pattern is that in some countries, banks already established cooperative joint ventures to administer the online payment system as well as provide mobile payment applications – Currence in the Netherlands (Victor Murinde *et al.*, 2022).

Conventional banks accepted both the opportunities and tests that pandemic brought, therefore they became accustomed to the fluctuating circumstances of financial services. They had to partner with Fintech companies, invest in their own financial technology platforms development, and accept the digital transformation in order to continue with healthy competition in developing industry. For future research following facts could be taken into consideration. Banks' elasticity was impacted by the economic occurrences of the COVID-19 pandemic, generating various challenges for banks to fulfill loan demands, as well as confining their aptitude to deliver liquidity and financing. As a result, Fintech P2P lending arises as an alternative to respond to those challenges, mostly because of its involvement of online verification processes (Khakan Najaf *et al.*, 2021).

As denoted by Pinter *et al.* (2021) younger generations that were born after 1998, were also born and raised in the digital era and era of digital technologies. Those generations of younger consumers favor contactless payments above the traditional cash and card utilization. Consequently, one specific post pandemic Fintech feature is increase of contactless payments. With the aim to follow imposed social restrictions Fintech companies improved their services by offering digital wallets as a new solution for individuals. Applications such as Google Pay and Apple Pay received greater attention during and post COVID-19. Individuals were obliged to find alternative and safer methods of conducting their transactions and purchases. Additionally, the increased usage of Fintech products and services proved that companies are in a position to adapt their operations and business procedures with the purpose of ensuring consumer satisfaction even in the period of disturbance such as pandemic.

However, nothing of this would not be possible if there were not educated and financially aware individuals that facilitated and organized everything in a manner that ensured safe and sound financial operating system. Additionally, Emara and Zhang (2021) suggest that policies should be focused on boosting the investments in emerging human capabilities, specifically in diverse skill development programs to train consumers for new digital age.

This includes the expansion of the internet coverage together with internet speed, then boosting the usage and adoption of electronic banking by different social participants, from individuals, institutions and governments. Moreover, focusing on cyber security and fraud protection is crucial to enhance the easy remittances flow, particularly because of their augmented practice due to the COVID-19 pandemic. Therefore, new procedures that should be in the center of attention now are the regulatory practices together with data protection. One characteristic feature of technology 4.0 is focus on data protection as well as increased security levels.

REFERENCES

1. Abdul-Rahim, R., Bohari, S. A., Aman, A., & Awang, Z. (2022). Benefit-Risk Perceptions of FinTech Adoption for Sustainability from Bank Consumers' Perspective: The Moderating Role of Fear of COVID-19. *Sustainability*, 14(14), 8357. https://doi.org/10.3390/su14148357

2. Alhammad, M. M., Tan, C., Alsarhani, N., & Zolkepli, I. A. (2022). What Impacts Backers' Behavior to Fund Reward-Based Crowdfunding Projects? *A Systematic Review Study*. Cc, 14(2), 90–110. https://doi.org/10.17705/1pais.14207

3. Alkhwaldi, A. F., Alharasis, E. E., Shehadeh, M., Abu-AlSondos, I. A., Oudat, M. S., & Atta, A. A. B. (2022). Towards an Understanding of FinTech Users' Adoption: Intention and e-Loyalty Post-COVID-19 from a Developing Country Perspective. *Sustainability*, 14(19), 12616. https://doi.org/10.3390/su141912616

4. Alshater, M. M., Saba, I., Supriani, I., & Rabbani, M. R. (2022). Fintech in islamic finance literature: A review. *Heliyon*, 8(9), e10385. https://doi.org/10.1016/j.heliyon.2022.e10385

5. Altamura, C. E., & Daunton, M. (2020). Finance, financiers and financial centres: A special issue in honour of Youssef Cassis Introduction. *Financial History Review*, 27(3), 283–302. https://doi.org/10.1017/S0968565020000153

6. Ascarya, A. (2022). The role of Islamic social finance during Covid-19 pandemic in Indonesia's economic recovery. *International Journal of Islamic and Middle Eastern Finance and Management*, 15(2), 386–405. https://doi.org/10.1108/IMEFM-07-2020-0351

7. Aziz, A., Iqbal, J., Murtza, M. H., Gill, S. A., & Cheema, I. Y. (n.d.). Effect of COVID-19 pandemic on women entrepreneurial sustainability: The role of Islamic microfinance institutions. *Journal of Economic and Administrative Sciences*. https://doi.org/10.1108/JEAS-08-2021-0166

8. Baltgailis, J., & Simakhova, A. (2022). The Technological Innovations Of Fintech Companies In Ensuring The Stability Of The Financial System In Pandemic Times. *Marketing and Management of Innovations*, 2, 55–65. https://doi.org/10.21272/mmi.2022.2-05

9. Banna, H., & Alam, M. R. (2021). Impact of digital financial inclusion on ASEAN banking stability: Implications for the post-Covid-19 era. *Studies in Economics and Finance*, 38(2), 504–523. https://doi.org/10.1108/SEF-09-2020-0388

10. Banna, H., Hassan, M. K., Ahmad, R., & Alam, M. R. (2022). Islamic banking stability amidst the COVID-19 pandemic: The role of digital financial inclusion. *International Journal of Islamic and Middle Eastern Finance and Management*, 15(2), 310–330. https://doi.org/10.1108/IMEFM-08-2020-0389

11. Bao, Z., & Huang, D. (2021). Shadow Banking in a Crisis: Evidence from Fintech During COVID-19. *Journal of Financial and Quantitative Analysis*, 56(7), 2320–2355. https://doi.org/10.1017/S0022109021000430

12. Berg, T., Fuster, A., & Puri, M. (2022). FinTech Lending. *Annual Review of Financial Economics*, 14, 187–207. https://doi.org/10.1146/annurev-financial-101521-112042

13. Bhatia, A., Matthan, R., Khanna, T., & Balsari, S. (2020). Regulatory Sandboxes: A Cure for mHealth Pilotitis? *Journal of Medical Internet Research*, 22(9), e21276. https://doi.org/10.2196/21276

14. Bhatt, A., Joshipura, M., & Joshipura, N. (2022). Decoding the trinity of Fintech, digitalization and financial services: An integrated bibliometric analysis and thematic literature review approach. *Cogent Economics & Finance*, 10(1), 2114160. https://doi.org/10.1080/23322039.2022.2114160

15. Bin-Nashwan, S. A. (2022). Toward diffusion of e-Zakat initiatives amid the COVID-19 crisis and beyond. *Foresight*, 24(2), 141–158. https://doi.org/10.1108/FS-08-2020-0082

16. Bondarenko, L., Moroz, N., Zhelizniak, R., & Bonetskyy, O. (2021). Fintech Market Development In The World And In Ukraine. *Financial and Credit Activity-Problems of Theory and Practice*, 6(41), 121–127.

17. Botchey, F. E., Qin, Z., & Hughes-Lartey, K. (2020). Mobile Money Fraud Prediction-A Cross-Case Analysis on the Efficiency of Support Vector Machines, Gradient Boosted Decision Trees, and Naive Bayes Algorithms. *Information*, 11(8), 383. https://doi.org/10.3390/info11080383

18. Chan, C., Wang, H., Kong, Y., & Lin, J. W. (2021). An analysis of COVID-19 impacts on S&P 500 and FinTech index. *International Journal of Financial Engineering*, 8(2), 2141003. https://doi.org/10.1142/S2424786321410036

19. Charaia, V., Chochia, A., & Lashkhi, M. (2021). Promoting Fintech Financing For Sme In S. Caucasian And Baltic States, During The Covid-19 Global Pandemic. *Business Management and Economics Engineering*, 19(2), 358–372. https://doi.org/10.3846/bmee.2021.14755

20. Chatterjee, S., Sarker, S., Lee, M. J., Xiao, X., & Elbanna, A. (2021). A possible conceptualization of the information systems (IS) artifact: A general systems theory

perspective *Information Systems Journal*, 31(4), 550–578. https://doi.org/10.1111/isj.12320

21. 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. https://doi.org/10.1016/j.techfore.2021.120645

22. Chemmanur J. Thomas, Michael B. Imerman, Harshit Rajaiya, and Qianqian Yu (2020). Recent Developments in the Fintech Industry. *Journal of Financial Management, Markets and Institutions*. Vol. 8. DOI: 10.1142/S2282717X20400022

23. Choi, M., & Kwak, J. (2021). Rationalization of Network Segregation for Continuity of Financial Services Following COVID-19. *Ksii Transactions on Internet and Information Systems*, 15(11), 4163–4183. https://doi.org/10.3837/tiis.2021.11.016

24. Comerio, Niccolò & Strozzi, Fernanda. (2018). Tourism and its economic impact: A literature review using bibliometric tools. *Tourism Economics*. 25. 135481661879376. 10.1177/1354816618793762.

25. Correa, J. C., Dakduk, S., van der Woude, D., Sandoval-Escobar, M., & Lopez-Llamas, R. (2022). Low-income consumers' disposition to use automated banking services. *Cogent Business & Management*, 9(1), 2071099. https://doi.org/10.1080/23311975.2022.2071099

26. Correia, F., Martins, A., & Waikel, A. (2022). Online financing without FinTech: Evidence from online informal loans. *Journal of Economics and Business*, 121, 106080. https://doi.org/10.1016/j.jeconbus.2022.106080

27. Costantino, L., & Pompella, M. (2021). Fintech in Light of the 2020 Emergency: Excess Innovations to the Facts-From Securitization to Tokenomics, and More. *Review of Business*, 41(1), 44–68.

28. Cumming, D. J., Martinez-Salgueiro, A., Reardon, R. S., & Sewaid, A. (n.d.). COVID-19 bust, policy response, and rebound: Equity crowdfunding and P2P versus banks. *Journal of Technology Transfer*. https://doi.org/10.1007/s10961-021-09899-6

29. Daluwathumullagamage, D. J., & Sims, A. (2021). Fantastic Beasts: Blockchain Based Banking. *Journal of Risk and Financial Management*, 14(4), 170.https://doi.org/10.3390/jrfm14040170

30. Daragmeh, A., Lentner, C., & Sagi, J. (2021). FinTech payments in the era of COVID-19: Factors influencing behavioral intentions of "Generation X"in Hungary to use mobile payment. *Journal of Behavioral and Experimental Finance*, 32, 100574. https://doi.org/10.1016/j.jbef.2021.100574

31. Elsaid, H. M. (n.d.). A review of literature directions regarding the impact of fintech firms on the banking industry. *Qualitative Research in Financial Markets*. https://doi.org/10.1108/QRFM-10-2020-0197

32. Emara, N., & Zhang, Y. (2021). The non-linear impact of digitization on remittances inflow: Evidence from the BRICS. *Telecommunications Policy*, 45(4), 102112. https://doi.org/10.1016/j.telpol.2021.102112

33. Erel, I., & Liebersohn, J. (2022). Can FinTech reduce disparities in access to finance? Evidence from the Paycheck Protection Program. *Journal of Financial Economics*, 146(1), 90–118. https://doi.org/10.1016/j.jfineco.2022.05.004

34. Foglia, M., Recchioni, M. C., & Polinesi, G. (2021). Smart Beta Allocation and Macroeconomic Variables: The Impact of COVID-19. *Risks*, 9(2), 34 https://doi.org/10.3390/risks9020034

35. Gago, V., & Cavallero, L. (2022). The Pandemic as Financial Laboratory. *Topia-Canadian Journal of Cultural Studies*, 45, 165–174. https://doi.org/10.3138/topia-2022-0033

36. Gao, J. (2022). Has COVID-19 hindered small business activities? The role of Fintech. *Economic Analysis and Policy*, 74, 297–308. https://doi.org/10.1016/j.eap.2022.02.008

37. Gates, K. (2022). COVID-19 and the Care of the Financialized Self. *Topia-Canadian Journal of Cultural Studies*, 45, 175–187. https://doi.org/10.3138/topia-2022-0016

38. Gouda, H. (2022). Exploring the effects of learning abilities, technology and market changes on the need for future skills. *Higher Education Skills and Work-Based Learning*, 12(5), 900–913. https://doi.org/10.1108/HESWBL-10-2021-0200

39. Guang-Wen, Z., Siddik, A.B. (2023). The effect of Fintech adoption on green finance and environmental performance of banking institutions during the COVID-19 pandemic: the role of green innovation. *Environ Sci Pollut Res* 30, 25959–25971 https://doi.org/10.1007/s11356-022-23956-z

40. Guo, F., Huang, Y., Wang, J., & Wang, X. (2022). The informal economy at times of COVID-19 pandemic. *China Economic Review*, 71, 101722 https://doi.org/10.1016/j.chieco.2021.101722

41. Hariyono, A., & Tjahjadi, B. (2021). The Role of Intellectual Capital in the Development of Financial Technology in the New Normal Period in Indonesia. *Journal of Asian Finance Economics and Business*, 8(1), 217–224. https://doi.org/10.13106/jafeb.2021.vol8.no1.217

42. Hasan, R., Ashfaq, M., & Shao, L. (n.d.). Evaluating Drivers of Fintech Adoption in the Netherlands. *Global Business Review*. https://doi.org/10.1177/09721509211027402

43. Hearn, A. (n.d.). The collateralized personality: Creditability and resistance in the age of automated credit-scoring and lending. *Cultural Studies*. https://doi.org/10.1080/09502386.2022.2042576

44. Herdinata, C., & Pranatasari, F. D. (2022). Impact of COVID-19 on Organizational Support in Financial Technology. *Economies*, 10(8), 183. https://doi.org/10.3390/economies10080183

45. Ho, M.-T., Le, N.-T. B., Tran, H.-L. D., Nguyen, Q.-H., Pham, M.-H., Ly, M.-H., Ho, M.-T., Nguyen, M.-H., & Vuong, Q.-H. (2021). A Systematic and Critical Review on the Research Landscape of Finance in Vietnam from 2008 to 2020. *Journal of Risk and Financial Management*, 14(5), 219. https://doi.org/10.3390/jrfm14050219

46. Jiang, S., Qiu, S., & Zhou, H. (2022). Will digital financial development affect the effectiveness of monetary policy in emerging market countries? *Economic Research* 35(1), 3437–3472; doi.org/10.1080/1331677X.2021.1997619

47. Jing, W. L., Rashid, S. B. A., & Islam, M. U. (2022). The Impact of COVID-19 on Financial Markets & Institutions: A Literature Review. *International Journal of Early Childhood Special Education*, 14(3), 6488–6502. https://doi.org/10.9756/INT-JECSE/V14I3.813

48. Kamran, M., Butt, P., Abdel-Razzaq, A., & Djajadikerta, H. G. (2022). Is Bitcoin a safe haven? Application of FinTech to safeguard Australian stock markets. *Studies in Economics and Finance*, 39(3), 386–402. https://doi.org/10.1108/SEF-05-2021-0201

49. Karim, S., Naeem, M. A., & Abaji, E. E. (2022). Is Islamic FinTech coherent with Islamic banking? A stakeholder's perspective during COVID-19. *Heliyon*, 8(9), e10485. https://doi.org/10.1016/j.heliyon.2022.e10485

50. Karim, S., Naz, F., Naeem, M. A., & Vigne, S. A. (2022). Is FinTech providing effective solutions to Small and Medium in ASEAN countries? *Economic Analysis and Policy*, 75, 335–344. https://doi.org/10.1016/j.eap.2022.05.019

51. Khera, P., Ng, S., Ogawa, S., & Sahay, R. (2022). Measuring Digital Financial Inclusion in Emerging Market and Developing Economies: A New Index. *Asian Economic Policy Review*, 17(2), 213–230. https://doi.org/10.1111/aepr.12377

52. Khuong, N. V., Nguyen, T. T. P., Liem, N. T., Thuy, C. T. M., & Son, T. H. (2022). Factors Affecting the Intention to Use Financial Technology among Vietnamese Youth: Research in the Time of COVID-19 and Beyond. *Economies*, 10(3), 57. https://doi.org/10.3390/economies10030057

53. Kim, H. (n.d.) An empirical analysis of navigation behaviors across stock and cryptocurrency trading platforms: Implications for targeting and segmentation strategies. *Electronic Commerce Research*.https://doi.org/10.1007/s10660-022-09612-1

54. Lanfranchi, D., & Grassi, L. (2022). Examining insurance companies’ use of technology for innovation. *Geneva Papers on Risk and Insurance-Issues and Practice*, 47(3), 520–537. https://doi.org/10.1057/s41288-021-00258-y

55. Le, L.-T., Yarovaya, L., & Nasir, M. A. (2021). Did COVID-19 change spillover patterns between Fintech and other asset classes? *Research in International Business and Finance*, 58, 101441. https://doi.org/10.1016/j.ribaf.2021.101441

56. Le, M. T. H. (2021). Examining factors that boost intention and loyalty to use Fintech post-COVID-19 lockdown as a new normal behavior. *Heliyon*, 7(8), e07821. https://doi.org/10.1016/j.heliyon.2021.e07821

57. Li, J., Wei, R., & Guo, Y. (2022). How Can the Financing Constraints of SMEs Be Eased in China? - Effect Analysis, Heterogeneity Test and Mechanism Identification Based on Digital Inclusive Finance. *Frontiers in Environmental Science*, 10, 949164. https://doi.org/10.3389/fenvs.2022.949164

58. Li, K., Kim, D. J., Lang, K. R., Kauffman, R. J., & Naldi, M. (2020). How should we understand the digital economy in Asia? Critical assessment and research agenda. *Electronic Commerce Research and Applications*, 44, 101004. https://doi.org/10.1016/j.elerap.2020.101004

59. Li, S. (2021). How Does COVID-19 Speed the Digital Transformation of Business Processes and Customer Experiences? *Review of Business*, 41(1), 1–14.

60. Lin, A. J., Chang, H.-Y., Huang, S.-W., & Tzeng, G.-H. (2021). Improving Service Quality of Wealth Management Bank for High-Net-Worth Customers During COVID-19: A Fuzzy-DEMATEL Approach. *International Journal of Fuzzy Systems*, 23(8), 2449–2466. https://doi.org/10.1007/s40815-021-01130-w

61. Ling, S., Pei, T., Li, Z., & Zhang, Z. (2021). Impact of COVID-19 on Financial Constraints and the Moderating Effect of Financial Technology. *Emerging Markets Finance and Trade*, 57(6), 1675–1688. https://doi.org/10.1080/1540496X.2021.1904883

62. Liu, H., Yao, P., Latif, S., Aslam, S., & Iqbal, N. (2022). Impact of Green financing, FinTech, and financial inclusion on energy efficiency. *Environmental Science and Pollution Research*, 29(13), 18955–18966. https://doi.org/10.1007/s11356-021-16949-x

63. Lyons, A. C., Kass-Hanna, J., & Fava, A. (2022). Fintech development and savings, borrowing, and remittances: A comparative study of emerging economies. *Emerging Markets Review*, 51, 100842. https://doi.org/10.1016/j.ememar.2021.100842

64. Macchiavello, E., & Siri, M. (2022). Sustainable Finance and Fintech: Can Technology Contribute to Achieving Environmental Goals? A Preliminary Assessment of “Green Fintech” and “Sustainable Digital Finance.” *European Company and Financial Law Review*, 19(1), 128–174.

65. Maiti, M., Vukovic, D., Mukherjee, A., Paikarao, P. D., & Yadav, J. K. (2022).Advanced data integration in banking, financial, and insurance software in the age of COVID-19. *Software-Practice & Experience*, 52(4), 887–903.https://doi.org/10.1002/spe.3018

66. Mansour, H. (2022). How successful countries are in promoting digital transactions during COVID-19. *Journal of Economic Studies*, 49(3), 435–452. https://doi.org/10.1108/JES-10-2020-0489

67. Metawa, N., Dogan, E., & Taskin, D. (2022). Analyzing the nexus of green economy, clean and financial technology. *Economic Analysis and Policy*, 76, 385–396. https://doi.org/10.1016/j.eap.2022.08.023

68. Minutolo, M. C., Kristjanpoller, W., & Dheeriya, P. (2022). Impact of COVID-19 effective reproductive rate on cryptocurrency. *Financial Innovation*, 8(1), 49. https://doi.org/10.1186/s40854-022-00354-5

69. Modgil, S., Dwivedi, Y. K., Rana, N. P., Gupta, S., & Kamble, S. (2022). Has Covid-19 accelerated opportunities for digital entrepreneurship? An Indian perspective; *Technological Forecasting and Social Change*, 175., 121415https://doi.org/10.1016/j.techfore.2021.121415

70. Moreira-Santos, D., Au-Yong-Oliveira, M., & Palma-Moreira, A. (2022). Fintech Services and the Drivers of Their Implementation in Small and Medium Enterprises. *Information*, 13(9), 409. https://doi.org/10.3390/info13090409

71. Murinde, V., Rizopoulos, E., & Zachariadis, M. (2022). The impact of the FinTech revolution on the future of banking: Opportunities and risks. *International Review of Financial Analysis*, 81, 102103. https://doi.org/10.1016/j.irfa.2022.102103

72. Musa, S. F. P. D., Besar, M. H. A. H., & Anshari, M. (n.d.). COVID-19, local food system and digitalisation of the agri-food sector. *Journal of Indian Business Research*. https://doi.org/10.1108/JIBR-04-2022-0103

73. Najaf, K., Sinnadurai, P., Devi, K. S., & Dhiaf, M. M. (n.d.). Does electronic economics matter to financial technology firms? *Electronic Commerce Research*. https://doi.org/10.1007/s10660-022-09578-0

74. Najaf, K., Subramaniam, R. K., & Atayah, O. F. (2022). Understanding the implications of FinTech Peer-to-Peer (P2P) lending during the COVID-19 pandemic. *Journal of Sustainable Finance & Investment*, 12(1), 87–102. https://doi.org/10.1080/20430795.2021.1917225

75. Nathan, R. J., Setiawan, B., & Quynh, M. N. (2022). Fintech and Financial Health in Vietnam during the COVID-19 Pandemic: In-Depth Descriptive Analysis. *Journal of Risk and Financial Management*, 15(3), 125. https://doi.org/10.3390/jrfm15030125

76. Naz, F., Karim, S., Houcine, A., & Naeem, M. A. (n.d.). Fintech Growth during COVID-19 in MENA Region: Current Challenges and Future prospects. Electronic Commerce *Research*. https://doi.org/10.1007/s10660-022-09583-3

77. Nguyen, P. V., & Nguyen, A. D. (2022). Extending UTAUT2 to Mobile MoneyAdoption and Consumer Behavior: An Empirical Study in Vietnam. *Journal of Asian Finance Economics and Business*, 9(4), 367–380. https://doi.org/10.13106/jafeb.2022.vol9.no4.0367

78. Nigmonov, A., & Shams, S. (2021). COVID-19 pandemic risk and probability of loan default: Evidence from marketplace lending market. *Financial Innovation*, 7(1), 83. https://doi.org/10.1186/s40854-021-00300-x

79. Nor, S. M., Abdul-Majid, M., & Esrati, S. N. (2021). The role of blockchain technology in enhancing Islamic social finance: The case of Zakah management in Malaysia. *Foresight*, 23(5), 509–527. https://doi.org/10.1108/FS-06-2020-0058

80. Odinet, C. K. (2021). Predatory Fintech and the Politics of Banking. *Iowa Law Review*, 106(4), 1739–1800.

81. Omarova, S. T. (2021). The People's Ledger: How to Democratize Money and Finance the Economy. *Vanderbilt Law Review*, 74(5), 1231–1300.

82. Ozik, G., Sadka, R., & Shen, S. (2021). Flattening the Illiquidity Curve: Retail Trading During the COVID-19 Lockdown. *Journal of Financial and Quantitative Analysis*, 56(7), 2356–2388. https://doi.org/10.1017/S0022109021000387

83. Park, D., & Ryu, D. (n.d.). E-commerce retail and reverse factoring: A newsvendor approach. *Managerial and Decision Economics*. https://doi.org/10.1002/mde.3690

84. Peng, X., & Dong, C. (2021). The New Pattern Of Online Credit Loan In The Post-Epidemic Era. *Economics and Finance Letters*, 8(1), 92–103. https://doi.org/10.18488/journal.29.2021.81.92.103

85. Pinter, E., Bago, P., Berenyi, L., Molnar, L., Deutsch, N., Szigeti, G., & Pinter, T. (2021). How do Digitalization and the Fintech Phenomenon Affect Financial Decision-Making in the Younger Generation? *Acta Polytechnica Hungarica*, 18(11), 191–208

86. Podolchak, N., Karkovska, V., Dzyurakh, Y., Prokoryshyn-Rashkevich, L., Lukashevska, U., & Yaremko, H. (2022). Ukrainian Ecosystem Transformation Challenges Of Fintech Products In The Covid-19 Conditions. *Financial and Credit Activity-Problems of Theory and Practice*, 4(45), 254–266. https://doi.org/10.55643/fcaptp.4.45.2022.3847

87. Powers, Z. (2021). The Proliferation of the Online Sales of Tourism Activities. *Tourism*, 69(4), 630–634. https://doi.org/10.37741/t.69.4.10

88. Sakas, D. P., Kamperos, I. D. G., Reklitis, D. P., Giannakopoulos, N. T., Nasiopoulos, D. K., Terzi, M. C., & Kanellos, N. (2022). The Effectiveness of Centralized Payment Network Advertisements on Digital Branding during the COVID-19 Crisis. *Sustainability*, 14(6), 3616. https://doi.org/10.3390/su14063616

89. Savitha, B., & Hawaldar, I. T. (2022). What motivates individuals to use FinTech budgeting applications? Evidence from India during the covid-19 pandemic. *Cogent Economics&Finance*, 10(1), 2127482. https://doi.org/10.1080/23322039.2022.2127482

90. Schmidt-Jessa, K. (n.d.). The impact of COVID-19 on digital-only banks: Are they winners or losers? *Journal of Banking Regulation*. https://doi.org/10.1057/s41261-022-00198-0

91. Shahzad, A., Zahrullail, N., Akbar, A., Mohelska, H., & Hussain, A. (2022). COVID-19's Impact on Fintech Adoption: Behavioral Intention to Use the Financial Portal. *Journal of Risk and Financial Management*, 15(10), 428. https://doi.org/10.3390/jrfm15100428

92. Sharma, S., Tiwari, A. K., & Nasreen, S. (n.d.). Are FinTech, Robotics, and Blockchain index funds providing diversification opportunities with emerging markets? Lessons from pre and postoutbreak of COVID-19. *Electronic Commerce Research*. https://doi.org/10.1007/s10660-022-09611-2

93. Sherkow, J. S. (2022). Regulatory Sandboxes And The Public Health. *University of Illinois Law Review*, 1, 357–410.

94. Singh, A. K., & Sharma, P. (n.d.). A study of Indian Gen X and Millennials consumers' intention to use FinTech payment services during COVID-19 pandemic. *Journal of Modelling in Management*. https://doi.org/10.1108/JM2-02-2022-0059

95. Starr, C. W., Saginor, J., & Worzala, E. (2021). The rise of PropTech: Emerging industrial technologies and their impact on real estate. *Journal of Property Investment & Finance*, 39(2), 157–169. https://doi.org/10.1108/JPIF-08-2020-0090

96. Thach, N. N., Hanh, H. T., Huy, D. T. N., Gwozdziewicz, S., Nga, L. T. V., Huong, L.T. T., & Nam, V. Q. (2021). Technology Quality Management Of The Industry 4.0 And Cybersecurity Risk Management On Current Banking Activities In Emerging

Markets -The Case In Vietnam. *International Journal for Quality Research*, 15(3), 845–856. https://doi.org/10.24874/IJQR15.03-10

97. Ullah, S. (2023). Impact of COVID-19 Pandemic on Financial Markets: a Global Perspective. *J Knowl Econ* 14, 982–1003 https://doi.org/10.1007/s13132-022-00970-7

98. Vasenska, I., Dimitrov, P., Koyundzhiyska-Davidkova, B., Krastev, V., Durana, P., & Poulaki, I. (2021). Financial Transactions Using FINTECH during the Covid-19 Crisis in Bulgaria. *Risks*, 9(3), 48. https://doi.org/10.3390/risks9030048

99. Waliszewski, K., & Warchlewska, A. (2021). How We Can Benefit From Personal Finance Management Applications During The Covid-19 Pandemic? ThePolish Case. *Entrepreneurship and Sustainability Issues*, 8(4), 103–121. https://doi.org/10.9770/jesi.2021.8.4(6)

100. Wojcik, D. (2021). Financial geography II: The impacts of FinTech—Financial sector and centres, regulation and stability, inclusion and governance. *Progress inHuman Geography*, 45(4), 878–889. https://doi.org/10.1177/0309132520959825

101. Wojcik, 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. https://doi.org/10.1111/tesg.12434

102. Wu, A.-C., & Kao, D.-D. (2022). Mapping the Sustainable Human-Resource Challenges in Southeast Asia’s FinTech Sector. *Journal of Risk and Financial Management*, 15(7), 307. https://doi.org/10.3390/jrfm15070307

103. Xia, Y., Qiao, Z., & Xie, G. (2022). Corporate resilience to the COVID-19 pandemic: The role of digital finance. *Pacific-Basin Finance Journal*, 74, 101791. https://doi.org/10.1016/j.pacfin.2022.101791

104. Yan, C., Siddik, A. B., Akter, N., & Dong, Q. (n.d.). Factors influencing the adoption intention of using mobile financial service during the COVID-19 pandemic: The role of FinTech. *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-021-17437-y

105. Yan, J., & Jia, P. (2022). The Impact of COVID-19 on Bank Sector Traditional Business Model Sustainability in China: Bank Branch Versus Fintech. *Frontiers in Physics*, 10, 820646. https://doi.org/10.3389/fphy.2022.820646

106. Yanchun Xia, Zhilin Qiao, Guanghua Xie. (2022). Corporate resilience to the COVID-19 pandemic: The role of digital finance. *Pacific-Basin Finance Journal*, Volume 74, 101791, ISSN 0927-538X, https://doi.org/10.1016/j.pacfin.2022.101791.

107. Yang, Y.-C., Liu, W.-P., & Shih, K.-H. (n.d.). The COVID-19 pandemic and firm value: The mediating effect of FinTech applications. *Review of Quantitative Finance and Accounting*. https://doi.org/10.1007/s11156-022-01112-5

108. Yeon, A. L., & Tsulasi, P. U. (2022). Equity crowdfunding industry regulations in Malaysia and Indonesia: Prospects and challenges during the Covid-19 pandemic. *Journal of International Studies-Jis*, 18, 31–62. https://doi.org/10.32890/jis2022.18.2

109. Yuan, Y.-P., Tan, G. W.-H., & Ooi, K.-B. (n.d.). Does COVID-19 Pandemic Motivate Privacy Self-Disclosure in Mobile Fintech Transactions? A Privacy-Calculus-Based Dual-Stage SEM-ANN Analysis. *Ieee Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2022.3204285

110. Yun Liu, Yun Zhang, Yifei Zhang, He Xiao. (2022). Small business owners' Fintech credit in crises: Theory and evidence from farmers under the COVID-19. *Pacific-Basin Finance Journal*, Volume 71, 2022, 101692, ISSN 0927-538X, https://doi.org/10.1016/j.pacfin.2021.101692

111. Zen, A. C., Bittencourt, B. A., & Spohr, R. (2022). Co-creation strategies in timesof crisis: The case of Warren. *International Journal of Entrepreneurship and Innovation*, 23(2), 144–150. https://doi.org/10.1177/14657503221092969

112. Zhang, Y., Xing, C., & Guo, X. (n.d.). The Shielding Effect of Access to Financeon Small and Medium-Sized Enterprises during the COVID-19 Crisis: Comparing Fintech and Traditional Finance. *Emerging Markets Finance and Trade*. https://doi.org/10.1080/1540496X.2022.2072201