**MYKOLAS ROMERIS UNIVERSITY**

**FACULTY OF ECONOMIC AND BUSINESS**

**ELECTRONIC BUSINESS MANAGEMENT**

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# IDENTIFICATION OF THREATS ARISING FROM FINANCIAL TECHNOLOGIES

**A Master's thesis**

**Supervisor**

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**VILNIUS, 2020**

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# IDENTIFICATION OF THREATS ARISING FROM FINANCIAL TECHNOLOGIES

**A Master's thesis on Electronic business management**

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# CONTENTS

# TABLES

# FIGURES

## ABBREVIATIONS

**FinTech – financial technologies**

**TechFins – technological finance**

**RegTech – regulation technology**

**ABCD – AI (artificial intelligence), blockchain, cloud, data**

**GAFA – Google, Apple, Facebook, Amazon**

**BAT – Baidu, Alibaba and Tencent**

**OCC – Office of the Controller of the Currency**

**CFPB – Consumer Financial Protection Bureau**

**CFTC – Commodity Futures Trading Commission**

**FinCEN – Financial Crimes Enforcement Network**

**GLBA – Gramm-Leach-Billey Act**

**FCRA – Fair Credit Reporting Act**

**FTC Act – Federal Trade Commission Act**

**ECPA – Electronic Communication Privacy Act**

**QQ – China's most popular instant messaging service. Supported by telecommunications company Tencent**

**WeChat – mobile communication system for sending text and voice messages, developed by the Chinese company Tencent**

**IMF – International Monetary Fund**

**EY – "Ernst & Young" is a British auditing and consulting company, one of the largest in the world, and one of the Big Four audit firms.**

**AI – artificial intelligense**

**M&A – Mergers and Acquisitions**

**IT – Information Technology**

**ATM – asynchronous transfer mode**

**KPMG – one of the largest professional service networks in the world and one of the Big Four audit firms along with Deloitte, Ernst & Young and PwC (Klynveld Peat Main Goerdeler)**

**API – application programming interface**

**GDP – general data protection**

**FTC – The Federal trade Commission**

**P2P – pear-to-pear**

**B2B – business-to-business**

**B2C – business-to-customer**

**O2O – offline-to-online**

**NFC – Near Field Communication**

**ICO – Initial coin offering**

**IoT – internet of things**

**FATF – Financial Action Task Force**

**AML – Anti Money laundering**

**DLT – distributed ledger technology**

**CRM – Customer Relationship Management)**

**OCR – optical character recognition**

**mPOS – mobile Point Of Sale**

**FCA – Financial Conduct Authority**

**GFC – general financial crisis**

**SME – Small and medium-sized enterprises**

**QR code – quick response code**

**PSD – Payment Services Directive**

**ASIC – Australian Securities and Investment Commission**

**AIFC – Astana International Financial Centre**

**MAS – Monetary Authority of Singapore**

**OTPs – one-time passwords**

**PIN – Personal Identification Number**

**ID – identification document**

**CQA – code generated application**

**KYC – know your customer**

**VPN – virtual private network**

**PPTP – Point-to-Point Tunneling Protocol**

**L2TP/IPsec - Layer 2 Tunneling Protocol**

**IKEv2 - Internet Key Exchange protocol**

**SSTP - Secure Socket Tunneling Protocol**

# INTRODUCTION

**Relevance of the topic -** Over the years, many countries have used the classic, traditional types of financial instruments, such as obtaining a loan, finding investors, buying shares and conducting many other financial transactions, it took us a lot of time and documents, and basically the other side benefited. More precisely, for example, banks live with an absolute power. As financial technologies (further - FinTech) are emerging constantly, startups are trying to be in the front lines and made a lot of new and useful services for users. Since the gaps in FinTech are associated with regulators, legacy IT networks can make a higher quality financial services. FinTech simplifies the process of borrowing and using money for everyone in the financial system.

Before FinTech was in the financial system, the lending described by banking organizations was extremely biased, and credit risks were blurred proportionately for many. FinTech works with an extensive database of diverse information. Based on the data received, FinTech can know in advance the level of success of a company. FinTech is currently using specialized programs, which can change damaged credit scores for users, whom the financial crisis has become unexpected and harmful, choosing the right approach to lending. This shows the clear meaning that FinTech has in the financial industry, trust variety are already given by a simple in-person meeting with more than 40% of the loan application more often denied entrepreneurial types of business.

An idea of crowdfunding as one of the types of FinTech has allow to finance companies and projects on the Internet. This is another great opportunity that can solve many problems and issues.

While FinTech changed the way it received a loan, it also changed the way it did online transactions. Crypto-conversions, such as Bitcoin, allow you to make purchases, and of course it is allow to commit the transfers over the world. With the FinTech industry, individuals can make faster and cheaper payments with only basic data. All signed transactions made through FinTech are stored in the absolutely secure Blockchain database.

In today's world, FinTech occupies an important place in the financial market over the last few years. This digital revolution has changed the financial world and made it modernized. FinTech quickly entered financial markets and significantly improved its user experience. Every year a lot of new FinTechs are created and, as an effect, they encounter problems in the procedures of using them. It is very important to consider not only the profitable side, but also to raise all the issues, whose solutions can be obtained on the basis of research and discussion.

Of course, “regulation” is the main concern of the FinTech industry that is often talked about. But, unfortunately, it is not the main FinTech problem. FinTech's core concept was to simplify the lives of consumers, but many no longer trust the financial market, because it is so unpredictable at present that many often burn out of it. That is, “trust in the financial field” is another problem of this modernized

system. Additionally, I would like to write about “reluctance to assume the new technologies”, because the proponents of the traditional system are categorically against innovation. Although many sources assure us that startups are invested at a high level, and FinTech’s access to finance is obvious. “Lack of investors and adequate access to finance” is another important issue in this industry. Based on all this, in my opinion, there is another problem. In conditions of strong competition, banks are trying to survive in all ways, and one of them is to attract startups, that is, the release of new services, new technologies and methods. And as derivative banks live again and continue to profit and benefit people. “A Change in FinTech's Goal.” It is hard to predict what will happen next, but it is distinct that there are threats and problems in the FinTech area that must to be eliminate.

**Problem of the research -** what are the main threats of FinTech?

**Object of the research –** the main threats of FinTech.

**Research hypothesis –** According to sources, the problem of the field of FinTech is regulation, but based on such rapid development, we should expect that the FinTech industry will have many threats and problems that need to be eliminate in opportunely.

**Aim of the research –** after the identification of external and internal threats to formulate the solutions for the effective operation of FinTech.

**Objectives of the research:**

- To consider the theoretical facets of the FinTech.

- To analyse the applying of FinTech in order to identify possible threats and its impact on the economics of the country.

- To identify the main threats of FinTech field through the most appropriate method of the research and select the more suitable solutions.

**Methods of the research**

1. Systematic analysis of the scientific literature.
2. Comparative analysis.
3. Correlation analysis.
4. Analytical assessment.

**Significance of the research.** The significance of this research lies in exploring the FinTech field from a different side. With the advent of FinTech, only the positive aspects of this unique industry are very often represented in our lives. Of course, FinTech's positive aspects are endless and can be talked about for a very long time, but what about the other side of the “coin”, what threats does FinTech pose for its field and what global impact does it have on the economy and development? This research work is also of great importance for the opportunity to present to a wide audience facts, figures and data that the public does not always think about, even if the topic of the study is relevant and widely discussed in various sectors of society. The analysis showed and confirmed that the elimination of Fintech threats

requires a lot of work, which should be carried out not only at the country level, but also centrally throughout the world, since this century is the “digital era” and there are no borders.

**Limitations of the scientific research.** The chosen methods and variables for the assessment of the scientific research produce the results. It is very important to choose the appropriate methods to present statistically correct results and draw the most accurate conclusions. Many economic indicators were rejected due to insufficient and statistically insignificant results. Since FinTech field is on the developing stage and unpredictable at the moment and all issues regarding regulation, use, implementation, etc. in the "experimental" stage, it is very difficult to carry out any mathematical calculations with false data. The biggest problem was to make an analytical assessment and conclusions based on empirical, comparative and correlation analysis. Since there is always the probability of a subjective assessment of the issue.

**Master thesis is organized as the following:** firstly, the topic in the scientific literature is briefly reviewed in the theoretical part. Secondly, empirical research is performed and findings are discussed. Thirdly, methodological part of the research is provided. Then in the fourth part presented analytical part overview, and finally, conclusions are drawn. The Master thesis is comprised of 72 pages including annotation, summary and annexes, contains 6 tables and 6 figures.

# 1. THE THEORETICAL ASPECTS OF FINANCIAL TECHNOLOGIES

## 1.1. Concept of financial technologies

Nowadays, the majority of the public use new technological products for various financial transactions, such as payment via smartphone, online banking, online trading websites and other forms of payment for purchases. However, most of us do not know or have not heard at all about the origin of FinTech, with the exception of investors or individuals who specialize in the financial world. We can say with confidence that the appearance of FinTech completely changed life and created a completely new era of relations between people and the financial sector. It should be noted that FinTech is not mentioned as a new product, as it has existed for a long time. Given that financial technology has kept pace with the times and modernized with the goal of a revolutionary boom in the financial industry. If you flip through history, it all started with the advent of the printing press. After which paper money appeared in the world. This was one of the first steps of the FinTech revolution. But the invention of the telegraph in 1866, which allowed the successful creation of the first transatlantic cable line, was one that was convincing to the public. This was the beginning of the globalization in the worldwide financial field. The Fedwire Funds Service used Telegraph to make money transfers between banks in 1918. "Star Time" Telegraph existed until the 1970s.

After the telegraph was developed, a series of new technological products was developed and launched on the market in order to support the financial sector. One of FinTech's typical products in the middle of this period was the credit card invented by Diners Club in 1950. The advent and success of credit cards continued to spread the way for the formation of many other new technological products, such as ATMs in 1960, which allowed people to withdraw their money directly from an ATM rather than going to banks. However, at the moment, banks still played an important and significant role in most financial transactions. Technology products seemed inadequate to service, support, and replace the entire role of banking, as well as to provide the best assistance to the financial market. Therefore, the improvement and continuous development of new technological products were essential for creating innovation for the global financial industry.

At the end of 1960, the first electronic system, called Quoton, was created, which had the form of large computer screens, in order to support brokers and announce prices in the stock market. In 1966, in order to create the prerequisite and basis for the long-term evolution of FinTech the global Telex network was launched in the future, which was widely distributed among the public. Since then, the emergence of the Clearing House Interbank Payment System has made a great contribution to supporting the implementation of payment transactions in US dollars between banks over the world. In 1970, the first electronic exchange trading was founded and commissioned. In addition, mainframe computers were

installed in most financial institutions to ensure the safe and optimal storage of large amounts of data in the 1980s.

Before the advent of e-commerce models in the financial industry in 1982, technology and innovation were used in most cases as support at banks, financial headquarters, shopping centers and offices. In other industries, they did not know about the existence of any technological products. With the progress of Internet technology in the 1990s, the overwhelming success of the e-commerce model followed, which increased the importance and necessity of technology for the global financial industry. With the growth of the Internet, the world's first Fintech companies appeared, online brokerage services that supported the realization of the e-commerce model. At this time, in order to achieve the development trend by banks, the introduction of innovation and the application of technologies in various financial operations began. The Internet boom in 2000 was marked by a turning point for the formation and widespread dissemination of online banking among customers. The Internet has been widely used all over the world, reducing deliberation and turning all actions into second tasks, and therefore it has become an invaluable support tool for the continuous development of FinTech. At that time, many FinTech infrastructures appeared and were widely used with hard functions and highly developed services that were invented for mass use in areas such as risks, financial management, money management, data analysis systems and automated online trading systems. This progress on the Internet has become the foundation for Fintech companies that are developing now.

On the other hand, FinTech also contributed to creating a new face for the global financial sector and offered many new improvements to solve the problems and obstacles that customers often faced in their financial transactions. PayPal was one of the typical examples of the FinTech. It was one of the companies at the forefront of innovation, changing the form of transaction and money management through online trading and payment service instead of having to go to the bank. Another example marked the growth of FinTech was the emergence of e-commerce platform named eBay. It was a website that allows the customers to purchase a wide range of products through a variety of stores available on this website and quickly make the secure payments via the network. Besides that, they could also create their trading markets or even can hold some auctions to sell their products at better prices. Therefore, it was considered as a main shift in FinTech in this digital era.

Financial transactions were optimized and mobile applications appeared, and thereby began the growth of mobile technologies. For example, instead of transferring money to a bank, they can quickly complete a transaction through an online banking application on mobile devices. This operation can help customers minimize transaction costs, as recipients can receive money immediately, without having to wait too long, and also save time for customers. Then, robotic consultants were invented to quickly support and provide the necessary information to clients, while reducing labor costs and the costs that customers must pay to hire private consultants. New funding channels and fundraising sites have been

opened and are widely used in various forms to offer more online services with great benefits for customers, such as online lending, online banking, online payments and online financing. As a result, the existence and continuous development of FinTech has caused tremendous pressure and problems for traditional banks.

At a time when banks had a monopoly power, consumers needed a “breath of fresh air” in the financial fields. FinTech is the main competitor for the traditional financial sector, in which innovative methods are used to improve financial performance. The use of modern devices, investment services and cryptocurrencies is an example of technologies aimed at modernizing and improving the financial world. FinTech is not only startups, but also successful companies that will change the financial world for the better. Financial institutions are introducing new FinTech solutions and innovative technologies. Thus, improving and developing the provision of services and increase competitiveness, as well as further development.

In one of the materials used in this thesis, more than 200 scientific papers with the term “FinTech” were analyzed and several definitions were given as “FinTech is a new financial sector, where technologies are used to improve financial performance”. In other words, applications, procedures, products, processes, business models and ideas in the financial sector, programs to simplify checks, analysis, all the technologies that we use in our daily lives - that’s all FinTech is.

Compared to 2008, where global investments in Fintech amounted to 930 million, in 2015 they increased by 2.2% and exceeded the total amount of 22 billion US dollars. According to the office of the mayor of London, over the past few years. According to statistics, 40% of the workforce in London is engaged in financial and technological services, which shows the rapid development of the FinTech industry in this region.

In 2014, $ 1.5 billion was invested in Fintech in Europe. Among them, the leading positions were occupied by London companies with $ 539 million, Amsterdam companies with $ 306 million, and Stockholm companies with $ 266 million. FinTech European contracts increased from 37 in the 4th quarter of 2015 to 47 in the 1st quarter of 2016. Lithuania begins to become the North European center for FinTech companies since Britain left the European Union. According to statistics, since 2016 Lithuania has issued 51 FinTech licenses.

A new FinTech Center has opened in Sydney. According to a KPMG report, the financial services sector of Sydney covers 9 percent of national GDP in 2017 and leads the way in Hong Kong and Singapore for the same services. In 2015, the Monetary Authority of Singapore launched the FinTech and Information Group initiative to attract startups from around the world. FinTech's innovative lab was launched this year in Hong Kong.

The EY report, published in February 2016 by order of the UK Treasury, compares seven leading FinTech centers: the UK, California, New York, Singapore, Germany, Australia and Hong Kong.

California took first place in “talent” and “capital”, Great Britain in “government policy” and New York in “demand”.

From a financial and technological point of view, financial services in comparison with other industries is considered the most vulnerable to software failures. If you recall the details, then finances have always been protected by regulation, but the wave of startups makes global banks unite in recent years. Former bank secrecy rules and bank transfer rules pose a threat to FinTech companies. In October 2018, the FinTech Baltic Program, sponsored by the International Monetary Fund (IMF) and the World Bank, provided guidance to various governments and central banking institutions for the adoption and deployment of FinTech's ongoing success, which consists of 12 policy elements. FinTech companies are often confronted with financial regulators, such as issuing banks and the federal government, who are critical of FinTech's rapid growth. An important problem that regulators face due to the threat of hacking is data security and the protection of confidential financial data of consumers and corporations. Many global FinTech companies work closely with cloud technology to meet significantly accurate regulatory requirements. The Federal Trade Commission (FTC) gives free sources to fulfill their official obligations to protect confidential data. Some private initiatives provide that several levels of protection can protect financial data. Any breach of data, regardless of size, can result in direct responsibility to the company and destroy the reputation of FinTech.

## 1.2. Types and necessity of financial technologies

### 1.2.1. Payments and remittances

The main types of FinTech industry are money transfers and payments. FinTech companies created a new breakthrough in the payment transaction when they launched a series of applications and online financial services with many different forms of payment in according to the goals and needs of consumers. Instead of going to banks to carry out all payment transactions, today, with the development of FinTech products, customers can comfortably make all their payments anytime, anywhere in a simple and quick way using many online financial services.

Money transfers and payments can be divided into 3 main types: payment gateways, including online peer-to-peer payments, electronic wallets and money transfer technology.

A payment gateway is a hardware-software complex that allows you to automate the process of accepting payments on the Internet. It is developed by a payment system that defines its specification and is responsible for its support.

A new form of payment, which helps counterparties to transfer money from their bank accounts to the bank accounts of other persons anywhere and anytime via the Internet or smartphones with a network connection, is a P2P payment model. A P2P payment carries out all transactions electronically,

where consumers and sellers connect automatically. In this regard, the cost of using this type of payment is much lower than traditional. In addition, the greatest benefit that this model brings to consumers is that it minimizes the cumbersome procedures involved in writing and mailing checks or transferring cash through traditional banks, while maximizing the benefits for consumers, such as speed, convenience and simplicity.

Electronic wallets an app that lets users store and spend money from a mobile and/or smart device, where users can link and top up their e-wallet from a bank account and increasingly used as tools for financial inclusion in emerging markets. The mobile wallet is a digital wallet which uses technology to store the digitized valuables such as the debit cards or credit cards that allow the customers to make in-store payments quickly and securely. The key purposes for inventing this payment method are to completely replace the physical wallets which people always carry in their pockets, enhance the convenience, speed and secure for the users as well as try to build the cashless society in the future. To make a payment, mobile wallets use NFC technology, which is a type of radio frequency identification technology and is carried out by transferring payment information from a mobile device to a payment terminal.

Remittance tech is innovative solutions for cheaper, faster and safer money transfer and a service that facilitates cross-border money transfers between individuals. Technology companies use innovation for fast money transfers for a fraction of the costs.

### 1.2.2. Cryptocurrencies and blockchain

In recent years, the concept of cryptocurrency, which is a form of electronic money that can be used to carry out financial transactions via the Internet, has come into our everyday life. A familiar example of a digital currency is Bitcoin, which appeared in 2009. Cryptocurrencies allow users to trade in goods and services that are carried out by paying with bitcoins. Bitcoin is an independent currency and is not subject to supervision or control by anyone. Therefore, transaction costs are considered the lowest in comparison with traditional forms of payment. But at the present time, more and more countries are refusing to use cryptocurrencies at the state level, thereby reducing many risks.

Digital currency, like bitcoin, on the one hand, can minimize the risk of a country's economic collapse. Everyone knows that, for example, inflation causes serious unrest in every country, since many processes are associated with international currencies like the euro and the dollar. All this is due to the large problem of cash. As for digital currencies, in this reason the risk associated with inflation are minimal. Since usually digital currency is intended for end use. Bitcoin is only 21 million according to the latest data, and over time its amount will be reduced several times. It should be noted that there lease of bitcoin, as a global and virtual currency, not regulated by government bodies was planned to remove

the collapse. Also, using of digital currencies could increase the security, simplicity, speed and capacity of financial transactions for consumers. But world practice at the moment suggests otherwise.

In the section on cryptocurrencies, I would like to dwell on the issues of exchanging cryptocurrencies and especially talk about Gatecoin. The gatecoin is the Bitcoin and Ethereum token exchange for professional and retail investors. As we know, a stock exchange is an issue on the primary securities markets for purchase and sale, that is, a cryptocurrency exchange is a place where people can buy and sell digital assets. As with the traditional exchange, where companies raise new money by issuing securities or bonds, the digital market exchange is a place where, using tools like ICOs, companies can also raise money by pre-selling their earnings. By providing companies and start-ups in the early stages, creating the foundation for fundraising, while avoiding compliance with regulatory requirements and venture capitalists, banks or stock exchanges. Regulatory laws for both exchanges and ICOs are different worldwide. But each exchange has its own special rules and regulations for trading and listing. Projects must meet certain criteria, and exchange standards, before they actually transfer their tokens.

And also we should mention cryptocurrencies with price stabilization mechanisms, also known as stable coins. Before we get down to price stabilization, let's see what makes for good money. The classic answer to this question is that money must satisfy the three main functions, they must function well as a medium of exchange, a means of preserving value and a unit of accounting. So how are cryptocurrencies measured? Speaking about the "medium of exchange", we mean, first of all, the ability to make transactions. Existing blockchains provide this functionality at a basic level, and today the challenge is to achieve the speed and scalability of the commercial level without compromising decentralization. To solve this problem, a lot of talent and capital are used, and significant progress is expected in the near future. From the opinion of preserving value, modern technology as a whole already allows cryptographically to secure the storage and extraction of resources within a reliable and reliable distributed architecture. The capability to serve as a unit of account is directly connected with price stability, and perhaps in this case, cryptocurrencies are in a worse situation. Here we enter the field of monetary policy. All cryptocurrencies have one by definition, but they are quite primitive and obviously fail at their task. This is where stablecoins come in. They seek to achieve price stability through sophisticated monetary policy, and to implement it on blockchain protocols that fulfil the “medium of exchange” and “store of value” functions. This combination has the potential to become truly usable money, and to compete against conventional currencies in practically every facet of the economy. This goal is extremely ambitious, but there is no shortage of tech talent or venture capital ready to back it. So what is the final purpose of stablecoins? Arguably, it is creating a model that can function as fully self-sovereign money - money that is just as usable as conventional currency, but one that you, as the holder of the encryption key, truly own and control. It would be money that no institution can take away from

you. Every transfer from your account would occur only if and when you give it your consent. In a way, it is the original Bitcoin dream, and Bitcoin's early popularity has shown that it is a widely shared one. But still, no matter how much we praise cryptocurrencies, the experience of recent years shows that cryptocurrencies have very little chance, in many countries they are prohibited at the legislative level. While blockchain is already used in many areas and mechanisms.

**Blockchain:**

The emergence of Blockchain technology has become a large-scale event, which made it possible to look at many systems from a different perspective. As we know this data structure, which enables users to create a digital book and distribute it through a network of computers. Blockchain makes it possible to minimize the risks that are created with the account book by foreign manipulations. In a word, the blockchain registers all changes and all movements that occur with each transaction. It means that when any manipulations occur, this software instantly produces a series of algorithms to verify the accuracy of transaction data and sends information to all parties involved in using the software. That is, numerous copies are made, with data about the changes, which reduces the possibility of making changes to the data.

In this system, the addition of information is confirmed and considered valid only if the majority of the parties that participate in the block chain click on the "Consent" button. In addition, a typical feature of the blockchain is that it will record all actions and make records publicly available to any party that uses this software, instead of maintaining a private database of records, like traditional banks. In addition, the blockchain also plays the direct role of a trusted intermediary between the parties in transactions, and does not receive the support of other intermediary agencies. Consequently, transactions implemented in blockchain software will be faster, easier and cheaper than transactions carried out in the current banking system.

Cryptocurrencies, blockchain, ICOs - these are three terms that are in the headlines daily in the world. Blockchain is the underlying technology which came to prominence with the launch of Bitcoin in 2009, but what is blockchain? Blockchain combines two long-standing technological developments. On one side, distributed ledger technology, and on the other, cryptography. If we look at cryptocurrencies, which at their base are blockchain systems combining distributed ledger systems and cryptography.

Now, when we think about blockchain, it could be or not involved cryptocurrencies. A cryptocurrency will involve a blockchain, but a blockchain does not necessarily involve a cryptocurrency. In other words if we think of a blockchain based system at its base, it is a distributed ledger which is encrypted, maybe with an additional layer of smart contracts on top. Those individual data entries, can be anything. The communications between those data entries do not necessarily involve any sort of currency.

Big blockchain systems like Ethereum, Hyperledger, quarter R3 or bitcoins are very reliable. But if I create a blockchain in my basement, it's probably not so safe. Just because it is blockchain does not mean that it is safe. Secondly, in terms of consistency and transparency, this poses two problems. One of them is the problem of garbage, in other words, if you insert this information, it is always there, and this is a big problem in the context of building stories, creating information, the problem of persistence. And finally, privacy issues. If the information enters the public blockchain without access rights, this information can be constantly in the public domain, and this can create all kinds of problems that do not necessarily mean that we want to constantly review each piece of information. So, looking at the blockchain, and we talk about this a lot throughout this course, and on other courses, Blockchain is a crucial technology that is used in all financial sector and beyond. But this is not a solution for every problem, but it gives us a reason to review, review many of our existing systems and infrastructure in order to build better systems.

### 1.2.3. Alternative finance and Crowdfunding

Seven years ago, alternative financing has changed the offer of financial services and suppliers in two main ways: business models and new technologies. It is very important to know the four basic and interconnected technologies that have enabled the development of alternative finance. Better known as ABCD, the FinTech managers, namely AI, blockchain, cloud computing and data. If you look at each of them in the reverse order, the banks for a long time relied and generated a huge amount of information including all the information about customers, their identities, their transactions, their relationships and location. However, much of this was collected using paper forms filled out by customers and bank staff, which are not easy to find or use for analysis. Digitizing all this collected information from paper to data, from physical mass to digital and with zeros means that such information is easier to store, transmit, search, process, analyze and display. This digitization makes it easy to create and operate online capital markets, where data collectors can more efficiently process and analyze data for those who need capital, and then display relevant information on new platforms for potential capital providers to make their own investment decisions. Whereas filling out digital forms and tracking the activity of online clients allows online platforms, virtual banks and electronic brokers to scale faster with less manual labor and space resources, which would otherwise be required for traditional bank branch networks. Typically, customer data includes Internet behavior and actions, such as the time and place of logging in and transactions, as well as browsing the web, e-commerce, and using social networks. Increasingly, offline behavior is also monitored using data from the Internet of things for IoT devices such as wearable smart watches, smart cars, and smart home devices such as Amazon Echo. According to statistics, the world's largest retailer Walmart processes 2.5 petabytes of data every hour, if you consider that 1 petabyte of data is 10 bytes

with 15 zeros, imagine how many are processed each day. In the past, enterprises, such as financial institutions, had to create their IT systems using various enterprise-level software, which over time was developed or licensed at a high price and located on large indoor servers. The software is hosted in data centers on special servers owned by companies specializing in managing servers based on cloud computing, with an additional service, such as cybersecurity protection. Thanks to this, new enterprises, such as alternative financial providers, no longer need to allocate high capital costs for expensive infrastructure, they can focus on improving customer service and can dynamically scale the use of their servers in accordance with their growth rate. Cloud computing made it possible to avoid high prepayments for licensed versions of software and payments for upgrades and improvements to the system and version. Software in the cloud can now be sold at a lower initial cost depending on the subscription model. And software updates can be performed automatically on an ongoing basis, which gives the customer one more reason to change suppliers. This means that for online capital markets like for launching virtual banks, lower upfront costs are required to prototype new business models and user interfaces for faster and more cost-effective deployment, as well as to make the same tasks when moving to new jurisdictions.

Alternative finance or Crowdfunding helps users raise capital from a huge amount of individuals to fund business ventures and projects. There are Reward-based, Donation-based, Equity-based, Debt-based.

Reward-based – is when in exchange for money given by fans of the project, the business or organization will give some type of incentive for them to participate. Rewards can be anything, ranging from goods and services to discounts, and vouchers.

Donation-based – is when users find projects that they wish to donate money to in exchange for nothing. Often directly linked to charity or noble causes that the funders want to actively support.

Equity-based – this is when entrepreneurs and startups have the opportunity to get help from investors in exchange for dividends, a financial share in the company or assets. The rights of new shareholders may vary depending on conditions. Companies in this FinTech market category can easily raise money or can be intermediaries between accredited investors and trusted startups. Others use the crowdfunding model and allow anyone to invest in a new business, they also very often use a virtual fundraising, in which how everything can be done online. This is a very convenient and fast way of sponsorship for investors.

Debt-based – is when individuals lend money to enterprises or other individuals, and expect that they will be returned with interest. For peer-to-peer platforms complying with Sharia (P2P), interest is withdrawn or replaced with other payments.

**Crowdfunding**

The concept of crowdfunding is not new, as many might think. For example, the Statue of Liberty is known as a gift from the French people in memory of the American Revolution. But not everyone knows that there was not enough funding to found the statue, and therefore Joseph Pulitzer financed it by posting an appeal to the New York World newspaper in 1885 in search of contributions. The rest is history. The modern incarnation of crowdfunding gained popularity when Kickstarter launched in 2009 an online platform for financing campaigns for creating creative projects in exchange for rewards. Although not its' initial main target audience, Kickstarter became a favorite amongst hardware enthusiasts who wanted to fund minimum-batch-order production runs of electronics in Shenzhen and sought other enthusiasts to help with funding and receive part of the batch run as rewards. Gradually it became used more for pre-marketing and product validation of prototype consumer electronic, and other products, and even incorporated by hardware accelerators and venture capitalists. Crowdfunding has been used to benefit charities as well. With sites like go fund me having raised three billion U.S. dollars from over 25 million donors across two million campaigns. In China, Tencent's “99 Charity Day” in 2017 raised approximately 930 Million Yuan or 126 Million U.S. Dollars from over 12 million Wechat users for charities running 6700 programs over a three-day period. Many other crowdfunding platforms have since emerged with different levels of curation.

### 1.2.4. Enterprise tools and software

Software plays a vital role in doing business, managing and ensuring coherence in today's society. Typically, software falls into three main categories, such as custom and specialized software, software for the corporate consumer and for the mass consumer.

Corporate software helps simplify work with staff, manage tasks and projects, organize meetings, automate reporting, manage clients and contracts, as well as organize internal communications and much more. Software-as-a-service (SaaS) and Cloud-based point of sale (POS) are the most used corporate tools and software.

Software-as-a-service (SaaS) - is the business model in which the application is hosted by a service provider. Financial SaaS is cloud-based and accessible from anywhere in the world. In case of failure of the accountant's computer, all records will remain valid.

Cloud-based point of sale (POS) - is a type of system in which transaction processing information is retrieved or accessed from the cloud service. To replace cash registers, smart devices must be connected to WIFI. Business owners can make transactions on the go and also monitor in real time store activity and metrics.

### 1.2.5. Advice and personal finance

In the modern world, before making any decision, many organizations resort to the help of consulting agencies, which in turn is an expensive service. Or, as an alternative, including for individuals, it is the presence of an AI-based program, which also has auxiliary functions for comparison and control. Where users can find, compare and buy financial products, using the filter criteria by preference, to find the most popular financial products. Personal investment management, financial advice and planning is an integral part of development. Some products in this sector intended for personal finance management. Robo-advisers or, to put it more simply, AI can online, without human intervention, give practical financial and investment offers and portfolio management tips. All information is based on mathematical principles, statistical analysis and patented algorithms.

### 1.2.6. Digital banks

Digital banking in the modern world has already occupied its niche and simplified absolutely all areas of payments in the financial world. Each of us in his own way understands the importance of online banking. When asked what digital banking means, we are more inclined to think that this is online banking. But alas, this is not only a platform with online banking, but also a platform where all the most important banking services are provided. In a word, digital banking can be described as a moment in the office of a bank or any financial institution, where you give your vision of data and other information appears on the screens of managers, perhaps even that you don't know about. Or submit your personal bank account with an external interface for you, and an internal one for the bank. In a word, if banking is required to provide all functional levels of banking services with the same functions as the head office, branch, online service, bank cards, ATMs and retail outlets.

Digital banking is more than a mobile or online platform, as it has a middleware function, where operating systems and databases are connected with other applications and departments for risk management, as well as product development and marketing. According to the analysis of the study in 2015, 47% of bankers consider digital banking to be a potential for improving customer relations, 44% as a means to create a competitive advantage, 32% as a channel for attracting new customers. And only 16% see the potential for cost savings.

Key benefits of digital benefits:

- Business efficiency - as we all know, digital platforms improve many areas of customer relations instantly satisfying their needs, thereby increasing the effectiveness of middleware to increase productivity.

- Saving money. Robotic methods are a key factor in reducing costs, as manual labor is very expensive for many industries. Human error, rental of premises, electricity, big data require a lot of

money. To reduce costs in the future and to respond instantly to market changes, the most optimal solution is digital platforms.

- Increased accuracy - the level of errors, where the human factor often plays more than 40%, which is considered inadmissible in the service sector and in conjunction with finances. If there is no IT integration between branches, business performance is often reduced to a minimum. By implementing IT solutions for business, financial accuracy helps not only to avoid many subjective problems. but also makes it possible to obey with state laws.

- Improving competitiveness - managing marketing data, as well as CRM platforms that improve the vision of customers and their needs, by sending newsletters, notes, advertising, online chat, in particular chat bots, effectively affect the implementation of customer reward programs, which in turn increase customer loyalty and satisfaction plays an important role.

- Increased flexibility - multi-level automation accelerates all processes, thereby - customer satisfaction. After the 2008 crisis, risk management occupies a special place. Risk management software can detect and respond to market changes faster than even experienced professionals.

- Increased security - cyber threats pose great risks to the reputation of organizations. No one is uninsured against cyberthreats, and large banks and technology companies can become its victims. For protection in recent years, additional security levels are used.

In the modern era, "Digital" is a buzzword, and Banks that want to stay afloat and keep up with the times in the race for the needs of next-generation digital banking can to adapt and innovate. Digital Banking is not only advanced concepts such as Internet banking, mobile banking, direct banking, various banking applications, the use of social media, artificial intelligence, robotics, chat bots, cognitive computing, blockchains, big data, voice biometrics etc. It should also include various internal modernization programs aimed at achieving the common goals of digital banking.

Banks face enormous competition challenges from non-bank companies and small FinTech companies. Therefore, in order to fight competition and outstrip competition in the era of digital banking services, it is important for banks to work not only on a good website, connecting to social networks and mobile banking, etc. but they also need to innovate with new technologies when AI, ML, Blockchain, Analytics, cloud become buzzwords.

### 1.2.7. Insuretech

The concept of “Insuretech” arose like a result of combining of two well-known and relatively understandable words for us, such as “insurance” and “technology”. This is a combination of insurance and technology in almost any form. Insuretech is a FinTech segment that has been frequently used and developed in the insurance industry over the past few years. As in other industries, insurance is becoming

increasingly dependent on digital platforms and tools. Many participants in this market very simply define and explain insurance technology and explain it only by those processes in which insurance and technology are considered together. In particular, many insurance companies are focused on end users, that is, they help improve functionality, post information for transparency, increase clarity of applications and contracts, or simplify insurance processes in general. Designed to help users save money and use time efficiently. Opportunities that major players cannot use, such as user policies or using data from client devices to better understand their behavior and provide dynamic bonuses, are often considered. Insuretech, as well as other variations of FinTech, contribute to the development and proper functioning of the industry, like insurance, where a huge amount of data is also processed.

### 1.2.8. Regtech

Many of us have probably never used the modern term RegTech, which is interpreted as "regulatory technology". This concept is a new area in the FinTech industry that uses an IT to prove regulatory processes. RegTech's goal is to ensure compliance and standardization of regulatory processes. Since this type of technology, like others, provides the right level of quality at low cost. RegTech companies primarily operate through the SaaS cloud. Today, RegTech focuses on reporting and compliance processes that guarantee cost savings for the financial services industry and regulators. Nevertheless, in the academic newspaper for 2016, it was provided of RegTech is much higher, saying that "RegTech has the potential to made a proportional regulation regime, which identifies and eliminates risks, and also contributes to much more effective regulatory compliance."

It is assumed that the potential of RegTech will be fully revealed only by a new and variety regulatory framework, which will appear through the link between data and digital identification. The development of FinTech, the fast-paced alters in current markets and the active position of regulators (for instance, with the improvement of regulatory sandboxes) could potentially come together to facilitate the transition from one to another.

The first government agency to create and contribute the term RegTech, defining it as follows: "RegTech is a FinTech subgroup that concentrates on technologies that can help meet regulatory requirements effectively and efficiently" was FCA.

A report by the UK government's chief science adviser in March 2015 stated that "FinTech has the potential to be applied to regulation and compliance. To make financial regulation and reporting more transparent, efficient and effective, it is necessary to create new mechanisms for technologies. " In interesting to note that in 2014, Andy Haldane, during his main speech at the University of Birmingham, already proposed the conception of a technology-driven regime.

Two points contributed to the improving of RegTech. As for FinTech, 2008 for RegTech was no less turning. FinTech's growth was driven by startups, while RegTech's developments today are mainly a reply for the big costs of meeting new institutional requirements with parties to regulators and policies.

The growth and promotion of FinTech influenced the processes of government centralization of data and their control, and, as a result, the expansion of the database to automate compliance and monitoring processes. For the financial services industry, the application of regulatory and compliance technologies can significantly increase efficiency and achieve better results. RegTech may have applications such as:

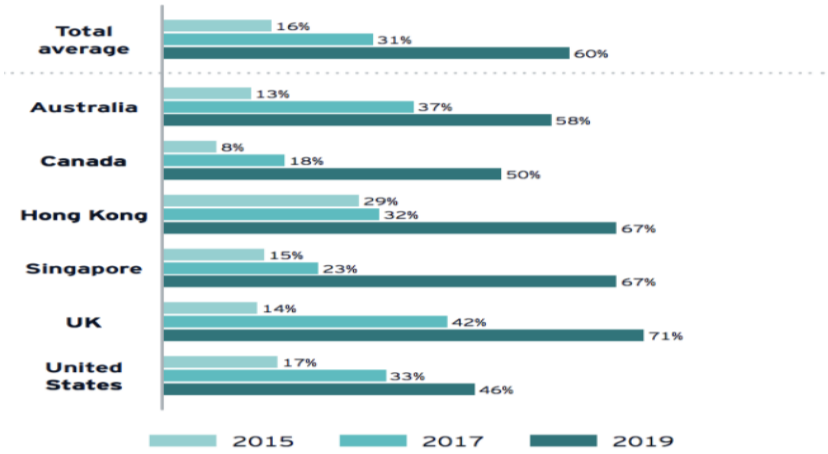
- Legislative / regulatory gap analysis tools
- Universe matching tools
- Health Check Tools
- identity verification
- Information management tools
- Transaction Reporting Tools
- Regulatory reporting tools
- Activity monitoring tools
- Training tools
- Riskdata warehouses
- Case Management Tools
- Horizontal scan
- transaction monitoring

Software and applications that address financial services regulation help users and businesses comply with market rules. It is also designed to help companies deal with financial crime and reduce risks in a variety of ways, including customer registration, fraud detection, cybersecurity and more.

# 2. IDENTIFICATION OF THREATS ARISING FROM FINANCIAL TECHNOLOGIES AND IMPACT ON THE WORLD ECONOMIC FIELD

## 2.1. World practice of using financial technologies and solving emerging problems

FinTech is a relatively new industry that has gone beyond the boundaries of traditional business to facilitate many moments in people's lives. FinTech participants, this is a completely new level of business vision, from startups to huge holdings and companies with a new management outlook and great operational capabilities, with a variety of projects and products and worldwide coverage. Many FinTech companies went their way through many obstacles, came up with new ideas, looked for new investors, used the chances of crowdfunding, and then increased their staff, created departments that help the proper functioning and smooth work with the state and went beyond the boundaries of their domestic market. The most developed markets in this industry go ahead, such as China, India, in these countries the adoption rate of 87%. Further Russia and South Africa – 82%. Among the developed countries, the Netherlands, Great Britain and Ireland are leading. In Figure 1 -Australia, Canada, Hong Kong, Singapore, the UK and the USA - adoption rates grows from 16% in 2015 to 31% in 2017 to 60% in 2019. During the last five years, these six markets, which mentioned above have become examples of industry development and globalization. Over the past 1.5 year, EY investigate has shown that more than half of FinTech's leading fees in these six markets intend to use some or all of the funds growth for international spread. The global adoption rate of 64 % in 2019 surpass by 12 points the projected adoption rate in the future by 52%. FinTech's high adoption countries from 2017 to 2019, such as Ireland, the Netherlands and Singapore, show the availability of FinTech services.




Source: EY (Ernst & Young), 2019

**Fig. 1. Comparison of FinTech adoption in six markets from 2015 to 2019**

FinTech services can be grouped into five main services, such as transfers, payments, budgeting, financial planning and investment, saving, loans and insurance, as can be seen in Fig. 2, consumer awareness of FinTech services is high in all categories, in particular in the field of payment and money

transfer services customers and consumers showed the highest level of awareness of FinTech's new services and products are invented. Around the world, 89% of customers know about payment platforms for mobile phones in stores, and 82% know about non-bank money transactions and peer-to-peer payment services that are provided by FinTech platforms. The wide integration of FinTech payment offers with online and offline retail means that consumers receive various options when placing an order, which further increases awareness.

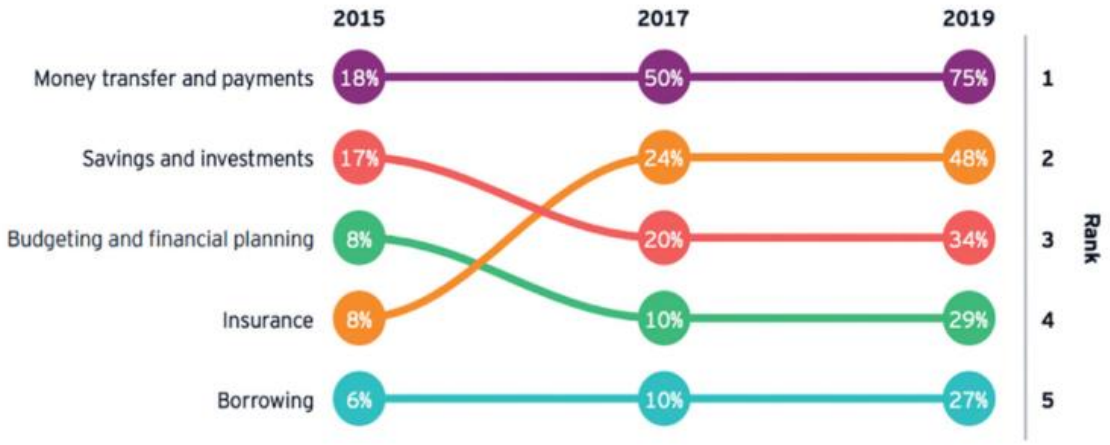

Notes: The figures refer to the percentage of respondents who indicate they were not aware and have not heard of any services for that category.

Source: EY (Ernst & Young), 2019

**Fig. 2. Consumer awareness of FinTech services in each category**

As shown in Fig. 3. 75% of consumers use the category of money transfers and payments. For example, in China, the adoption rate is 95%, this is almost a complete indicator, since money transfer and payment applications are widespread and popular. In this category, are most often used peer-to-peer and mobile payments, non-bank money transfers. The unique of this services are well-known. According to researches in 2017, is the main reason consumers used FinTech. The limitation and regulation of certain markets, such as investment services, crowdfunding platforms and peer-to-peer lending services, slows their introduction and growth. In recent years, insurance has also been heavily used, approximately half of consumers worldwide using of comparison sites, downloading information to a smart device related to insurance. Here, non-financial service organizations often facilitate the implementation of consumer FinTech, for example, equipping cars with special devices for electronic insurance or providing mobile phone applications that consumers can use to calculate steps and receive discounts on health insurance. High FinTech usage for some services does not necessarily indicate saturation of the markets as a whole. Research conducted by EY shows the potential of budgeting, financial planning, as well as savings and investment services. More of the possibilities are to reach demographic groups where adoption rate still low, like consumers without education. For example, savings and investment services operations make up 27% for women and 40% for men. The FinTech industry is expected to remain dynamic and innovative in remittances and payments It is expected that in the future new offers will appear in other markets, either through international scaling and expansion, or in other ways that will

help local FinTechs expand in each region. We also expect new technologies, such as artificial intelligence and blockchain, to continue to drive the creation of completely new FinTech services.



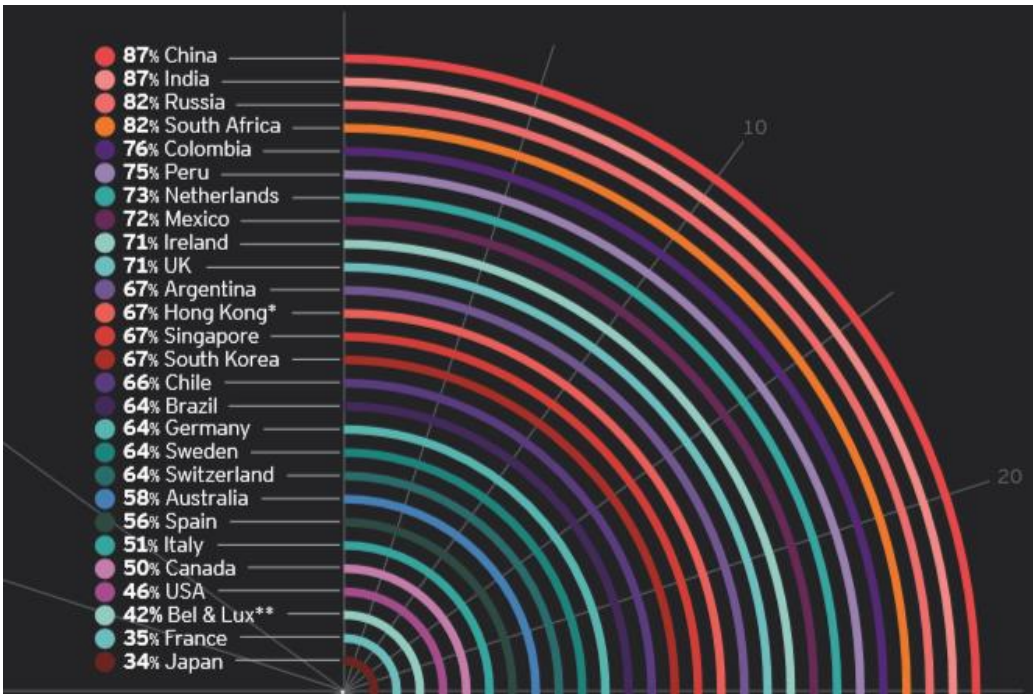

Source: EY (Ernst & Young), 2019

**Fig. 3. Comparison of FinTech categories for 2015 - 2019 (adoption rate)**

Innovations in digital services completely change the vision regarding financial services, and in order to grow afloat or grow further, participants must be tuned to new ideas that will realize the expectations of customers. Participants changed their vision and started with a design approach followed by flexible workflows. Based on technological thinking, they can offer FinTech services that are both personalized, affordable, understandable, transparent, reliable and economical. As our researches in 2017 showed, these characteristics are primarily important for consumers, so that over time they can act destructively for existing banks, insurers and wealth managers. Participants who can resist this competitive threat are those who change their own offers and offer new similar, but most convenient FinTech services through partnerships, acquisitions or their own development. In recent years, many organizations have presented their own versions of FinTech services in areas such as online currency exchange, online consulting and investment management, and unlicensed banking services without the use of digital technologies. In fact, FinTech has changed norms of action and inaction in the financial industries. What was considered the “wrong innovation” and destructive for the company in 2015, has become a prerequisite for all players at the present time. In this regard, the fact that so many participants are currently offering similar services, each company should strive to specialize itself in order to create and offer something that other companies do not have, thereby attracting and retaining customers in any traditional way. In order to stand out and develop further, necessary to have an idea of what FinTech users really want. While many prefer an online tool or application, which make it possible to keep track of all financial products in one place, they are more concerned about the security of personal data. Security issues are less pronounced in countries, such as Sweden, Germany, Belgium and the

Netherlands, most likely due to strict data protection rules in these markets. In general, despite their security concerns, it is convenient for receiving users to work with sites and applications on the Internet and fully digital financial services outside the branch.

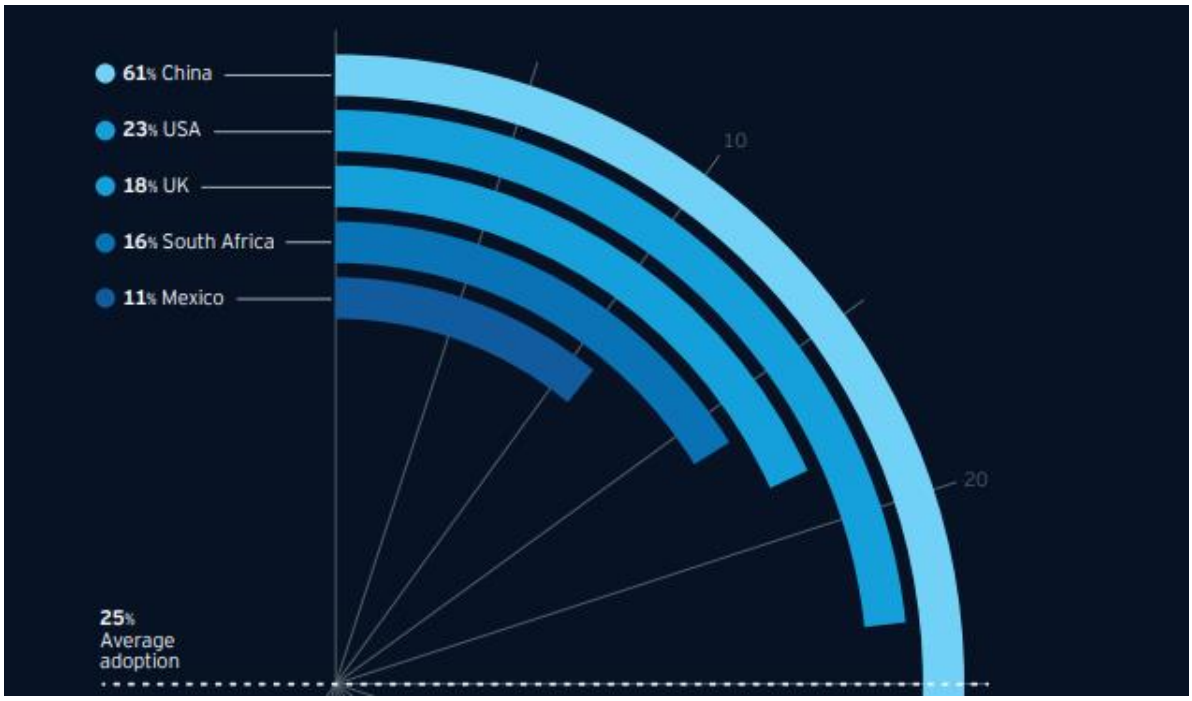
However, this level of comfort does not applicable to use with social networks to communicate with suppliers. Only 27% of adopters prefer to communicate with their banks through social networks, rather than through their own bank applications or classic channels. This indicator is higher (32%) among adopters aged 25 to 34 years. Recent EY researches showed that 68% of young investors use social networks for all purchases, whether for information or to confirm their choice in fact.




Source: EY (Ernst & Young), 2019

**Fig. 4. Consumer FinTech adoption across 27 markets**

According to YE statistical data as seen in Fig.4. China displays the highest consumer FinTech adoption rate at 87%, followed by the India, at 87%. The average of adoption rate is 64%. This information and statistics is quite understandable and is explained quite simply by a large population, as we know China and India are the most densely populated countries.




Source: EY (Ernst & Young), 2019

**Fig. 5. SME FinTech adoption across 5 markets**

As shown in Fig. 5. over the past six months, one in four global SMEs has used the services provided by FinTech in all four categories. This means that one or another SME is using FinTech, which they have chosen as a supplier. Since SMEs allocate finance and resources, as well as personnel to select suppliers, using FinTech services is a professionally balanced decision. SMEs often use FinTech to optimize their business and solve specific problems. Thus, 25% is a high level of acceptance when it comes to companies introducing new technologies. The highest adoption rates indicate widespread financial platforms and ecosystems. What can be said about China. If China did not participate in this, the average FinTech implementation in the world would be lower - 17%. In this reason, the United States will be most prevalent among FinTech SMEs among the four markets, followed by the United Kingdom and South Africa. Research and surveys show that FinTech adoption rates among SMEs may increase. 22% of passive participants who do not participate already use FinTech services in three categories, which means that soon there is a great chance to become active users of FinTech. This is regarding to our question about future use, according to a survey of SMEs, whether they intend to use each FinTech service in subsequent years. To this extent, the global adoption rate may increase from 25% to 64%. These are likely to be fast-growing companies supported by venture capitalists; the acceptance rate among SMEs supported by venture capital investments is 38%. Adopters also tend to have global perspectives: adoption rates among SMEs with an international client base of 55%. The emphasis is also on online sales, and almost all FinTech users (96%) agree that online and mobile sales channels are important for their organization. FinTech supporters are mostly active users of Internet services like online payment systems for billing and account management.

56% of SMEs worldwide use banking and payment services. As mentioned above, this category is the most widespread and widely used, followed by insurance, financial management and financing. In these calculations, the level of use in each category considers all small and medium-sized enterprises that have used at least one FinTech service over the past half year. Active users of banking and payment services to SMEs in emerging markets make up 63%. In China, this figure is much higher at 92%. These high rates reflect conditions in emerging markets. Developed markets and FinTech participants can offer alternative products, already existing products, which require a little refinement or solutions that are needed for a project to optimize and expand. In contrast, emerging markets have a simple infrastructure, enabling FinTech members to create products and services from scratch. FinTechs in emerging markets can meet the needs of underserved customer segments, including SMEs, by providing them with solutions for key areas of their business, such as banking and payments. SMEs also tend to follow the example of their clients, many of whom are already significant consumers of FinTech services for their daily activities, accepting the consumer of their preferred payment methods. These differences between emerging and developed markets help explain the varying popularity of specific services by category. In developed markets, FinTech's most widely used services are online bookkeeping and payroll management tools, online billing tools and online payment systems. In emerging markets, the main services are online payment processors, online billing and account management tools, as well as mPOS machines and readers.

We all heard about the “Trade War”, and more specifically about the “Technological War” between the USA and China, of course, these 2 superpowers that “dominate” the world, and we all use various social networks, gadgets, search engines in every day routine these concepts are associated with the well-known GAFA, which came to us from the United States, but what about the second "giant"? We will not touch politics, just consider the experience of United States and China in the field of fintech threats and problems, exactly in the regulation field.

In recent years, innovative financial technologies in the United States have been popular with regulators. FinTech companies offer their customers a wider range of services. While FinTech in the United States and its regulation continue to grow and evolve.

Over the past few years, many startups have appeared in Silicon Valley, which are the result of a projection of technologies and various virtual solutions. FinTech businesses that have gained popularity in the United States have a range of financial services such as online payments, loans, AI consulting, insurance, bitcoins and other financial products in DLT-based virtual currency, and many of these services are also provided. through mobile applications.

In the United States, FinTech companies must be licensed in accordance with the general legal framework, but there are no laws or regulations governing the types of businesses in which FinTech is prohibited from participating. In the United states, FinTech's business is a bit distinctive compared to

other countries. These companies very often do not comply with the regulatory framework specific to FinTech by any particular federal or state regulator. Depending on FinTech's activities, the company may be subject to federal or state licensing or registration requirements, as well as federal and state laws and regulations. And this is considered the main barrier to the growth of FinTech. As regulators work to develop rules that will govern the financial space, there is also uncertainty about how FinTech regulation will evolve in the United States and to what extent financial companies will receive government support and cooperation as the industry develops.

According to federal financial regulators, it is necessary to adapt the regulation of the sector to analyze consumers and reduce risks, but without suppressing industry growth and taking into account the huge potential of FinTech innovations. FinTech companies see regulatory authorities as willing to control and, as a result, work with FinTech market players. Examples of such efforts include the following;

- "Project Catalyst" which was initiated by CFPB. It aims to expand the reach of CFPB and collaborate with FinTech companies in connection with improving of FinTech policies. CFPB has realized a no-action letters policy, therefore to which FinTech suppliers can request a letter of inaction from CFPB employees, subject to certain reservations and restrictions, does not commend forced or supervisory actions against organizations regarding special regulations that apply to a new FinTech products offered by organization.

- To provide a regulatory framework sensitive to innovation, OCC established the Office of Innovation,

- The innovative office, which was opened in 2018 at the initiative of the FDIC, is focused on creating an environment to exploring the possibilities of FinTech.

In the United States, regulatory sandboxes play the crucial role in the growth of FinTech and are widely used to analyze a specific company. In additionally the United states is also necessary to comply with other laws, such as GLBA, FCRA, FTC Act, ECPA, FTC, SEC, CFPB, CFTC, OCC, FinCEN, and others inherent in each state.

In December 2016, Al Maaba founder Jack Ma coined the phrase "TechFin": "FinTech takes the original financial market and improves its technology," Ma Yun told the China China Morning Post at a Chinese conference in Hong Kong. "TechFin is technology restructuring." Another way to think about this is where different financial institutions and FinTech startups seek to improve FinTech's existing financial system, technology companies approach this issue on the other side, with a large number of consumers and technology oriented at TechFin. It is instructive to compare the growth of American technology giants with the Chinese in order to better understand their difference in origin and approaches. Chinese technology giants are commonly known as BATs: Baidu, Alibaba and Tencent. In the United States, GAFA are widely known abbreviations: Google, Apple, Facebook and Amazon.

During the dot-com boom and the Internet 2.0, today's tech giants of Silicon Valley grew mainly through advertising or eyeball models that were based on attracting more viewers. Examples of this are search engines like Google, and social networks like Facebook. At that time, Apple was mainly a hardware manufacturer and a beginner in e-commerce, such as the eBay market platform, which acquired PayPal in 2002 to secure its transactions, and Amazon, an online book seller, recorded most of its transactions with credit cards. In China, by contrast, where credit card penetration remained low, technology giants have included transactions in their platforms from the start. Hangzhou-based Alibaba started like a platform for B2B, and when it switched more to a platform for business or B2C consumer, with the advent of Taobao online store, it expanded the payment system of its subsidiary, now known as Alipay, for consumer transactions . Instead of Amazon’s money back guarantee, Alibaba provides comfort to its retail customers by storing payments of goods on a deposit account that is not released until Yu'eBao customer receives or approves the goods or “remaining treasures” when Alibaba was born and began offering interest to customers who held their funds on this account at rates higher than bank deposits.

The Wall Street Journal reported that in just four years, Yu'eBao had accrued 370 million account holders and 211 billion dollars in US assets to be twice the size of the next largest money market fund JP Morgan Asset Management. Shenzhen-based online gaming company Tencent built in micropayments early because its freemium business model was based on gamers making in-game payments for its free-to-play games, to buy say, awesome virtual swords. When the company transitioned into mobile and introduced instant messaging through QQ for youth and then WeChat, they captured an amazing userbase of nearly one billion active users who learned to transact online through inventions like hongbao where users can give and receive traditional red packets for mere cents. WeChat’s best-known instant messaging app allows users to use third-party financial mini-applications and transact with them without leaving the ecosystem. China's first only online bank, WeBank, using sophisticated credit analysis based on WeChat on social networks and online shopping schemes, which is also offered to service traditional QR codes of lenders, which also quickly turn China into a cashless society, was introduced 2015 by Tencent. Being built into WeChat and many other applications, smartphone users in China can use scanned codes to simplify offline transactions or O2O transactions, contact others to replace a business card, and make payments. Financial supermarkets are also growing. For example, Alibaba's Zhao Cai Bao offers term deposit products from third-party financial institutions or individuals, mutual funds and stock market information. Which are compared with distribution services and platforms that are only available to institutional fund managers and for distributed retail sales through banks or retail fund managers. While in the West, GAFA does not have messaging applications. WhatsApp, which is best known to all of us, includes many innovative WeChat features. The Apple Store has developed an online ecosystem with the App Store and iTunes. Amazon Prime is

all Netflix needs to show that users are willing to pay for quality movies, television, and music content. What about the next generation? We can say with confidence that ABC, namely artificial intelligence, blockchain and data cloud. Direct finance and banks are used to working in strictly regulated conditions, since banks lost confidence after the global financial crisis, it has become a rather complicated system. Silicon Valley's idea that “asking for forgiveness is easier than seeking permission” works great in the Internet industry, where lines of code can be fixed and changed on a website overnight. This works less efficiently in such a tightly regulated industry as finance, but it still works and is considered to be no less than the right decision in the modern world.

Now even in the context of China, we have seen some of the developments get to such a stage where they've had to come in, develop regulatory frameworks to balance out risks. And this is something that I think we're seeing around the world and this is the idea of piloting, or a test-and-learn approach, regulatory sandboxes. Initially, the regulators were a bit more conservative, they only allowed banks to try and then the rest of the innovators, the startup companies. So, there have been some struggles in the beginning. An added problem for Hong Kong would be the facts that they have three different regulators, for banks, for insurance, and for securities, so which means that sometimes these regulatory sandbox environment would be more complicated.

But according on the experience of the two giants in this industry, we saw that United States is trying to control and, through various regulatory laws, adjusts, analyzes, and adapts to current laws but as I noted earlier, FinTech always makes its own rules and new laws, so United States is on the process of working over the regulating laws, from the vision of controlling and ensuring security, it must to be successful, but what about improving of, excessive regulation can have an effect on this field, and China adheres to no less interesting plans in this field, but rather "doing nothing" in terms of development is possible get its turnover, but the same rules and laws, which in any case must be observed. In any case, we needed a middle ground and centralization.

In conclusion, I would like to note that the threats, problems and issues of the FinTech sphere are so global and the same that for developed countries as for developing countries in this industry. And they are resolved as they arise, since no one can predict what innovation awaits us.

### 2.2. The main threats arising from financial technologies

There are threats to the FinTech industry and one of them is cybercrime, which can undermine the integrity of the entire financial system. In particular, this is the main reason why some central banks are reluctant to cover FinTech. Many countries cannot boast a high level of cybersecurity. Since they do not have enough capacity and infrastructure to provide. There is also the problem of insufficient attention to security measures when FinTech startups are too focused on the quick launch of their product.

If cybersecurity measures are not followed, a number of problems arise that are related to FinTech abuse. Another major threat is regulation. Without proper regulation, easy access to finance can stimulate excessive borrowing and the accumulation of personal debt and risky financial behavior. It should also be noted that there is concern about market competition. As is often the case, FinTech members may become too large in the early stages and fail to match their strengths or seize monopoly power. On the other hand, a very large number of participants with similar services can also capture the market and impede supervision. This is true in many small and developing countries, where sector growth may be limited by regulatory and supervisory capacity.

I don't think FinTech is a temporary phenomenon, it will certainly live and simplify life. With FinTech, all countries can benefit, and this in turn can lead to more sustainable growth by increasing labor productivity and creating new markets and jobs. The main task is to find the right balance between regulation and promotion of this growing sector.

"Insufficiently thought-out use of FinTech technologies can lead to the creation of threats." In this regard, the solution of security issues should be comprehensive and be resolved at each and every stage of the implementation of the service, starting with the development of the solution architecture and ending with implementation and operation.

Of course, the growing of new and modern products in the financial field requires new mechanisms for economic security. The emergence and active development of supra-national payment systems poses a serious threat to the institution of the state as such because of the possible transition of economic entities from state-controlled payment systems.

The success of FinTech development in one country largely depends on state regulation of this area. At the level of governments in several countries, working groups are being set up to develop legislation governing FinTech. For example, with the advent of the updated Payment Services Directive (PSD2) in the European Union, the regulatory center has shifted to financial companies that offer to open banking services, API platforms with support for big data and advanced analytics. The partnership between FinTech and government is developing in Asian countries. For example, the Singapore Monetary Authority (MAS) and the ASIC have entered into an agreement with FinTech. AIFC in Kazakhstan – financial center for Central Asia.

In the framework of FinTech, standardization issues cannot be circumvented given the best international practices. At the same time, it is necessary to pay special attention to the fact that further steps to standardize the concepts used in FinTech are one of the most important elements of its further development. In my opinion, the issue of standardization will be solved by introducing the regulation of the sphere of FinTech.

For efficient work of the FinTech sector, the main and most important requirement is the financial literacy of the population, which based on the simplicity and accessibility of the presentation of

information, ergonomic and design solutions, the introduction of elements of artificial intelligence, machine learning, development of robotic consulting in the financial sector.

New technologies are the group works of like-minded people, uniting entrepreneurs, technologists, software developers, information security specialists, etc., which, in turn, is a socially significant phenomenon in terms of creating additional jobs.

The list of the main threats and challenges facing the development of FinTech in the world includes the following: the first problem is scalability, the second is access to secondary financing, the third is a strategy for withdrawing from investments through mergers and acquisitions.

So, only about 30 companies in the world show the ability to quickly export their products and services to other countries. Problems not only in their capabilities, but also in the fact that in many markets there is no BaaS scalability platform (bank as a service), partners lack an open source API (application programming interface), and the imperfection of the regulatory environment does not allow for quick independent licensing in the new market.

The problem of secondary financing is that, having received the initial capital and having mastered it, companies do not have time to reach the desired level of profit and therefore need either geographical expansion or product diversification.

The third problem arises from the first two - this is the growth of companies through M & A (mergers and acquisitions). At this level of development, not all startups and their managers are ready for such a development scenario, which will inevitably entail changes in the composition of the team and corporate culture. On the other hand, potential investors are afraid of too high risks of losing the still unstable companies. However, M & A deals have already begun between startups, although they have not yet become widespread.

### 2.3. Financial technologies greatest adoption and growth

The closest to us and correct view of the traditional version is self-analysis, where absolutely all calculations are performed by a person. With the advent of human-made financial technologies, many industries have become more convenient. Many people wonder what will happen next. The classic probability, if all the calculations and analyzes are done by someone else, for example, AI. So how does AI transform the FinTech's future?

For example, the recognition and prediction of financial errors and the combination of artificial intelligence and big data allow us to better understand who our customers are, how they spend money, as well as lifestyle. Many banking services are based on the intelligent forecasting of regular customers and his / her financial needs at a particular point in time. Therefore, we are talking not only about the bank, but also about the provision of products and services through one and the same interface channel, which will reliably improve the quality of customer service. However, building trust with customers is

still one of FinTech's biggest challenges. In fact, to find the likelihood of success of communications with other clients individually, they apply text analytics algorithms to their incoming emails from their clients, which in turn are done using AI. Thus, they can now better understand their customers, classify these emails and better serve their customers. Another example is the automated psychographic mechanism for assessing creditworthiness, which allows you to evaluate the creditworthiness of your customers, especially in weak credit information markets. I would also like to mention another example, CallCredit, one of the largest credit agencies in the UK. They use Azure Machine Learning to identify criminals who pretend that people get access to credit reports and borrow money. Thanks to all of these machine learning and artificial intelligence tools, CallCredit can now actively identify people who cannot actually repay their loans. This machine learning model could advise its lenders on how to make much more accurate decisions. So, here are some of the examples of how we integrate Big Data Analytics, AI technology with FinTech solutions.

According to information received from the MioTech startup, which provides analytical analysis for financial institutions, AI will radically change the way financial institutions analyze risks and investment opportunities. Thanks to a breakthrough in in-depth study and training of AI, many basic artificial intelligence algorithms have significantly improved, including natural language processing, images, speech recognition, etc. Natural language processing is so important topic. Currently, computers can understand speech, syntax, and more accurately retrieve objects. Progress has also been made in analyzing attitudes and attitudes. We see that the algorithm can understand both syntax and semantics. By analyzing daily online stories, we can extract various topics, such as product release, buyback behavior, etc. We can also analyze the impact of each event in real time. Image processing has also improved significantly. Many issues also go to new levels, such as classification, feature extraction, and pattern recognition. Using this technology, we can easily process satellite images and learn about the progress in creating 5G infrastructure. The most obvious example is the development of the fight against fraud. Currently, large banks have 1000 of people who are responsible to verifying the legality of transactions.

However, AI can learn the way criminals commit fraud in short time, with all the transactional data, and have to make real-time decisions. Humans only need to review the results and make a final decision afterwards. In the meantime, the algorithm can find the new pattern much faster Paypal and Alipay are already using this technology to prevent financial fraud. To commit financial fraud online will only get harder and harder from now on. Individuals and companies are generating a huge amount of data every day, so relying on humans for analysis will no longer be feasible and the ability to process the data will determine how well financial institutions can provide their services. Companies are using us to predict risk in real time. Although AI is being increasingly adopted in real-world contexts, there are still many challenges that we need to solve. The protection of AI algorithm is still not well resolved

If some crucial task is judged by AI, then the hacker's invasion is likely to lead the big financial disaster. Data sharing and data security are also a big problem. Data is the base for most financial applications. However, a large proportion of data is processed by international companies like Google and Facebook. How we can share the data and protect data privacy is a big challenge as well.

The financial crisis of 2008 was one of the key reasons for the huge acceleration of FinTech development worldwide. But in addition, it has become a catalyst for the development of RegTech, or regulatory technology. And RegTech's ideas are for FinTech, but much more broadly. In other words, RegTech is the idea of using technology for regulatory compliance, regulatory monitoring, but also, regulatory design. It is the idea of using technology to make financial markets and their regulation more effective. Now, if we think of RegTech in that way, the key aspect is that it is beyond FinTech. RegTech can be applied in any segment of the economy, and not just in the context of financial regulation. If so, we can use it to regulate FinTech. Why not? However, RegTech is the most developed in the field of finance. In particular, we see RegTech across traditional financial institutions, across new startups, and also across regulators, themselves. And the global financial crisis really made this a necessity. Since 2008, we have seen an absolute explosion in new regulations around the world. New regulations are released by a major jurisdiction approximately once every hour. The end result is that, every year, thousands of new regulations come out. And, for a financial institution doing business on a cross-boarder basis, this is one of the most difficult factors on their operations as well as on their profitability because, not only is regulation a challenge. As a result, the global financial crisis and its explosion of regulation has driven the established financial industry into applying technology to address their compliance burdens and their compliance costs. We have seen an explosion in new startups, new firms, which are offering technologies to help both startups as well as traditional financial institutions and even regulators to better address their regulatory and compliance burdens. Finally, regulators themselves are increasingly using technology for a range of purposes not only to do a better job in their regulatory functions, but also to increase market efficiencies and reduce cost in the industry.

The RegTech ecosystem encompasses both industry and regulators. It also encompasses startups of an increasing range and it also encompasses regulators. However, most of the development that we've seen in the area of RegTech over the past decade following the global financial crisis has been focused in the traditional financial services industry, in particular, in the banking industry. And we can see this obviously simply from the cost of regulation. We have an organization which is called the FATF. The FATF is the Anti-Money Laundering Financial Action Task Force, and it sets internationally agreed minimum regulatory standards in financial systems that every financial institution worldwide must comply with. Now, the challenge is that these are simply agreements. They then have to be implemented into the individual regulatory systems of jurisdictions of countries around the world The end result is that the AML, Anti-Money Laundering requirements, the KYC, Know Your Customer requirements in

the United States, or Europe, or Singapore, or Hong Kong, or Japan, Mainland China are all very similar but not identical. For a global regulation we need something centralized.

So what awaits FinTech in the future? Based on today's experience, we can safely say that each time FinTech becomes smarter, more independent, which speaks about high technologies of artificial intelligence. It is also safer and more understandable, which indicates the best variation in the use of blockchain technologies. As for the regulation of this sphere, there is an assumption that RegTech, which was generated by FinTech, is its solution. It may take time to create a centralized regulatory system - a mechanism that can adapt to any changes in the rapidly changing field of FinTech.

# 3. METHODOLOGICAL PART OF ASSESSMENT OF THE IMPACT OF THREATS ARISING FROM FINANCIAL TECHNOLOGIES IN THE CASE OF THE REPUBLIC OF KAZAKHSTAN

## 3.1. The overview of the using of financial technologies in Republic of Kazakhstan and methods for regulating its development processes

The FinTech market of the Republic of Kazakhstan is at the very beginning of its development. The state's interest in attracting foreign investment is stimulated by the recent adoption of laws governing the venture market and the online lending market, as well as opening of an international financial center in Astana (AIFC) with favorable conditions for the development of FinTech companies. Nowadays FinTech field is predominant marketplace in Republic of Kazakhstan. That is why large corporations, venture capital funds and organizations, business accelerators, development institutions create favorable conditions for the development of FinTech.

AIFC and the National Bank of Kazakhstan serve as the main regulators in this field. The AIFC Framework is in line with the latest industry developments due to the efficient rulemaking process that allows to modify or adopt new rules in a few months. A balanced approach to FinTech regulation and innovation through first and most active FinTech regulatory sandbox in the region aimed at promoting better risk management, competition and faster deployment of FinTech firms to market. National Bank of Kazakhstan has its own regulatory sandbox.

Kazakhstan creates facilities for Private Equity and Venture Funds. Newly emerged local VC firms (Qaztech ventures, BeInTech, BTS, Global Venture Alliance I2BF) and funds, an increase of angel investor's activity (QazAngels). And provides access to traditional and innovative ways of financing and raising capital through regulatory support of crowdfunding and ICO.

Local clients are actively going online: the cashless payment volumes increased by 726%, the number of internet transaction increased by 2365%, internet payment volumes increased by 7513% (from KZT 5.3 bln to KZT 405.5 bln), the POS terminal transactions jumped by 1021%, with the volumes growing just 352%.

Other drivers of FinTech in Kazakhstan:

- State Digitalization program (Digital Kazakhstan)
- Eurasian Union Sandbox initiation
- Startup boom due to lack of innovation in local banks
- Belt and Road Initiative
- Increase of e-commerce penetration (WAIFC)
- Customers are becoming needy and tech-savvy

- Pro-FinTech government (FinTech as a pillar) and regulations
- The pipeline of frameworks that will be introduced soon (VC framework, digital banking, payment services)

Given the fact that Kazakhstan is a growing country, of course, it should be noted that all areas (social, economic, political, etc.) are subject to simultaneous growth, which in turn changes the views and needs of the population, and as a result increases the need for FinTech. And only in this case we can talk about any innovations, solutions and ideas. In general, according to statistics in recent years, the sphere of FinTech is rising well. The following list highlights the main threats of the Kazakh FinTech. In many ways, this list is similar to the global list.

- cyberthreats;
- imperfection of state regulation of the country;
- currency risks;
- in adequate secure of personal data;
- unattractiveness of Kazakhstan FinTech for external investors.

I believe that the main solution to the above problems will be to improve the welfare of the population, and as a result, increase their solvency, as well as increase the number of economically active population of the country, which will lead to literacy in many areas, including in the field of finance and IT and the emergence of innovative ideas.

### 3.2. The role of Astana International Financial Centre in the international platform for the development of financial services and technologies

Republic of Kazakhstan is a stable and prosperous state with the largest economy in Central Asia. The country has achieved significant GDP growth since its independence. Over the past 20 years, the average of annual growth rate for GDP is about 6%, which is related with an increase in export, and rising of domestic consumer demand on account of real income growth. Due to the financial resources accumulated from oil export revenues during the period of active economic growth, the economy has remained resilient in the face of external shocks in 2008-2009 and 2015-2016.

Despite the volatile global investment climate, which reduced foreign investment into emerging markets and transition economies, the country maintained its attractiveness for foreign investors. In all the years since its independence, Kazakhstan has attracted about USD 320 billion of foreign investment. This figure has been achieved thanks to the favourable business climate in the country: currently Kazakhstan provides investment preferences. In order not to deviate from the main topic of my thesis, that is, identifying threats related to FinTech, but also solving the major problems, I would like to acquaint you with the Astana International Financial Center (further AIFC), which is located in the

Kazakhstan.

What is AIFC? The constitutional law on the establishment of the Astana International Financial Center was signed in December 2015. AIFC's goal is to provide financial services internationally. The aim of AIFC is to help attract investment in the country's economy, create attractive conditions for investing in financial services, develop the Kazakhstani securities market and ensure its integration with international capital markets.

The administration of the AIFC was established in 2015. In 2016, the AIFC development strategy and structure of the AIFC bodies were approved, and the AIFC Committee on Regulation of Financial Services was established.

In May 2016 year, the session “International experience of economic growth”: mechanisms and tools for growing of AIFC was held as part of the Astana Economic Forum. The same year, the 29th plenary meeting of the Council of Foreign Investors was chaired by the first president of the Republic of Kazakhstan – Elbasy N.Nazarbayev, dedicated to the establishment and development of the AIFC.

In August 2016, was established the AIFC Bureau for Continuing Professional Development. In January 2017, the AIFC Financial Services Regulatory Committee was established as an independent regulatory body for financial services and related activities in the AIFC. The AIFC Legal Advisory Board was established in February 2017. In March 2017, was held a forum on Islamic finance. Then was opened the AIFC academic Council.

In January 2018, the official launch of the activities of all AIFC bodies took place. The AIFC became a member of the General Council of Islamic banks and their organizations, and a green finance center was also established. In July of that year, the official opening of the hub took place. AIFC signed an agreement with the Islamic Development Bank on a grant to develop a master plan for the development of Islamic finance. In addition, AIFC became a founding member of the World Alliance of International Financial Centers.

In November 2018, the official launch of trading on the AIFC exchange and the first placement of Eurobonds of the Ministry of Finance on the hub exchange took place. In the same month, the center became a member of the Federation of Euro-Asian Stock Exchanges.

The Astana International Financial Center Committee for Financial Services Regulation, together with a group of world regulators, launched a global network of financial innovations. Then the AIFC exchange received the status of a “recognized stock exchange” from the Royal Tax and Customs Service of Great Britain. The AIFC court and the International Arbitration Center have also launched the new e-justice system.

The task of the financial services regulatory committee is to create a comfortable environment for the activities of individuals, as well as various organizations and institutions. As of June 2019, the AIFC financial services structure includes 25 types of regulated activities, three types of market activities and

five types of support services.

The AIFC Court represents the first judicial system in Kazakhstan, based on the English common law. The AIFC court is not involved in criminal and administrative proceedings and has exclusive jurisdiction over civil and commercial disputes arising between the AIFC divisions and their foreign employees. AIFC court works without judicial system of Kazakhstan. It consists of a trial court and a court of appeal. To ensure quick resolution of disputes with a small amount of the claim, the first instance court includes a special unit known as the Small Claims Court. Decisions of the AIFC Court of Appeal are final and not subject to further appeal.

The International Arbitration Center (further IAC) appoints arbitrators and mediators for the proceedings. The composition of the IAC arbitrators includes 30 international arbitrators, 18 of which act as mediators. International arbitrators have many years of experience in arbitration in the areas of subsoil use, trade, oil and gas, construction, energy, Islamic finance, banking, intellectual property law and other areas of commercial law.

The AIFC exchange was created for the country's stock market. The activities of the exchange are designed to ensure transparency and investor protection. AIFC Exchange provides a full business cycle of services, which include bidding, settlement and clearing operations, registration of data transfer and IT services.

In August 2016, the AIFC Academy was established to ensure and maintain the competitiveness of AIFC as a financial center. In April 2017, it was renamed the AIFC Bureau of Continuing Professional Development. The purpose of the bureau is directly related to professional development. The bureau consists of five centers: Training Center, HR Nerve Center, Astana International Campus, Partnership Center and Commercial Center.

The AIFC Expat Center (further EC) was created in order to ensure favorable conditions for entry and stay, as well as the easiest adaptation of foreigners in Kazakhstan. EC provides the AIFC international business partners and foreign employees with access in English to a wide range of public services on a one-stop basis. In addition, the AIFC participants are given various preferences. So, for example, citizens of 45 countries can stay in Kazakhstan without a visa for 30 days, work visas at the invitation of the AIFC units and participants are issued for up to five years.

Green Finance Center specialists are promoting the AIFC as a green finance for Central Asia and Eastern Europe. They offer strategic solutions to government, financial institutions and enterprises in the form of assistance in issuing green bonds. The main directions of the center are the development of tools, as well as the training of specialists and conducting trainings in the field of green financing.

FinTech Hub

The AIFC FinTech hub creates favorable conditions and provides infrastructure for growth of FinTech field. The goal of the hub is to integrate all of regional participants and members in the FinTech

market to stimulate the creation and implementation of new products, increase the human capital and also to develop entrepreneurial thinking. FinTech Hub also engages startups, entrepreneurs, international investors, industry experts from around the world for creating more mature investment market in Kazakhstan that gives maximum opportunities to financial institutions and venture capital funds.

### 3.3. The correlation analyze in the case of the Republic of Kazakhstan

Nowadays the FinTech of Kazakhstan in the stage of active development. Every year, the spread of FinTech is increasing. This, of course, can be seen with the naked eye by the method of comparative analysis over the past few years. When it comes to FinTech, this is primarily associated with the development of innovation, and as a result, the simplification of the financial, economic, social relationship between individuals and countries. As we noted in previous chapters, the development of FinTech is including economic growth. At present, the use of innovation and the development of FinTech as a whole dynamically affects the country's competitiveness. Since my topic of the thesis is tied to the identification of threats of FinTech, in this case not only external but also internal, I decided to consider the connection between innovative and economic development and stability of the country. For this I will use quantitative data, that is, reliable data presented in a numerical format, as statistical and percentage indicators. Since this type of research is often used in many areas where it is necessary to perform mathematical calculations and implement a correlation analysis method. As the main formula, I will use the Pearson correlation coefficient, see Formula (1) below, which will show the statistical relationship between the growth of FinTech, and as a consequence of the various threats associated with this industry and the development of the country, in the case of Republic of Kazakhstan.

$$r_{xy} = \frac{\sum(d_x - d_y)}{\sqrt{\sum {d_x}^2 \times \sum {d_y}^2}} \tag{1}$$

Here. d - deviations from the arithmetic mean of x and y. Then we will transform the formula as seen in Formula (2):

$$r_{xy} = \frac{\sum(\bar{x} - x_i) \times (\bar{y} - y_i)}{\sqrt{\sum(\bar{x} - x_i)^2 \times \sum(\bar{y} - y_i)^2}} \tag{2}$$

$$\bar{x} = \frac{x_i}{n} \tag{3}$$

$$\bar{y} = \frac{y_i}{n} \tag{4}$$

The analyzed variables will be named in the research further as:

$r_{xy}$ - Pearson correlation coefficient;

$x_i$ – global index of economic growth;

$y_i$ – global innovation index;

$\bar{x}$ – average of the global index of economic growth (calculated through the Formula (3);

$\bar{y}$ – average of the global innovation index (calculated through the Formula (4);

n - the number of the analyzed period.

For the convenience of calculation, all data according Annex 1 for the last 3 years (2016-2018) will be summarized in table 1 below:

**Table 1. Indexes for analyzed period (2016-2018)**

| Data / Year | Data from the global index of economic growth list | Data from the global innovation index list |
|---|---|---|
| 2016 | 63,6 | 31,51 |
| 2017 | 69 | 31,50 |
| 2018 | 69,1 | 31,42 |

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According to the table, we can draw an approximate graphical representation of the correlation bond and then prove it using mathematical calculations.

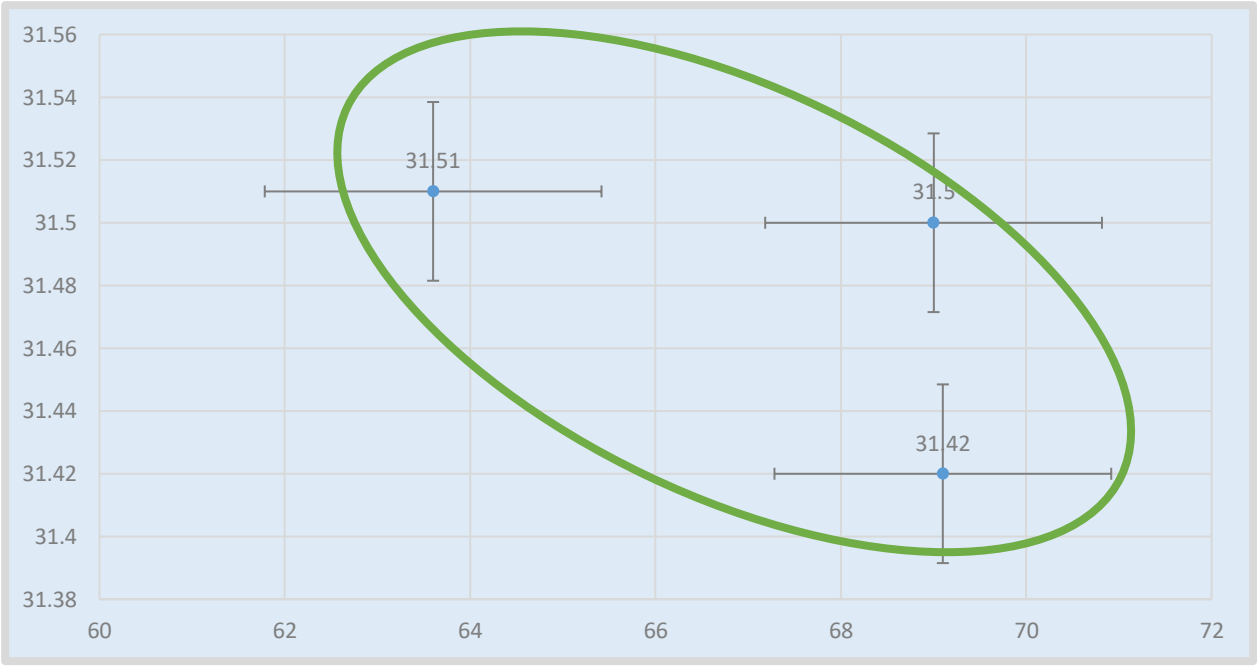


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**Fig. 6. Graphical representation of correlation analysis according indexes**

On the graph, which represented in Fig.6. I see a negative correlation, but to make sure we will continue the calculation.

Firstly, we have to calculate the sum of those measures as seen in Formula (5) and (6):

$$\sum x_i = 63{,}6 + 69{,}0 + 69{,}1 = 201{,}70 \quad (5)$$

$$\sum y_i = 31{,}51 + 31{,}50 + 31{,}42 = 94{,}43 \quad (6)$$

$$\bar{x} = \frac{x_i}{n} = \frac{201{,}70}{3} = 67{,}20 \quad (7)$$

$$\bar{y} = \frac{y_i}{n} = \frac{94,43}{3} = 31,48 \quad (8)$$

For each x and y we calculate the coefficient of deviation from the arithmetic mean value using the Formula (7) and (8), and represent it in the Table 2:

**Table 2. Coefficient of deviation from the arithmetic mean value**

| Data / Year | $\bar{x} - x_i$ | $\bar{y} - y_i$ |
|---|---|---|
| 2016 | 3,6 | -0,03 |
| 2017 | -5,8 | -0,02 |
| 2018 | -5,9 | 0,06 |

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Here we calculate the square of deviations, using the values, which indicated in Table 2 and represent it in Table 3:

**Table 3. Square of coefficient of deviation from the arithmetic mean value**

| Data / Year | $(\bar{x} - x_i)^2$ | $(\bar{y} - y_i)^2$ |
|---|---|---|
| 2016 | 12,96 | 0,0009 |
| 2017 | 33,64 | 0,0004 |
| 2018 | 34,81 | 0,0036 |

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Then we calculate the sum of the squared deviations, as seen in Formula (9) and (10) below:

$$\sum(\bar{x} - x_i)^2 = 12,96 + 33,64 + 34,81 = 81,41 \quad (9)$$

$$\sum(\bar{y} - y_i)^2 = 0,0009 + 0,0004 + 0,0036 = 0,0049 \quad (10)$$

We calculate for each period the multiplication of the difference of the arithmetic mean value as seen in Table 4:

**Table 4. Multiplication of the difference of the arithmetic mean value**

| Data / Year | $(\bar{x} - x_i) \times (\bar{y} - y_i)$ |
|---|---|
| 2016 | -0,108 |
| 2017 | 0,116 |
| 2018 | -0,354 |

Created by author

Then we calculate the sum of multiplication of the difference of the arithmetic mean value as seen in Formula (11):

$$\sum(\bar{x} - x_i) \times (\bar{y} - y_i) = -0,108 + 0,116 + (-0,354) = -0,35 \quad (11)$$

$$r_{xy} = \frac{-0,35}{\sqrt{\sum 81,41 * 0,0049}} = \frac{-0,35}{0,63} = -0,56 \quad (12)$$

Using the Formula (12) we calculate the final value of the Pearson correlation coefficient. It is -0.56. We know that the value of the correlation coefficient reflects the strength of the bond. When assessing the bond strength of the correlation coefficients we used the R.E. Chaddock scale. We will analize it according to Table 5.

**Table. 5. R.E. Chaddock scale**

| Determination coefficient | | Qualitative characteristic |
|---|---|---|
| Positive correlation | Negative correlation | |
| 0,1-0,3 | -0,1-(-0,3) | weak |
| 0,3-0,5 | -0,3-(0,5) | moderate |
| 0,5-0,7 | -0,5-(0,7) | salient |
| 0,7-0,9 | -0,7-(-0,9) | high |
| 0,9-1 | -0,9-(-1) | very high |

Created by author based the form of R.E. Chaddock scale

According this table we have the negative correlation. It is a relationship between two variables in which one variable increases as the other decreases, and vice versa. And correlation strenght is salient. We conclude, taking into account also qualitative indicators, that over the past 3 years (2016-2018 inclusive), the rate of innovation development, that is, FinTech technologies and FinTech startups, has made a significant breakthrough, where the rate of evolution (development) of the country was conditionally stable. At present, the FinTech sector in the Republic of Kazakhstan is at a development level, as is the country itself. I can say with hope that in a few years the correlation between these values will be positive and in this growth the level of development of financial and other technologies will have tremendous power. Analyzing and comparing a lot of data, I can say that many FinTech startups are mainly connected, as in many other countries, with payments and transfers.

# 4. THE ANALYTICAL PART OF THE THREATS ARISING FROM FINANCIAL TECHNOLOGIES

## 4.1. Analytical overview of the main threats of financial technologies and solutions for the effective operation of this field

Nowadays, having destroyed all business verticals, especially the financial industry, FinTech has created a completely new trend, improving many aspects of finance, from regular payments to regulation and other novelties of this truly useful industry. This has led to a rhythmic and unique customer service system, helping them understand and accept FinTech without any doubt. But despite all this, there are people who are still afraid to accept FinTech due to many reasons, they cannot trust the system, robots, in the end they cannot believe in such transparency and comfort, they also fear for the security of their data and property, only because FinTech companies are growing rapidly, leaving no time to check, reflect.

If we talk about the security of the financial sector then at the moment, cybercrime is considered a potentially dangerous occurrence. For this reason, central banks are reluctant to cover FinTech, because the integrity of the entire financial system is at stake. In many countries there is no cybersecurity, for example, some FinTech startups, not paying enough attention to security measures, are launching their projects that can lead to global problems.

Without proper regulation, easy access to finance can stimulate risky behavior, such as excessive borrowing and the accumulation of personal debt. There is also legitimate concern about market competition. Some early market participants may become too big too early and may have significant monopoly power. On the other hand, too many participants providing similar services can also occupy the market and impede supervision. This is especially true in many small and developing countries.

The wide range of technologies and their possible use under the aegis of FinTech means that all countries can benefit from technological innovations in financial services in a way that satisfies their needs. This can lead to more sustainable growth through increased productivity and the creation of new markets and jobs. The main task is to find the right balance between regulation and the promotion of this growing sector.

“Insufficiently thought-out use of FinTech technologies can lead to the creation of threats”. In this regard, the solution of security issues should be comprehensive and be resolved at each and every stage of the implementation of the service, starting with the development of the solution architecture and ending with implementation and operation.

Of course, the development of new financial products requires new mechanisms for economic security. The emergence and active development of supra-national payment systems poses a serious

threat to the institution of the state as such because of the possible transition of economic entities from state-controlled payment systems.

The success of the development of FinTech in a single country depends largely on the state regulation of this sphere. At the level of the governments of a number of countries, working groups are being established to develop legislation governing the sphere of FinTech. For example, with the introduction of the updated Payment Services Directive (PSD2) in the European Union, the focus of regulation has shifted to the financial companies that offer to open banking services, API platforms with big data support and advanced analytics. The partnership between FinTech companies and government agencies is developing in Asian countries.

In the framework of FinTech, standardization issues cannot be circumvented given the best international practices. At the same time, it is necessary to pay special attention to the fact that further steps to standardize the concepts used in FinTech are one of the most important elements of its further development. In my opinion, the issue of standardization will be solved by introducing the regulation of the sphere of FinTech.

Improving the financial literacy of the population is another significant area of FinTech based on the simplicity and accessibility of information presentation, ergonomic and design solutions, the implementation of artificial intelligence elements, the development of robotic consulting and machine learning in the financial sector.

New technologies are the result of the work of like-minded teams (uniting entrepreneurs, technologists, software developers, information security specialists, etc.), which, in turn, is a socially significant phenomenon in terms of creating additional jobs.

Also to the list of major threats and problems facing the development of FinTech in the world are the following, the first problem is scalability, the second is access to secondary financing, the third is the exit strategy from investments through mergers and acquisitions.

So, only about 30 companies in the world show the ability to quickly export their products and services to other countries. Problems not only in their capabilities, but also in the fact that in many markets there is no BaaS scalability platform (bank as a service), partners lack an open source API (application programming interface), and the imperfection of the regulatory environment does not allow for quick independent licensing in the new market.

The problem of secondary financing is that, having received the initial capital and having mastered it, companies do not have time to reach the desired level of profit and therefore need either geographical expansion or product diversification.

The third problem arises from the first two - this is the growth of companies through M & A (mergers and acquisitions). At this level of development, not all startups and their managers are ready for such a development scenario, which will inevitably entail changes in the composition of the team

and corporate culture. On the other hand, potential investors are afraid of too high risks of losing the still unstable companies. However, M & A deals have already begun between startups, although they have not yet become widespread.

However, it is interesting to note that the FinTech sector has occupied its niche in the financial industry. And to this day, the technological revolution continues, in which, as elsewhere, there are pros and cons. By cons, of course, we can include the presence of problems and threats. After analyzing all the points, was compiled Table 6 below, which shows the main external and internal threats of the FinTech field.

**Table. 6. Internal and external threats of FinTech field**

| **Internal** | **External** |
|---|---|
| Credibility | Regulation |
| Discovery | Cyberthreats and security/ protection of personal data |
| Customer relationships | other risks* |
| *-it could be in some of the countries, depends on economic, political and social state . | |

Created by author

- Credibility

Users play an important role for FinTech, often lacking the trust component. It takes a lot of effort to gain the trust of people and get them to use your product.

Solution: content development with training inherently. Or a good marketing program explaining to users all the nuances of the new system.

In this case, marketing does not mean selling them your product, it means, first of all, correctly and intelligibly explain what innovations are and how they can use these services to their advantage. You need to research and create interesting content that will help you believe in your product. In order to better understand the concept of your audience are suitable, various e-books and documents, case studies, customer reviews and infographics. It is also necessary to choose the right form of content for each specific project.

- Discovery

In a world where there are many FinTech startups, let alone the giants of this industry, it's hard to succeed. So what can help you in this situation? A good product? this is a quarter of success. Customer trust? This is another quarter of the success. And what about half? But what about the overall picture? Finding your product among competitors is definitely not an easy task.

Solution: Effective distribution of content and the correct pattern of action.

Your marketing strategy should be clearly thought out in advance. Your target audience and satisfaction of their interests can become a springboard for the rest of your strategy. It must be remembered that for example, millennials are very knowledgeable in technology and constantly work with Internet resources, such as search engines, applications and social networks. Your application,

website or program should be well designed and optimized, be insightful, creative and informative when optimizing the search engine.

- Customer relationships

There is an invariable rule that every business requires customers. To maintain a customer base, not only do you provide a good product. You have to be confident that you will keep your customers for a long time, building long-term relationships with customers. Since your business will be held only thanks to your regular customers, you need to remember this, not forgetting that there is also word of mouth.

Solution: continuous improvement of services, product updates, customer feedback to find out their desires and needs.

It is necessary to establish an emotional connection with your customers, there may be different questionnaires, forums that will always remind them of the brand, the product, and the various pluses. You can safely use newsletters, newsletters and social networks.

Providing quality services is the key to building good customer relationships. You need to know and analyze your customers, to predict their behavior. This will help you to improve your product from time to time and motivates you to create new ideas. Use these ideas to constantly improve your product and service. FinTech startups are growing rapidly. The main guarantee of their success is the provision of alternative financial solutions that provide improved user experience and convenience.

- Cyberthreats and security/ protection of personal data.

Another huge problem in the Fintech sector is cyberthreats. These cyber threats can lead to massive destruction of systems where millions of customers are stored and processed. However, given that all the work is done by technologies, robots and AI, which contributed to the growth of modern FinTech boomers, it could be assumed that these same robots can be destructive for themselves. It all depends on the purpose for which this or that technology is used.

The 2018 American Credit Bureau, Equifax, reported that more than 143 million accounts were hacked as a result of a massive data hack. Hackers stole names, social security numbers, phone numbers, and other important information. In addition, other FinTech companies such as Citi Financial, Education Credit Management Corp, CheckFree Corp, Data Processors International, Korea Credit Bureau, Card Systems Solutions, JP Morgan, TRW Information Systems and Heartland Payment Systems have also been victims of security breaches.

Solution: Establishing the best security protocols. Continuous improvement of security systems and quarterly protocol verification.

To improve data encryption, many Fintech startups spend a huge amount of time and money creating sophisticated security protocols. A large number of companies are vulnerable to attacks due to the ease of disclosure of security protocols by hackers. The tunneling protocols used in VPNs are

effective in encrypting FinTech data. The famous tunneling protocols include: PPTP, L2TP / IPsec, OpenVPN, IKEv2, SSTP, etc. These protocols provide different levels of protection and provide security in various ways. FinTech needs constantly updated information on the types of protocols and how to use them in a virtual private network - this is especially true in a financial environment where cyber threats are inevitable and will continue.

For many cybercriminals, all customer information is priceless. They can use different ways to make a profit. Since financial information is the primary goal, it is imperative that startups, recognized companies maintain a minimum level of security. Fintech companies very quickly become giants in their industry, which makes them turn a blind eye to cybersecurity, preferring growth and relevance to the market. For further development, these companies need to consider priorities, and above all, ensure an adequate level of cybersecurity and data confidentiality for their employees and customers, and only then think about further development.

FinTech companies also need to focus on security efforts in three main areas:

- Application Security
- Cloud Security, where stored all information about customers.
- Automated Threat Intelligence

- Regulation

Innovations within the FinTech industry are happening fast, and few entities can keep up with the rapid advancements – this includes government agencies. Part of the FinTech platform's success relies on the speed of the industry. Unlike banks, FinTech startups quickly adapt to customer requirements. They are very flexible since they are not subject to strict regulatory rules.

The security that protects customers from hacking is the most important part in this interaction. Proof that they are taking appropriate measures to protect their customers is just as necessary as other features that distinguish FinTech startups from their traditional counterparts.

As mentioned above, regulation is one of the problems of this unique industry. Since there is no special regulation in this industry, financial legislation cannot control and even more so guarantee the compliance with legislative acts by start-ups, which are rapidly gaining in quantity, and quality in many cases is lame. And some short-sighted entrepreneurs bypass safety, thereby saving a little money and risking their business every day. So far, no official legislative body has stopped them.

Solution: Regulatory sandboxes, flexible Smart Regulation with AI technology

As I mentioned in previous chapters, regulation is the main threat of FinTech. And it requires a lot of work, in any case, regulating the FinTech sphere is a mandatory requirement to maintain stability and proper growth of the economy as a whole. Since FinTech innovations are growing and developing at a very fast pace, traditional regulatory authorities do not keep up and often do not understand the whole

mechanism. The solution to this issue, as I believe, lies in centralized smart regulation, which in turn should not impede the growth of innovation, and monitor the legality and correctness of the system.

Systemic risk is the risk that the crush of an individual financial institution will the reason of the the entire financial system's collapse, which will in turn cause the collapse of the economy. Economic crisis 2008 triggered an explosion in the development of FinTech. And that explosion in the development of FinTech has been a major challenge for regulators, after all, one element of FinTech is the idea of disrupting traditional institutions, traditional industries, traditional finance, but a major object of financial regulation after the 2008 crisis has been preventing of disruptions in all financial sector. And so far what we have seen are four major approaches amongst regulators. The first approach has largely been one of doing nothing, in many ways, this idea of doing nothing can be seen as either a positive or a negative approach. It can be either permissive or restrictive. China, prior to the middle of 2015 is usually seen as the major example of a country taking a permissive approach through deciding not to put in place new regulations. And in many ways, it was this decision, which has allowed the explosion of FinTech in the context of China.

The evolution from too small to care to too big to fail, that we've seen in the context of payments, money market, mutual funds, and other areas. As a result, even in the context of China, the decision since 2015 has been increasingly to build a new regulatory framework for digital financial services. In other jurisdictions, the "do nothing" approach was used, which was largely restrictive, requiring new business models from new participants in financial services. Over the past few years, regulators have been trying to balance the goals of innovation and growth with financial stability and consumer protection, and as a result, they are developing experimental approaches. Others have developed what are called sandboxes, these are areas for experimentation in a limited market context with limited regulation, in order for both the new company as well as the regulator, to learn how best to move forward. A growing number of jurisdictions that are developing new regulatory frameworks for P2P lending or alternative payment systems, also for some forms of crowdfunding.

The smart regulation that I mentioned earlier suggests that when transforming a financial system, you can change the underlying infrastructure so that the financial system works better and more efficiently. First, the idea behind this is that regulators should not only monitor what is happening in traditional financial institutions, but also be aware of new entrants. Whether those technologies are things like cryptocurrencies, blockchain, cloud techniques or anything more that emerges in coming years. So the first stage is really an understanding of what is going on. Without an understanding, a regulator cannot do a proper job of balancing the objectives of economic growth and financial stability. From that basis, one can work together to design better systems. And really, the starting point in smart regulation is systems design. It is the idea of digitising regulation so that regulatory requirements to the greatest extent possible can be conducted or met by industry participants in a digital form. Digitising reporting

requirements and other compliance requirements allows financial institutions to submit reporting and other obligations to regulators in a digitized form. This digitization process makes the analysis and processing of data easier and more efficient, not only to better achieve regulatory goals, but also to reduce costs and open up new opportunities. The idea of smart regulation is that technology is no longer the limiting factor in how a financial system or its regulation works. But to take advantage of these new opportunities, we must be aware of what the technology can do as well as the existing inefficiencies in many of our systems, and that is a RegTech process of designing financial infrastructure. That is, RegTech as a solution to the regulatory problem using the "Smart Regulation" mechanism.

Also, at the initial stage of any FinTech project, you need a Regulatory Sandboxes, a safe harbor for supervised innovation in financial market. Regulators must also take promising innovations. The best illustration of this is the speed at which regulatory sandboxes were announced. To date, more than 12 have been announced in the world, of which six have appeared in the last four months, and most of them are in Asia. Regulatory sandboxes are another reactionary move caused by fear of jurisdiction to remain a significant financial center. The creation of the sandbox demonstrates the desire of the regulator to move forward towards a more proportional regulatory framework that links risk to innovation. Sandboxes are not a children's game, and many of them have not yet invested sufficient resources in their work in terms of human capital or technical capabilities. Just like in the case of startups, Regulators will need to go into a repetition cycle in order to improve the quality and value of their Sandboxes. Regulators will need to maintain their vision, as sandboxes are unlikely to bring much results in the first year. Regulators must ensure that in the event of a crisis, they are proactive in resolving and eliminating problems. This means that innovation in regulatory matters must be developed. Everyone should learn from their experience. However, an adaptive regulatory framework needs to be created. This vision is based on a number of well-studied and established principles for regulators. First, financial stability at the macro and micro levels. Secondly, market integrity and thirdly, consumer protection. Regulatory sandboxes should become a new form of discussion, in which the main result is the promotion of innovation. The main task of regulatory authorities is to analyze and evaluate the current state of the market, and take any measures, but in most cases, many of us think that the task of regulatory bodies should be to prevent risks. Regulators will need a huge amount of data to do this. This is done in order to provide an adequate assessment of the true association of risk with this innovation. When analyzing, it is necessary to take into account foreign experience. With small staff, regulators will encounter difficulties in reviewing, evaluating and approving innovations. As a result, regulators will need machine learning tools that enable them to better understand large and unstructured data sets. This means that you must rely on machine learning tools or accept the risk of regulation. This is why regulatory sandboxes are an essential complement to the set of innovations available to regulators.

We discussed the topic of internal and external threats of the FinTech, that is, the problems of FinTech, including the influence of some very important aspects of this field. As we know, FinTech is a company that uses technology and innovation to compete with traditional financial institutions offered by banks and intermediaries in the financial services market. Currently, numerous technology startups as well as large established organizations that try to improve and optimize the financial services provided include themselves as a FinTech. For decades, we are used to using the services of traditional banks. So, what is the threat in itself of FinTech regarding banks. I would like to discuss about this important topic, since in my opinion this will affect the future of FinTech.

For banks, the main risks arising from the influence of FinTech are divided into strategic risks, operational risks, futsourcing risks, cyber risks and compliance risks.

Strategic risk: the potential risk to revenues and capital arising from improper management decisions and the improper implementation of decisions made increases the risks of lower profitability individual banks. Existing financial institutions lose a significant portion of their market share or profits if new entrants can make better use of innovation and provide less expensive services that better meet customer expectations. In the current environment, a decrease in profitability due to loss of profitable customers or a reduction in margin may reduce the ability of existing institutions to predict future business cycles.

High operational risk: the risk associated with the implementation of business functions by the company, including the risks of fraud and external events, leads to a large number of IT interdependencies of market participants (banks, etc.) and market infrastructure, which can cause an IT risk that will grow in a systemic crisis, especially if the services are provided primarily by one or more dominant players. The activities of FinTech companies in the banking sector increase the complexity of the entire banking system and introduce new players into the circulation who may have limited experience in managing IT risks. Due to the fact that outdated banking IT systems may not be sufficiently adapted, banks will have to seek help from a large number of third parties, either outsourcing or FinTech companies, thereby increasing complexity and reducing the transparency of final operations. The widespread use of third parties increases the risks associated with data security, confidentiality, money laundering, and cybercrime.

Compliance risk regarding data confidentiality: the risk of non-compliance with data privacy rules, non-compliance with laws, standards, local regulations can increase with the advent of large amounts of information and the use of outsourcing.

Outsourcing risk: the transfer of certain business processes by an organization to a large number of parties involved leads to ambiguity regarding the responsibilities of various participants in the value chain, which potentially increases the likelihood of operational incidents. A key challenge for financial institutions is to control operations outside their organizations and manage risk. If FinTech companies

are service providers, business partners, or interact with customers, banks will need to exercise great care in the execution of contracts and ensuring the safety of the bank and its customers.

Cyber risks: the risks of data and financial theft - mean that new technologies and business models can increase cyber risks if management tools do not keep up with technology changes. Enhanced interconnection of market participants can create benefits

for banks and consumers, while increasing their risks. A stronger reliance on the Application Programming Interface, cloud computing and other technologies that enhance the interaction of market participants can make the banking system more vulnerable to cyber threats and jeopardize large amounts of confidential data. This confirms the need for banks and FinTech companies that use the latest developments in the field of mobile payments, online lending, digital instant transfers and other breakthrough technologies to build their business to promote effective management and control of cyber risks.

The risk of liquidity and volatility of funding sources: the risk that the company, being considered solvent, does not have sufficient financial resources, the use of new technologies allows customers to switch from one savings account to another for more profit, thereby increasing the volatility of deposits, which can lead to increasing liquidity risk for banks.

The increasing of using huge amount of data the development of advanced methods for identifying and quantifying risks, making investments based on algorithms and a platform for analyzing and optimizing user portfolios fundamentally transforms management assets. With the advent of FinTech, more and more information is becoming available to Internet users, which simplifies its analysis and the generation of relevant conclusions. Accordingly the review, which leads by PricewaterhouseCoopers on the november of 2016, almost 56% of respondents considered that the development of FinTech leads to a deterioration in the security of information and privacy.

Also the managing digital identities of individuals and enterprises is one of the major issue for FinTech companies, as devices like phones equipped with biometric sensors (for example, fingerprint scanners) are increasingly used for authorization and authentication.

The use of mobile phones as authentication devices using biometrics, one-time passwords (OTPs) and CGA (code-generating applications) (for example, Google Authenticator) leads to the gradual abandonment of the usual password authentication mechanisms and PIN codes. While digital user IDs have become increasingly secure in view of their expanding use due to the development of FinTech, cloning these digital IDs can increase risks.

In any case, FinTech has high hopes. It is very important that traditional participants in the financial sector do not completely absorb the financial sector and continue their monopoly rule again. The sphere of FinTech should exist and develop further, having survived and resolving all the threats and problems that will be mandatory, and this means that growth is going on.

## CONCLUSION

The evolution of digital technology has significantly changed the world over the past decades. Every day, more and more digital services are being developed, which gradually changed customer behavior and replaced traditional business models. Movement is applied to various industries, especially in the financial sector. It has also shifted toward digital services since the advent of FinTech. Using advanced technology, FinTech contributed to various financial services, improving user experience and reducing costs. This technology sector, despite recent development, has laid a solid foundation for creating future financial products. Evolution FinTech has created an interdisciplinary industry that has certainly changed the financial sector. This obviously led to serious problems for traditional banking and payment systems.

This thesis in the first chapter studied the theoretical aspects of development of FinTech. He covered various types of FinTech sphere. The main goal was to identify and analyze the evolution of FinTech in terms of the financial sector. In particular, the main topics are FinTech background information and its impact on various areas of the financial sector, including business models, financial processes, payment methods, adaptations, problems and recommendations.

In the course of studying this topic, a clear idea was formed about the key role of Fintech in economic development. The main criteria for coexistence with FinTech companies are flexibility and quick adaptability to new technologies. It became an integrated operation of financial institutions in the digital age. For success and further development, enterprises must often innovate to increase competitiveness. Given FinTech's key role in the financial world, we can safely assume that there is a solid foundation for long-term business development. The digital revolution created by FinTech has made the financial sector more modernized and significantly improved the user experience. In the last years, there has been a real boom in the FinTech area and there are more of them, and as a result, they begin to come into contact with external and internal threats that are identified during the use and development of the industry. It is necessary to take into account and raise all the issues related to this new technological industry, which can only be resolved through research and discussion.

In the second chapter, we examined Fintech from an extensive point of view, to identify the most common threats that threaten the future development of this area, we also studied the experience in developing fintech spheres in the most developed countries, such as the United States of America and China. Also, based on experience and statistics, we examined the “future of FinTech”. In the third chapter, for clarity, we examined FinTech on the example of a developing country, such as the Republic of Kazakhstan, as well as the role and goals of AIFC, which was created as a "financial center". We also conducted a correlation analysis, revealing the connection between the development of innovation and the development of the country as a whole.

Many of FinTech's threats and challenges are universal and global. Through the comparative method of the research we identified, that in developed countries, FinTech plays a very important role, which can also be said in countries where smart capabilities are most applicable. After a correlation analysis, it was concluded that in developing countries FinTech, although it occupies a certain place in the country's economy, is still used only in some industries. Also, if we talk about FinTech's "biggest threat" as a solution, then this industry is at the experimental stage. Other issues are resolved as it arises.

The main threats of FinTech field and their solutions reflected in the fourth chapter of the thesis, where was used an analytical approach to discuss. The majority of people during the discussion of FinTech topics say that: 1. FinTech is innovation, it is the future of our economy, it is a financial "push" to the new digital system. 2. FinTech threat to banks and traditional participants in the financial market. But few people think about FinTech threats, that's why was chosen this topic for my thesis, where were identified FinTech internal and external threats. Surprisingly enough of them to analyze each of them and identify weaknesses in this industry. After all, real development occurs when we know about weaknesses and are constantly working on them to eliminate and further develop.

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**Kadyrbayeva N.** Identification of threats arising from financial technologies / Master Thesis on Electronic Business management. Supervisor Dr. T. Mendelsonas. – Vilnius: Faculty of economic and business, Mykolas Romeris University, 2020.

## ANNOTATION

This Master's thesis analyses and evaluates the current situation in the field of Financial technology (further - FinTech), identifying internal and external threats and problems in the case of developed countries, like the United states and China, as well as of a developing country like the Republic of Kazakhstan. The identification of threats to regulation in this area, as well as cybersecurity issues and the impact on economic stability in the world, are tested empirically, using comparative analysis, countries indicators are compared in the issue of regulation of FinTech, and through an analytical assessment, are identified the internal and external threats and made the recommendations to solve them. The first part summarizes the theoretical aspects of FinTech, including the types and necessity of developing this area. The second part of the master's thesis examines FinTech from a global perspective, introduces the concept of "threat" as for FinTech in general, and for the global economy also. And made the assumptions regarding the future development of FinTech field. In the third part, is assessed FinTech field in the Republic of Kazakhstan, the role of Astana International Financial Center (AIFC) and FinTech Hub in the FinTech international development platform, as the correlation analysis of FinTech impact on the country's economic development using the global innovation development index, including financial technologies and the index of economic freedom, which in turn reflects the country's economic growth and developement. The fourth part presents an analytical review of the empirical, comparative, correlation analyses of the threats related with FinTech, which used in this research work and given the recommendations for solving them.

**Key words: Financial technologies (FinTech), impact, threats.**

**Kadyrbayeva N.** Identification of threats arising from financial technologies / Master Thesis on Electronic Business management. Supervisor Dr. T. Mendelsonas. – Vilnius: Faculty of economic and business, Mykolas Romeris University, 2020.

## SUMMARY

In the modern financial system over the last years, FinTech have been occupying the key place financial world. This digital revolution has changed the financial sphere and made it modernized. Nowadays, FinTech is used all over the world, we can say with confidence, that FinTech is involved in all areas of our lives. It is so universal that its participants are not only the economy and also the social and political part of development.

FinTech improved its user experience by penetrating the financial market. For enterprises and consumers, FinTech can provide a range of innovative services that ensure the simplicity and convenience of all financial procedures. Over the past few years, many new FinTech startups have been created and, often, they encounter problems in the process of using them. Apart from the profitable side, it is also necessary to consider and see the problematic aspects that can be solved only through research and discussion.

Through research and discussion, it is clear that “regulation” is not the only FinTech problem that everyone knows and talks about. The foundation of FinTech's concept and concept is simplifying the lives of users, but more and more people are no longer trusting or looking with caution to the current and unpredictable financial system. That is, “trust in the financial system” is another problem of this modernized system. In this part, the issue of system security, cybersecurity, and customer data security should also be noted, since many financial technologies are so quickly flowing and developing that very often a large flow leads to the collapse of the company. Also I would like add “unwillingness to accept new technologies”, but, supporters of the traditional system are categorically against innovations. Although many sources assure us that start-ups are invested at a high level and access to finance from FinTech is obvious. “Lack of investors and appropriate access to finance” is another high-profile issue in this industry. Based on all this, there is another problem in my opinion. In conditions of strong competition, banks are trying to survive all the ways, and one of them is attracting startups, that is, the release of new services, new technologies and methods. And as a derivative, banks again live and continue to receive profits and benefits from the people. "Changing the goal of FinTech." It is difficult to predict what will happen next, but it is clearly visible that FinTech field has threats and problems that need to be solved.

The main object of this research work is FinTech and its internal and external threats, and as a result, the problem of work is to identify the main threats of FinTech.

After reviewing a lot of data, from this industry, based on all the analyzes, it can be considered that the main problem in the FinTech area is regulation, given the fast pace of development, it can be expected that there will be many threats and problems in the FinTech industry that need to be resolved on time.

The objectives of the study include consideration of the theoretical aspects of FinTech and its impact on the country's economy, analysis of the application and identification of possible FinTech threats around the world, as well as consideration of the appropriate method for solving them.

The objectives of the research is include consideration of the theoretical aspects of FinTech and its impact on the country's economy, analysis of the application and identification of possible FinTech threats around the world, as well as consideration of an appropriate method to solve them.

The methods of the scientific research are systematic analysis of the scientific literature, statistical data analysis, comparative analysis, correlation analysis and analytical assessment.

An empirical research was performed to test the following hypothesis: FinTech has many bilateral threats, ranging from regulation, which is the main threat to FinTech industry around the world, and ending with security and other threats that negatively affect the country's development. This hypothesis was confirmed on the basis of comparative and correlation analyses. A comparative analysis showed that each country is trying to regulate this field independently, using different approaches, and the correlation analysis, which we used on the case of Fintech in the Republic of Kazakhstan, that at this stage, the development of innovations, including financial ones, has only an average effect on economic growth in country, which in turn shows the "cautious" use of FinTech and attempts to control it at the state level. An analytical assessment revealed several of the main threats to Fintech sector and gave ways to solve them, which at this stage are in the "experimental" stage in many countries. The recommendations how to solving this issues presented in the last part.

The relevance of this study lies in exploring the FinTech field from different angles. Since with the advent of FinTech in our lives, only the positive aspects of this exceptional industry are very often represented. The positive aspects of FinTech are endless and you can talk about them for a very long time. For further development, it is very important to know all the weaknesses of a particular industry, it is important to identify the threats that FinTech poses to its field and what global impact does it have on the economy and development? This research work is also significant in the opportunity to present to a wide audience facts, figures and data that the public does not always think about, even if the topic of the study is relevant and widely discussed among various sectors of society. The analysis showed and confirmed that the elimination of FinTech threats requires a lot of work, which should be carried out not only on the basis of the country, but also centrally throughout the world, since the present century is a “digital age” and there are no borders in it.

**Kadyrbayeva N.** Finansinių technologijų keliamų grėsmių identifikavimas / Elektroninės verslo vadybos magistro darbas. Vadovas dr. T. Mendelsonas. – Vilnius: Ekonomikos ir verslo fakultetas, Mykolo Romerio universitetas, 2020 m.

## SANTRAUKA

Pastaraisiais metais modernaus pasaulio finansų srityje „FinTech“ atliko labai svarbų vaidmenį. Skaitmeninė revoliucija pakeitė finansų sferą – ji tapo daug modernesnė. Šiandien „FinTech“ naudojama visame pasaulyje, ir galime užtikrintai pasakyti, kad „FinTech“ dalyvauja visose mūsų gyvenimo srityse. Šios technologijos yra universalus reiškinys, apimantis ne tik ekonomiką bendrąja prasme, bet ir socialinės ir politinės raidos aspektus.

„FinTech“ greitai prasiskverbė į finansų rinkas ir reikšmingai pagerino vartotojų patirtį. Verslui ir vartotojams „FinTech“ gali pasiūlyti įvairių šiuolaikiškų paslaugų, kurios užtikrina, kad visos finansinės procedūros yra tokios paprastos ir patogios, kiek tik tai įmanoma. Kasmet sukuriama vis daugiau „FinTech“ naujovių, tačiau jomis naudojantis susiduriama su problemomis. Labai svarbu ne tik atsižvelgti į pelningumą, bet ir įvardyti problemas, kurių sprendimus gali padėti rasti tyrimai ir diskusijos.

Viena iš pagrindinių problemų, apie kurią dažnai kalbama, yra „reguliavimas“. Deja, tai nėra vienintelė „FinTech“ problema. „FinTech“ idėjos pagrindas buvo supaprastinti vartotojų gyvenimus, tačiau daugelis žmonių nebepasitiki finansine sistema, kadangi šiuo metu ji yra labia nenuspėjama ir daug žmonių dėl to nukentėjo. Taigi „pasitikėjimas finansų sistema“ yra kita šios šiuolaikiškos sistemos problema. Taip pat svarbu atkreipti dėmesį į sistemos saugumą, kibernetinį saugumą ir vartotojų duomenų saugumą, nes daugelis finansinių technologijų taip greitai užplūsta rinką ir vystosi, kad dažnai šis didelis srautas sukelia įmonės griūtį. Kalbant apie problemas, taip pat norėčiau paminėti „nenorą priimti naujas technologijas“, nes tradicinę sistemą palaikantys žmonės yra kategoriškai nusiteikę prieš inovacijas. Nors daugelyje šaltinių teigiama, kad į startuolius investuojama labai daug ir jie gauna finansavimą iš „FinTech“, kita didelė šios srities problema yra „investuotojų ir adekvačių finansavimo galimybių trūkumas“. Dėl to, mano nuomone, kyla kita problema. Didelės konkurencijos sąlygomis bankai stengiasi bet kokiu būdu išgyventi. Vienas iš tokių būdų – startuolių pritraukimas, tai yra, naujų paslaugų, naujų technologijų ir metodų pristatymas. Tokiu būdu bankai išgyvena ir gauna pelną bei naudą iš žmonių. „„„FinTech“ tikslo kaita“. Sunku nuspėti, kas vyks toliau, bet akivaizdu, kad „FinTech“ srityje kyla grėsmių ir problemų, kurias svarbu išspręsti.

Pagrindinis šio tiriamojo darbo objektas yra „FinTech“ ir jos vidinės ir išorinės grėsmės, o darbo problema yra identifikuoti pagrindines „FinTech“ kylančias grėsmes.

Remiantis šaltiniais, problema, su kuria susiduria „FinTech“, yra šios srities reguliavimas, bet dėl labai greitos raidos šioje srityje turėtume tikėtis, kad „FinTech“ pramonė susidurs su daug grėsmių ir problemų, į kurias svarbu reaguoti laiku.

Šio tyrimo tikslas yra identifikuoti išorines ir vidines grėsmes, kad būtų galima atrasti sprendimus, leidžiančius „FinTech“ efektyviai veikti.

Šio tyrimo uždaviniai yra apžvelgti „FinTech“ teorinius aspektus ir jos daromą įtaką šalies ekonomikai, išanalizuoti „FinTech“ grėsmių taikymą visame pasaulyje ir identifikuoti galimas grėsmes, taip pat apsvarstyti galimus jų sprendimo metodus.

Mokslinio tyrimo metodai yra sisteminė mokslinės literatūros analizė, statistinė duomenų analizė, palyginamoji analizė, koreliacinė analizė ir analitinis vertinimas.

Atliekant empirinį tyrimą buvo siekiama patikrinti tokias hipotezes: „FinTech“ turi daug vidinių ir išorinių grėsmių, kylančių dėl įvairių priežasčių, pradedant reguliavimu, kuris visame pasaulyje yra pagrindinė grėsmė „FinTech“ pramonėje, baigiant saugumu ir kitomis neigiamai šalies vystymąsi veikiančiomis grėsmėmis. Ši hipotezė buvo patvirtinta remiantis palyginamąja ir koreliacine analize. Palyginamoji analizė atskleidė, kad kiekviena šalis šią sritį bando reguliuoti nepriklausomai, remdamasi skirtingais modeliais, o koreliacinė analizė, kuri buvo naudojama analizuojant Kazachstano respublikos „FinTech“ situaciją, atskleidė, kad šiuo metu inovacijų raida, įskaitant ir finansines inovacijas, turi tik vidutinį poveikį ekonominiam augimui šalyje. Tai parodo, kad „FinTech“ šalyje naudojamasi atsargiai ir bandoma kontroliuoti ją valstybiniu lygmeniu. Analitinis vertinimas atskleidė kelias pagrindines „FinTech“ sektoriaus grėsmes ir pateikė jų sprendimo būdų, kurie šiuo metu daugelyje valstybių vykdomi „eksperimentiniu“ lygmeniu. Šių problemų sprendimo rekomendacijos pateikiamos paskutinėje dalyje.

Šis tyrimas aktualus tuo, kad „FinTech“ sritis nagrinėjama iš kitos perspektyvos. Mūsų gyvenimuose atsiradus „FinTech“, dažniausiai akcentuojami tik teigiami šios unikalios pramonės šakos aspektai. Žinoma, „FinTech“ turi begalę teigiamų aspektų, apie kuriuos galima labai ilgai kalbėti, tačiau kas slypi kitoje „monetos“ pusėje, kokias grėsmes kelia „FinTech“ savo srityje ir kokią pasaulinę įtaką ji turi ekonomikai ir raidai? Šis tiriamasis darbas taip pat reikšmingas tuo, kad tai yra galimybė pristatyti plačiajai auditorijai faktus, grafikus ir duomenis, apie kuriuos visuomenė dažnai nesusimąsto, net jei tyrimo tema yra svarbi ir plačiai aptariama įvairiuose visuomenės sluoksniuose. Analizė atskleidė ir patvirtino, kad norint pašalinti „FinTech“ keliamas grėsmes reikia įdėti daug darbo, kuris turi būti atliekamas ne tik valstybės mastu, bet ir centralizuotai visame pasaulyje, nes šis amžius – „skaitmeninis amžius“, kuriame nėra sienų.

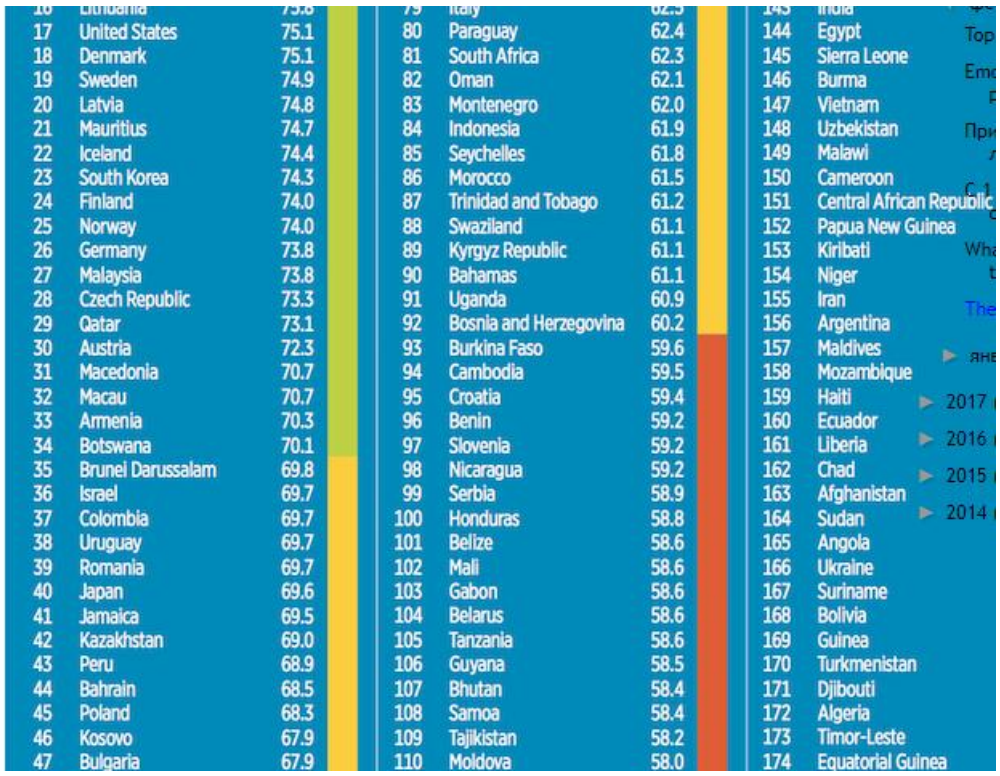
# ANNEXES

**ANNEX 1**

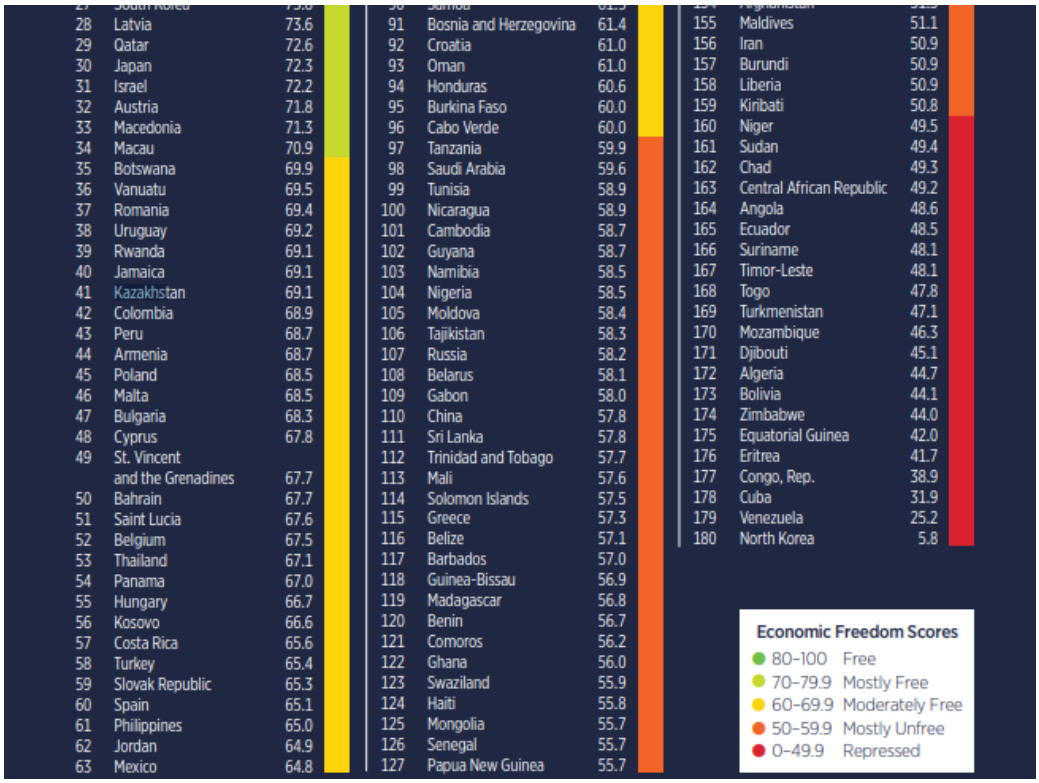
## Index of economic freedom in the world – 2016

| Rank | Country | Overall Score |
|---|---|---|
| 1 | Hong Kong | 88.6 |
| 2 | Singapore | 87.8 |
| 3 | New Zealand | 81.6 |
| 4 | Switzerland | 81.0 |
| 5 | Australia | 80.3 |
| 6 | Canada | 78.0 |
| 7 | Chile | 77.7 |
| 8 | Ireland | 77.3 |
| 9 | Estonia | 77.2 |
| 10 | United Kingdom | 76.4 |
| 11 | United States | 75.4 |
| 12 | Denmark | 75.3 |
| 13 | Lithuania | 75.2 |
| 14 | Taiwan | 74.7 |
| 15 | Mauritius | 74.7 |
| 16 | Netherlands | 74.6 |
| 17 | Germany | 74.4 |
| 18 | Bahrain | 74.3 |
| 19 | Luxembourg | 73.9 |
| 20 | Iceland | 73.3 |
| 21 | Czech Republic | 73.2 |
| 22 | Japan | 73.1 |
| 23 | Georgia | 72.6 |
| 24 | Finland | 72.6 |
| 25 | United Arab Emirates | 72.6 |
| 26 | Sweden | 72.0 |
| 27 | South Korea | 71.7 |
| 28 | Austria | 71.7 |
| 29 | Malaysia | 71.5 |
| 30 | Botswana | 71.1 |
| 31 | Bahamas | 70.9 |
| 66 | Panama | 64.8 |
| 67 | Thailand | 63.9 |
| 68 | Kazakhstan | 63.6 |
| 69 | Samoa | 63.5 |
| 70 | Philippines | 63.1 |
| 71 | Rwanda | 63.1 |
| 72 | Ghana | 63.0 |
| 73 | Trinidad and Tobago | 62.9 |
| 74 | Kuwait | 62.7 |
| 75 | France | 62.3 |
| 76 | Seychelles | 62.2 |
| 77 | Serbia | 62.1 |
| 78 | Saudi Arabia | 62.1 |
| 79 | Turkey | 62.1 |
| 80 | South Africa | 61.9 |
| 81 | Namibia | 61.9 |
| 82 | Guatemala | 61.8 |
| 83 | Paraguay | 61.5 |
| 84 | Kosovo | 61.4 |
| 85 | Morocco | 61.3 |
| 86 | Italy | 61.2 |
| 87 | Madagascar | 61.1 |
| 88 | Dominican Republic | 61.0 |
| 89 | Vanuatu | 60.8 |
| 90 | Slovenia | 60.6 |
| 91 | Azerbaijan | 60.2 |
| 92 | Côte d'Ivoire | 60.0 |
| 93 | Sri Lanka | 59.9 |
| 94 | Swaziland | 59.7 |
| 95 | Tonga | 59.6 |
| 96 | Kyrgyz Republic | 59.6 |
| 132 | Maldives | 53.9 |
| 133 | Burundi | 53.9 |
| 134 | Suriname | 53.8 |
| 135 | Togo | 53.6 |
| 136 | Guinea | 53.3 |
| 137 | Bangladesh | 53.3 |
| 138 | Greece | 53.2 |
| 139 | Mozambique | 53.2 |
| 140 | Papua New Guinea | 53.2 |
| 141 | Comoros | 52.4 |
| 142 | Sierra Leone | 52.3 |
| 143 | Liberia | 52.2 |
| 144 | China | 52.0 |
| 145 | Guinea-Bissau | 51.8 |
| 146 | Malawi | 51.8 |
| 147 | Micronesia | 51.8 |
| 148 | Ethiopia | 51.5 |
| 149 | Tajikistan | 51.3 |
| 150 | Haiti | 51.3 |
| 151 | Nepal | 50.9 |
| 152 | Lesotho | 50.6 |
| 153 | Russia | 50.6 |
| 154 | Algeria | 50.1 |
| 155 | Laos | 49.8 |
| 156 | Angola | 48.9 |
| 157 | Belarus | 48.8 |
| 158 | Burma | 48.7 |
| 159 | Ecuador | 48.6 |
| 160 | Bolivia | 47.4 |
| 161 | Solomon Islands | 47.0 |
| 162 | Ukraine | 46.8 |

## Index of economic freedom in the world – 2017



## Index of economic freedom in the world – 2018



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 28 | Latvia | 73.6 | 91 | Bosnia and Herzegovina | 61.4 | 155 | Maldives | 51.1 |
| 29 | Qatar | 72.6 | 92 | Croatia | 61.0 | 156 | Iran | 50.9 |
| 30 | Japan | 72.3 | 93 | Oman | 61.0 | 157 | Burundi | 50.9 |
| 31 | Israel | 72.2 | 94 | Honduras | 60.6 | 158 | Liberia | 50.9 |
| 32 | Austria | 71.8 | 95 | Burkina Faso | 60.0 | 159 | Kiribati | 50.8 |
| 33 | Macedonia | 71.3 | 96 | Cabo Verde | 60.0 | 160 | Niger | 49.5 |
| 34 | Macau | 70.9 | 97 | Tanzania | 59.9 | 161 | Sudan | 49.4 |
| 35 | Botswana | 69.9 | 98 | Saudi Arabia | 59.6 | 162 | Chad | 49.3 |
| 36 | Vanuatu | 69.5 | 99 | Tunisia | 58.9 | 163 | Central African Republic | 49.2 |
| 37 | Romania | 69.4 | 100 | Nicaragua | 58.9 | 164 | Angola | 48.6 |
| 38 | Uruguay | 69.2 | 101 | Cambodia | 58.7 | 165 | Ecuador | 48.5 |
| 39 | Rwanda | 69.1 | 102 | Guyana | 58.7 | 166 | Suriname | 48.1 |
| 40 | Jamaica | 69.1 | 103 | Namibia | 58.5 | 167 | Timor-Leste | 48.1 |
| 41 | Kazakhstan | 69.1 | 104 | Nigeria | 58.5 | 168 | Togo | 47.8 |
| 42 | Colombia | 68.9 | 105 | Moldova | 58.4 | 169 | Turkmenistan | 47.1 |
| 43 | Peru | 68.7 | 106 | Tajikistan | 58.3 | 170 | Mozambique | 46.3 |
| 44 | Armenia | 68.7 | 107 | Russia | 58.2 | 171 | Djibouti | 45.1 |
| 45 | Poland | 68.5 | 108 | Belarus | 58.1 | 172 | Algeria | 44.7 |
| 46 | Malta | 68.5 | 109 | Gabon | 58.0 | 173 | Bolivia | 44.1 |
| 47 | Bulgaria | 68.3 | 110 | China | 57.8 | 174 | Zimbabwe | 44.0 |
| 48 | Cyprus | 67.8 | 111 | Sri Lanka | 57.8 | 175 | Equatorial Guinea | 42.0 |
| 49 | St. Vincent and the Grenadines | 67.7 | 112 | Trinidad and Tobago | 57.7 | 176 | Eritrea | 41.7 |
| 50 | Bahrain | 67.7 | 113 | Mali | 57.6 | 177 | Congo, Rep. | 38.9 |
| 51 | Saint Lucia | 67.6 | 114 | Solomon Islands | 57.5 | 178 | Cuba | 31.9 |
| 52 | Belgium | 67.5 | 115 | Greece | 57.3 | 179 | Venezuela | 25.2 |
| 53 | Thailand | 67.1 | 116 | Belize | 57.1 | 180 | North Korea | 5.8 |
| 54 | Panama | 67.0 | 117 | Barbados | 57.0 | | | |
| 55 | Hungary | 66.7 | 118 | Guinea-Bissau | 56.9 | | | |
| 56 | Kosovo | 66.6 | 119 | Madagascar | 56.8 | | | |
| 57 | Costa Rica | 65.6 | 120 | Benin | 56.7 | | | |
| 58 | Turkey | 65.4 | 121 | Comoros | 56.2 | | | |
| 59 | Slovak Republic | 65.3 | 122 | Ghana | 56.0 | | | |
| 60 | Spain | 65.1 | 123 | Swaziland | 55.9 | | | |
| 61 | Philippines | 65.0 | 124 | Haiti | 55.8 | | | |
| 62 | Jordan | 64.9 | 125 | Mongolia | 55.7 | | | |
| 63 | Mexico | 64.8 | 126 | Senegal | 55.7 | | | |
| | | | 127 | Papua New Guinea | 55.7 | | | |



## The Global Innovation Index – 2016

| Country/Economy | Score (0–100) | Rank | Income | Rank | Region | Rank | Efficiency Ratio | Rank | Median: 0.65 |
|---|---|---|---|---|---|---|---|---|---|
| Serbia | 33.75 | 65 | UM | 15 | EUR | 36 | 0.65 | 70 | |
| India | 33.61 | 66 | LM | 6 | CSA | 1 | 0.66 | 63 | |
| Kuwait | 33.61 | 67 | HI | 46 | NAWA | 10 | 0.73 | 42 | |
| Panama | 33.49 | 68 | UM | 16 | LCN | 6 | 0.66 | 61 | |
| Brazil | 33.19 | 69 | UM | 17 | LCN | 7 | 0.55 | 100 | |
| Lebanon | 32.70 | 70 | UM | 18 | NAWA | 11 | 0.73 | 41 | |
| Peru | 32.51 | 71 | UM | 19 | LCN | 8 | 0.51 | 109 | |
| Morocco | 32.26 | 72 | LM | 7 | NAWA | 12 | 0.66 | 64 | |
| Oman | 32.21 | 73 | HI | 47 | NAWA | 13 | 0.53 | 103 | |
| Philippines | 31.83 | 74 | LM | 8 | SEAO | 12 | 0.71 | 49 | |
| Kazakhstan | 31.51 | 75 | UM | 20 | CSA | 2 | 0.51 | 108 | |
| Dominican Republic | 30.55 | 76 | UM | 21 | LCN | 9 | 0.62 | 82 | |
| Tunisia | 30.55 | 77 | UM | 22 | NAWA | 14 | 0.60 | 86 | |
| Iran, Islamic Rep. | 30.52 | 78 | UM | 23 | CSA | 3 | 0.71 | 51 | |
| Belarus | 30.39 | 79 | UM | 24 | EUR | 37 | 0.45 | 116 | |
| Kenya | 30.36 | 80 | LM | 9 | SSF | 3 | 0.76 | 30 | |
| Argentina | 30.24 | 81 | HI | 48 | LCN | 10 | 0.56 | 98 | |
| Jordan | 30.04 | 82 | UM | 25 | NAWA | 15 | 0.67 | 58 | |
| Rwanda | 29.96 | 83 | LI | 1 | SSF | 4 | 0.38 | 123 | |
| Mozambique | 29.84 | 84 | LI | 2 | SSF | 5 | 0.73 | 45 | |
| Azerbaijan | 29.64 | 85 | UM | 26 | NAWA | 16 | 0.54 | 101 | |
| Tajikistan | 29.62 | 86 | LM | 10 | CSA | 4 | 0.77 | 29 | |
| Bosnia and Herzegovina | 29.62 | 87 | UM | 27 | EUR | 38 | 0.46 | 115 | |
| Indonesia | 29.07 | 88 | LM | 11 | SEAO | 13 | 0.71 | 52 | |
| Jamaica | 28.97 | 89 | UM | 28 | LCN | 11 | 0.53 | 104 | |

## The Global Innovation Index – 2017

| Country/Economy | Score (0–100) | Rank | Income | Rank | Region | Rank | Efficiency Ratio | Rank | Median: 0.62 |
|---|---|---|---|---|---|---|---|---|---|
| Colombia | 34.78 | 65 | UM | 16 | LCN | 5 | 0.52 | 100 | |
| Bahrain | 34.67 | 66 | HI | 44 | NAWA | 9 | 0.56 | 88 | |
| Uruguay | 34.53 | 67 | HI | 45 | LCN | 6 | 0.59 | 82 | |
| Georgia | 34.39 | 68 | UM | 17 | NAWA | 10 | 0.63 | 60 | |
| Brazil | 33.10 | 69 | UM | 18 | LCN | 7 | 0.52 | 99 | |
| Peru | 32.90 | 70 | UM | 19 | LCN | 8 | 0.49 | 106 | |
| Brunei Darussalam | 32.89 | 71 | HI | 46 | SEAO | 12 | 0.34 | 124 | |
| Morocco | 32.72 | 72 | LM | 7 | NAWA | 11 | 0.61 | 71 | |
| Philippines | 32.48 | 73 | LM | 8 | SEAO | 13 | 0.65 | 55 | |
| Tunisia | 32.30 | 74 | LM | 9 | NAWA | 12 | 0.62 | 65 | |
| Iran, Islamic Rep. | 32.09 | 75 | UM | 20 | CSA | 2 | 0.80 | 16 | |
| Argentina | 32.00 | 76 | UM | 21 | LCN | 9 | 0.55 | 94 | |
| Oman | 31.83 | 77 | HI | 47 | NAWA | 13 | 0.46 | 115 | |
| Kazakhstan | 31.50 | 78 | UM | 22 | CSA | 3 | 0.46 | 116 | |
| Dominican Republic | 31.17 | 79 | UM | 23 | LCN | 10 | 0.65 | 54 | |
| Kenya | 30.95 | 80 | LM | 10 | SSF | 3 | 0.66 | 50 | |
| Lebanon | 30.64 | 81 | UM | 24 | NAWA | 14 | 0.61 | 69 | |
| Azerbaijan | 30.58 | 82 | UM | 25 | NAWA | 15 | 0.50 | 103 | |
| Jordan | 30.52 | 83 | UM | 26 | NAWA | 16 | 0.65 | 57 | |
| Jamaica | 30.36 | 84 | UM | 27 | LCN | 11 | 0.57 | 86 | |
| Paraguay | 30.30 | 85 | UM | 28 | LCN | 12 | 0.61 | 72 | |
| Bosnia and Herzegovina | 30.23 | 86 | UM | 29 | EUR | 37 | 0.47 | 112 | |

## The Global Innovation Index – 2018

| Country/Economy | Score (0–100) | Rank | Income | Rank | Region | Rank | Efficiency Ratio | Rank | Median: 0.61 |
|---|---|---|---|---|---|---|---|---|---|
| Brazil | 33.44 | 64 | UM | 15 | LCN | 6 | 0.54 | 85 | |
| Iran, Islamic Republic of | 33.44 | 65 | UM | 16 | CSA | 2 | 0.82 | 11 | |
| Tunisia | 32.86 | 66 | LM | 7 | NAWA | 9 | 0.63 | 55 | |
| Brunei Darussalam | 32.84 | 67 | HI | 44 | SEAO | 12 | 0.31 | 124 | |
| Armenia | 32.81 | 68 | LM | 8 | NAWA | 10 | 0.80 | 15 | |
| Oman | 32.80 | 69 | HI | 45 | NAWA | 11 | 0.51 | 92 | |
| Panama | 32.37 | 70 | UM | 17 | LCN | 7 | 0.61 | 64 | |
| Peru | 31.80 | 71 | UM | 18 | LCN | 8 | 0.47 | 100 | |
| Bahrain | 31.73 | 72 | HI | 46 | NAWA | 12 | 0.55 | 84 | |
| Philippines | 31.56 | 73 | LM | 9 | SEAO | 13 | 0.61 | 62 | |
| Kazakhstan | 31.42 | 74 | UM | 19 | CSA | 3 | 0.44 | 111 | |
| Mauritius | 31.31 | 75 | UM | 20 | SSF | 2 | 0.47 | 105 | |
| Morocco | 31.09 | 76 | LM | 10 | NAWA | 13 | 0.61 | 65 | |
| Bosnia and Herzegovina | 31.09 | 77 | UM | 21 | EUR | 36 | 0.50 | 97 | |
| Kenya | 31.07 | 78 | LM | 11 | SSF | 3 | 0.69 | 41 | |
| Jordan | 30.77 | 79 | LM | 12 | NAWA | 14 | 0.65 | 50 | |
| Argentina | 30.65 | 80 | UM | 22 | LCN | 9 | 0.51 | 91 | |
| Jamaica | 30.39 | 81 | UM | 23 | LCN | 10 | 0.57 | 80 | |

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The title of Master Thesis in Lithuanian:

Finansinių technologijų keliamų grėsmių identifikavimas

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Master Thesis finished – 10-04-2020

**DECLARATION OF INDEPENDENCE OF THE MASTER THESIS**

10-04-2020

Vilnius

I, **Nassip Kadyrbayeva**

student of Mykolas Romeris University,

Faculty of Economic and Business, Electronic Business Management - 6211LX064

declare that the master thesis

**”IDENTIFICATION OF THREATS ARISING FROM FINANCIAL TECHNOLOGIES”**:

1. It is written and executed by me independently and in good faith;

2. Has never been represented and defended in any other educational institution in Lithuania and abroad;

3. It is written in accordance with the principles of academic writing and is familiar with the methodological instructions for academic work.

I am aware that in case of breaching of the principle of fair competition ( plagiarism), a student can be expelled from the university for gross breach of academic discipline.

_____ **Nassip Kadyrbayeva**