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ABSTRACT

The purpose of this to explore the current state of technology adoption and innovation in commercial banks in Kazakhstan and identify the challenges they face in implementing these technologies. The research paper aim to understand and recognize the relationship between innovation and financial performance of commercial banks in Kazakhstan. The research considered theory of Disruptive innovations. Audited Financial reports of twenty-one commercial banks were used in Data analysis. The Dynamic Panel model was used to understand the impact of financial technology innovations to financial performance. Additionally, the research paper could also contribute to the existing literature on technology adoption and innovation in the banking sector in emerging economies.

Keywords: Commercial banks, performance, strategy, innovations, technologies

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INTRODUCTION

1.1 Background to the Study

Innovation is currently one of the complex phenomena that determine the economic growth, development and sustainability of the banking sector. The banking system plays a special role in solving the tasks of innovative development of the country. A new product in the banking sector is a combined or non-traditional form of banking services. Commercial banks and technology companies are overlapping in their operations, and digital services are becoming increasingly similar in their features, the focus on delivering value to the customer has become more important than ever (Urazova, 2021).

Based on data from the World Bank and ID Finance, the fintech adoption rate in China stands at 69%, in Russia at 43%, and in Kazakhstan at 21%. These figures indicate significant growth potential, particularly in Kazakhstan (Urazova, 2021).

Currently, people are experiencing the emergence of new technologies, such as financial technologies (fintech), within the banking sector and capital market. Fintech encompasses innovative data and automation technology employed in financial contexts. For instance, the progress of mobile applications, smartphones, smartwatches, and similar devices has made it convenient to make payments for various goods and services. This improvement could potentially lead to more cost-effective financial and banking products. However, fintech also has the capacity to disrupt traditional financial intermediaries, as emphasized by Vives (2017).

The analysis of the state of innovation activity of Kazakhstani enterprises according to the Statistics Committee of the Republic of Kazakhstan showed that the level of their innovation activity is quite low and amounted to only 9.3% in 2018 (in Sweden, this indicator is 57%, in Germany – 70%, in Finland – 46%, Austria – 70%, Great Britain – 62%). In addition, the technological level of enterprises is characterized by a moderate labor productivity in the manufacturing industry – 38.9 thousand US dollars / person, which is on average 2 times less than the OECD countries, as well as

a high degree of depreciation of fixed assets in industry (about 40%) (Kuchukova N.K., 2020).

The bank's strategy is the conceptual basis of its activities, defining the bank's priority goals and objectives and ways to achieve them, and distinguishing the bank from its competitors in the eyes of its customers and employees (Medvedeva, 2022). The purpose of strategic planning and management of innovative banking activities is the development of promising areas of activity and the introduction of new banking products.

The structure of the innovation complex includes strategy development, planning and budgeting of innovative development, stimulation and motivation of personnel, control over the introduction of innovations, information support of the innovation process. The most important component of the overall innovation complex is the development of a strategy (Kryuchkova, 2010). In order for the innovations of banks to bring profit, each bank needs to develop a strategy for the introduction of new products or services.

1.2 Statement of the Problem

Evaluation of the chosen innovation strategy is always aimed at finding out its compliance with the set goals, whether it leads to their achievement. The main purpose of innovation risk management and control is to minimize possible losses of the bank. The complexity of risk management in banking practice is associated with their multidimensional nature, the relationship with changing external conditions, the complexity of formalization and many other factors (Medvedeva G., 2022).

The innovation strategy assumes that the credit institution is interested in having as many competitors as possible copy the innovations it introduces. The reason for such an extraordinary manifestation of the innovation activity of a commercial bank in most cases is the lack of sufficient capital to introduce innovations to the consumer market, weak marketing opportunities. Large competitors invest their own funds in advertising and promoting this product or service to the market, as a result of which the innovator

bank profits from popularizing its own innovative ideas. Of course, it cannot be denied that in this case, competitors receive most of the profits from the use of innovation, but without using this strategy, the innovator bank would not be able to achieve dissemination of the customer market (Prosalova, 2012).

The degree and structure of the development of financial systems can influence the effectiveness of the banking system and the likelihood of financial crises. This is one of the main problems associated with expanding access to financial services. According to the theory of comparative financial systems, this relationship can be explained by the concept of financial competition, which reduces the likelihood of involvement in risky transactions over time (Allen and Gale, 2004).

Commercial banks in Kazakhstan have developed a variety of financial innovations that have had an impact on their financial performance. Among such innovations are mobile and Internet banking, the possibility of withdrawing funds from ATMs, opening online accounts, providing unsecured loans and others. All these financial innovations significantly contribute to the formation of the customer base, strengthening the capital base and increasing the profitability of banks, which ultimately leads to an improvement in their financial performance (Robert, 2011).

1.3 Objective of the Study

To sum up, most commercial banks in Kazakhstan strive to become leaders in the field of digital banking, because there you can attract a large flow of customers, thereby achieving an increase in revenue. Becoming a digital banking organization and working as such is no longer an opportunity, but a necessity of time.

Thus, we state that the research about the relationship between innovation and financial performance of commercial banks in Kazakhstan has not been deeply examined yet. Addressing this gap, this study aims to understand the effects of fintech innovations on performance of commercial banks in Kazakhstan.

Obtaining the results would make it possible to clarify how financial innovations affect the financial performance of banks. This, in turn, would provide bank managers with a clear understanding of the impact of innovation and encourage them to support or discourage the introduction of financial innovations based on these findings. Such a study would be important for Kazakhstani consumers, since a positive assessment of the results would give them the opportunity to benefit from an increase in the number of financial innovations.

REVIEW OF LITERATURE

2.1 Financial innovation in Kazakhstan

Ensuring the long-term viability of the national economy in the face of global competition is a key priority of Kazakhstan's national policy, with the transition towards innovative development being a crucial aspect. The competitiveness of the country's economy is closely linked to the growth of its innovative potential. This implies that economic expansion should primarily be driven by industrial and innovative advancements, the integration of science and technology, and the adoption of computer systems and resource-efficient technologies. However, despite the country's unique human capital and research capabilities, the level of innovative processes in Kazakhstan remains low, as highlighted by Zhumagulova and Bimagambetova (2021).

Meanwhile, there are a number of serious internal problems in the economy of Kazakhstan, one of them is that currently the process of modernization of the economy is carried out mainly through the development of industries related to the IV technological order. Such economic development creates the risk of an increasing technological lag of the country from world standards. The aging process of fixed assets continues in the country: the degree of their depreciation has increased by more than 50% and in some industries is critical 80-90%. In comparison with the economies of developed countries, the volume of investments in fixed assets of the industry of the economy of the Republic of Kazakhstan is unacceptably small and amounts to 16.5% - 17.0% of GDP in 2016-2017.

Enterprises exhibit limited innovative development, patent activity is weak, and they continue to operate within the confines of the traditional industrial model, disconnected from science, business, and education.

In order to tackle these challenges, it is crucial to establish and nurture mechanisms that promote competition and cultivate a demand for innovation. The support for innovative initiatives should be specifically directed towards sectors that

demonstrate the potential for international competition and cooperation. Moreover, active involvement of multinational companies in Kazakhstan's innovative market and the development of mechanisms for network interaction are essential.

In the present era, rapid technological advancements are occurring across various fields, including the banking sector. This is evident in the global context as well as in Kazakhstan. The rise of “financial technologies” or fintech presents opportunities for the country's growth and can lead to differentiation between strong and weak institutions such as banks. Throughout this research paper, the term “fintech” is employed, although there is no precise definition for it. Nevertheless, it can be understood as an innovative approach that utilizes technology to create new financial services (Thakor, 2020).

Moreover, in the late 21st century, the financial services market experienced a transformation characterized by the introduction and growth of alternative methods to deliver products and services, along with the establishment of remote financial institutions providing customized services through digital technology. This evolution in financial companies activities, referred to as “fintech”, combines the realms of finance and technology (Golikava, 2020).

Given the constantly evolving business landscape, every bank, as an active participant in the market, must undergo transformations and take on the role of driving internal innovation processes. However, these processes should not occur haphazardly; rather, they should be executed systematically, guided by a well-defined innovation strategy that aligns with the broader development strategy of the banking system (Kryuchkova, 2010).

Analyzing the process of the use of innovations in the banking systems, it can be noted that in the last decade there has been an active use of innovations. The leaders in the use of innovative developments are banks in Southeast Asia – Japan, Singapore and South Korea, as well as the United States. If we talk about European banks, then the

greatest attention is paid to innovative developments in countries such as the United Kingdom, Germany and France (Imramzieva, 2013).

Kazakhstan's banking sector reacted quickly to the changing market landscape and was one of the first to introduce mobile applications. The initial response came from the largest banks at the time, namely Halyk Bank, Kazkommertsbank, and Bank CenterCredit. Starting from 2010, these banks began offering customers online services through mobile applications, adapting to evolving consumer behavior and providing smartphone-based services (Assanov, Bekmakhan, Kadyrova, Tskhay, 2021). The introduction of 4G technology in 2016 played a significant role in encouraging users to shift towards mobile banking and contributed to the overall rise in popularity of mobile internet usage. Presently, according to Yandex (2018), mobile internet penetration stands at 84%, while overall internet penetration is at 95% among the population of 18 million people in Kazakhstan. This includes residents across all 118 cities and 4,235 rural settlements with access to 3G/4G networks.

The count of individuals utilizing mobile banking services is increasing on a daily basis. As per a survey conducted by Forbes Kazakhstan (2020), seven out of the top ten most downloaded applications in 2020 were related to banking. In September 2020, the number of Internet banking users in Kazakhstan rose by 4 million compared to the beginning of the year, reaching 12 million individuals. Furthermore, by the conclusion of 2020, the overall count of active payment cards had reached 25 million (Assanov, Bekmakhan, Kadyrova, Tskhay, 2021).

Kaspi bank holds the majority share of the digital banking market in Kazakhstan. The redistribution of the transaction market is a significant topic in Kazakhstan, considering the growth of digital services. In the past three years, online transfers using card numbers have gradually replaced bank transfers through account details, and currently, there is a shift towards transfers using phone numbers. Individuals and small entrepreneurs extensively utilize the feature known as «transfer» by phone number to Kaspi. This particular market segment, which is currently unregulated, would

eventually be occupied either by a bank or by an instant payment system (Urazova, 2021).

Currently, according to Markswebb research, AltynBank is the only bank in Kazakhstan that is capable of fully remote client identification. AltynBank, ForteBank, and Bereke bank's applications allow consumers to remotely update personal information, access banking products, request card reissuance, and order official documents. BCC and Eurasian's mobile applications enable the opening of current accounts in local currency or foreign currency, while Kaspi, BCC, HomeCredit, and Eurasian allow for the opening of deposits. (Urazova, 2021). Opening a debit card is possible with Eurasian, BCC, and Sberbank. However, compared to their Russian counterparts, Kazakh banks have been less proactive in implementing digital services like online chat support, providing a unified transaction history for all products, and managing products and limits. Some banks have complicated procedures for correcting personal information, particularly when it involves changing phone numbers (Urazova, 2021).

2.2 Theories of Financial Innovation

In the literature, financial innovations have different definitions. According to the European Central Bank (ECB 2003), financial innovation primarily refers to product and organizational innovations that allow banks to reduce costs or risks or improve the quality of service in the financial industry as a whole. Similar considerations can be found in Glen (2008) and Cheryl (2008), who define innovation based on several key concepts, such as eliminating underdeveloped markets, overcoming agency problems and information asymmetry, reducing transaction costs, conducting research or marketing, responding to changes in taxation and regulation, as well as the connection with globalization, risks and technological shocks. Financial innovations arise because of the interaction of two or more of these factors.

Christensen developed the theory of breakthrough innovation based on previous research in the field of technological innovation. In 1997, he published his famous

work entitled “The Innovator's Dilemma”, which made him famous through the study of commercial innovations. In this book, which became a bestseller of the time, he detailed his theory of breakthrough technologies (Yu Dan & Hang Chang Chieh, 2008). Breakthrough innovations arise in the process of development. Breakthrough technologies differ from mainstream technologies in that they offer values other than core ones, and although they are inferior to them in terms of performance, they are important customers.

For example, the term “disruptive innovation” is often applied randomly to various innovative situations (Constantinos M, 2006). This theory and its variations have been applied to so many unrelated situations that Christensen himself has expressed concern about some ways of using this theory. Such an existence of chaos and fragmentation around the term causes misunderstanding about breakthrough innovations, which to a certain extent complicates the further development and application of this theory. If the term remains vague, it can turn into just a fashionable expression in business. Therefore, there is a need for a clear classification of both the basic concepts of this theory and its real connotations, so that people can correct previous misunderstandings, prevent misuse and determine the real consequences of the concept of breakthrough innovations.

The characteristics of disruptive innovations include the following: lower gross margins, higher costs, smaller target markets, and simple products and services that may not seem as attractive as existing solutions based on traditional performance indicators. Due to the low gross margin, these lower market segments are of no interest to other firms that seek to move up the market, which creates space at the bottom of the market for the entry of new disruptive competitors (Constantinos M, 2006). Therefore, we can conclude that those commercial banks that have the above features in their financial statements relate to disruptive innovations, and the rest simply automated their work processes, which does not relate to disruptive innovations.

2.3 Fintech in banking services

Internet banking is a common name for remote banking technologies, in which access to accounts and transactions is provided at any time and from any computer with Internet access (Imramziyeva, 2014). The browser is used to perform operations, that is, there is no need to install the client part of the system software. Internet banking for individuals and legal entities is a remote banking system that allows you to manage your accounts and make payments and transfers using the Internet (Imramziyeva, 2014). Internet banking is the most profitable service for banks. In commercial banks of Kazakhstan offering Internet banking services, monthly payments exceed 20,000. JSC Halyk Bank of Kazakhstan became one of the first second-tier banks in Kazakhstan, which proved the fact of fast payback (Imramziyeva, 2014). Halyk Bank offers Home-banking services to its clients, allowing them to conveniently access banking services from the comfort of their homes or workplaces. These services include the use of automated teller machines, electronic payment systems, and conducting banking operations remotely (Zhorabayeva & Ushkempirova, 2016). This represents a unique form of banking service provision to individuals. The emergence of a virtual economy has opened up new opportunities for businesses, with many enterprises and companies utilizing global network access to facilitate transactions, engage in advertising and marketing research, and establish virtual stores (Zhorabayeva & Ushkempirova, 2016).

The introduction of new software products and processors in the banking industry has greatly facilitated automation processes for all banks. Fintech innovations can encompass various functions such as; electronically processing paper-based financial documents, computerizing billing and payment transactions, establishing new communication systems between separate job systems and the banking system, implementing instructions, enabling checkbook issuance and monitoring cash flow movements in customer accounts within specific time periods, facilitating payments through customer accounts, offering services from different companies, and conducting various operational activities (Zhorabayeva, Ushkempirova, 2016).

Moving forward, some authors argue that the benefits and drawbacks of inventing and implementing Fintech are not yet fully understood in relation to the ongoing trends in the financial industry. Fintech companies bring numerous innovations, particularly in terms of financial products, but traditional banks maintain a strong position. There are several reasons for this. Firstly, traditional financial institutions like banks, which lack expertise in financial technology, can provide their customers with a wider range of products that carry lower risks (Daulenova & Taylor, 2021). When compared to banks, FinTech may be inferior in terms of service due to its limited flexibility. While traditional banks still hold significance, fintech organizations also have their operational domains, and the most prevalent business model often involves integrating traditional and fintech-oriented approaches (Nikonov, 2018).

To date, there are several innovations used in banking practice: the active use of electronic money, the use of technology for Internet banking settlements, and other technologies for remote account management. The product innovations of banks include: innovative leasing if its object is fixed assets involved in the process of innovative activity of the company, factoring, which is the assignment of unpaid debt claims to the bank, franchising, which is a form of business cooperation between large and small businesses, forfeiting, provision of acquiring services, remote account management systems, package provision of insurance services (Kryuchkova, 2010).

In general, FinTech is bringing about significant changes in the banking industry as a whole. This transformation affects the time and location of financial products and services, creating new dynamics in the relationships among banks, FinTech companies, and customers. The development of FinTech not only influences market participants but also raises concerns regarding network stability, security, and financial protection, which can pose challenges for consumers. By mitigating the risks associated with FinTech, a new financial industry is emerging where FinTech is considered a crucial component. In summary, numerous authors provide definitions for the term "financial technologies" and discuss the positive and negative aspects of fintech adoption within

the global banking sector. However, there is a lack of specific information related to the impact of fintech on bank performance in Kazakhstan. Additionally, it is important to establish the correlation between the use of financial technologies and the overall state of the economy, including its growth or decline (Daulenova & Taylor, 2021).

Very often, in real banking practice, it is necessary to choose the best option for investing free funds in a project containing innovative technologies. The methodology for selecting the best investment option is based on a preliminary determination of the attractiveness of all considered alternative options according to the system adopted for comparison of the following indicators: internal rate of return; net discounted income; profitability index; payback period of investments (Medvedeva G., 2022). Nevertheless, for each credit institution, certain indicators of economic efficiency are important. Therefore, the modern system of selecting the best option for an investment project involves the use of an additional complex performance indicator that takes into account the rating of each investment project under consideration.

Information technologies have become an integral part of modern society; the successful development of any sphere of human activity is already unthinkable without high technologies. The main advantage in the banking competition for the client was the introduction of new technologies, because the offer of a new product in the current conditions is impossible without its technological support, and the possibility of receiving services in the shortest possible time is one of the criteria for choosing a bank. Attracting new customers is accompanied by an increase in the information flow, the need to process large amounts of information and an increase in the number of operations performed by bank employees (Anoshina, 2021).

Accordingly, in order to conduct more efficient activities of a credit institution, it is advisable to optimize internal business processes, automate typical tasks, minimizing the number of manual operations and their complexity. To this end, a system of continuous improvements has been implemented in many banks, and a list

of business processes prioritized for optimization, automation, and robotization is determined annually (Simonov, 2020).

Nevertheless, modern research in the field of innovation management in business has shown that in most commercial banks in Kazakhstan, top management is focused more on solving current operational tasks than on strategic development. The dynamics of innovation processes is greatly influenced by the traditional organization of work of bank employees for the Kazakh banking sector, which is based on conservative principles. Moreover, the quality of management in domestic banks is often far from the world level, which, in turn, reduces the effectiveness of the development of the banking system as a whole and, accordingly, levels its role in the recovery of the country's economy. In this regard, it is necessary to reform the management system in commercial banks in order to achieve the level of world requirements based on a well-thought-out innovation policy.

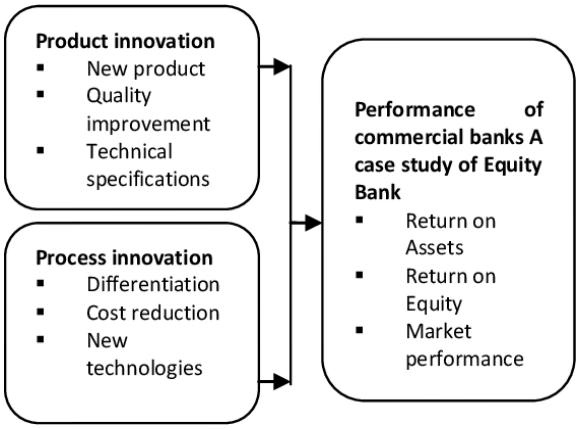
The financial technology is measured by looking at disruptive innovation sustainable innovation, and efficient innovation. Previous researches, has shown that technological innovations have played a role in promoting financial development and macroeconomic stability in developing countries. Therefore, it is hypothesized that fintech will have a positive impact on macroeconomic stability, as it is closely linked to long-term financial development.

2.4 The Impact of Financial Innovation on Financial Performance

Financial innovations have the potential to enhance economic performance through three fundamental mechanisms. Firstly, they can fulfill the needs of investors or issuers by introducing new securities or products that enable broader opportunities for risk-sharing, risk-pooling, hedging, and transferring resources across different periods or locations. Secondly, they can reduce transaction costs and enhance liquidity in financial markets. Lastly, they can mitigate “agency costs” that arise due to information imbalances between parties involved in trades or incomplete monitoring

of agents' performance by principals. All three of these factors driving financial innovation align with its objective of improving economic efficiency (Merton, 1992).

Figure 1. Impact of Product innovation and process innovation to performance of commercial banks.



Source: A case study of equity Bank

In fact, Internet banking does not bring income by itself, by providing round-the-clock access to products, products that the customer buys remotely bring income (Zhorabayeva & Ushkempirova, 2016). Internet banking is a kind of cost minimization for commercial banks, since there are no expenses for employees, as well as for opening and further work of the branch (Imramziyeva, 2014).

On the other hand, a successful innovation enables a company to establish a unique and advantageous position in the market, leading to a competitive edge and superior performance. However, as imitating competitors enter the market through the process of creative destruction, enterprises are compelled to continue producing innovations to sustain their competitive advantage. Price theory recognizes price as a mechanism that confers benefits to those who innovate first. Setting higher prices before imitators enter the market enables innovators to recoup their investment costs in developing the innovations (Robert M. G., 2011).

METHODOLOGY

This chapter shows the methods and procedures that will be used in conducting research to assess the relationship between financial innovation and the financial performance of commercial banks in Kazakhstan.

To analyze the implementation of technologies and innovations in commercial banks, we selected Kazakhstan. Because, Kazakhstan is developing country that has been actively using innovations in the banking sector for the last decade. There are twenty-two banks in Kazakhstan, including 10 foreign banks and 3 Islamic banks. Only one bank did not have general access to financial reports, so twenty-one Kazakhstani commercial banks were selected for the study.

Financial statements for 5 years were applied, data from 2016 year to 2020 year. The rapid development of innovations began on average in 2016; therefore, we took the data of five years from this year. Which includes total revenue, total expenditures, total assets, Research and development expenses, net profit of commercial banks. The study used secondary data sources. Secondary data on financial innovations were obtained from the audited financial results of companies.

To analyze data were used Descriptive statistics analysis, Multicollinearity, Dynamic Panel Model. The model aims to demonstrate how innovative products or services spread among potential users over time. It is intended to show a steady growth in the number of users and forecast how the distribution process will evolve in the future. The model is dynamic because the equation for time t includes an element from the previous period, an uneven response yi; t-1. Panel data is data that contains statistical information about the same set of objects for a number of consecutive periods of time (Gutierrez,2017).

Dynamic panel models are regression models that take into account both cross-effects and a dependent variable with a delay. They are a powerful tool for accounting for missed factors whose effects persist over time. Since a lagged dependent variable

is included as a regressor or, standard estimation methods, such as internal estimation, may be biased (Gutierrez, 2017).

The main purpose of regression analysis is to identify the relationship between each independent variable and the dependent variable. The interpretation of the regression coefficient is that it represents the average change in the dependent variable when the independent variable changes by 1 unit, provided that all other independent variables remain unchanged.

3.1 Research Hypothesis

1. Null Hypothesis (H0): There is no significant impact of fintech innovations on the performance of commercial banks in Kazakhstan.

Alternative Hypothesis (H1): There is a positive impact of fintech innovations on the performance of commercial banks in Kazakhstan.

Regression Model to analyses Descriptive Statictics, Corellation Dynamic Panel Model,

$$Perf_{i,t} = \beta_0 + \beta_1 OperEf_{i,t} + \beta_2 Inn_{i,t} + \beta_3 Size_{i,t} + \beta_4 RD_{i,t} + \beta_5 Covid_{i,t} + \beta_6 Islamic_{i,t} + \beta_7 Foreign_{i,t} + \beta_8 Growth_{i,t} + u_{i,t}$$

Less biased (addresses indigeneity problems), also fixes Heteroskedasticity issues raised from data.

Dependent variable:

$Perf_{i,t}$ − Return to Assets = Net income/Total Assets

Independent variables:

$\beta_1 OperEf_{i,t}$ − (Revenue- Expenditures)/Revenue

$\beta_2 Inn_{i,t}$ − R&D/Total expenses

$\beta_3 Size_{i,t}$ − ln(revenue)

$\beta_4 RD_{i,t}$ − ln(R&D spending expences)

$\beta_5 Covid_{i,t}$ − Dummy variables (i.e., 1) for years 2019 and 2020

$\beta_6 Islamic_{i,t}$ − Dummy variable (i.e., 1) to Al hilal bank, KZI bank, Zaman bank

$\beta_7 Foreign_{i,t}$ − Dummy variable (i.e., 1) when the majority of share is controlled by foreign banks or investors.

$\beta_8 Growth_{i,t}$ − (Sales Y1 - Sales Y0)/Sales Y0. It measures the yearly growth rate of the banks

$u_{i,t}$ − Idiosyncratic error

RESULTS

4.1 Data Analysis

This chapter shows analysis and findings of the study as set out in the research methodology. The study findings are illustrated on to determine the relationship between financial innovations and financial performance of commercial banks in Kazakhstan. Financial performance has been calculated by profitability ratio that provides how much profit a company can generate from its assets. It is return on assets (ROA).

A quantitative approach, including descriptive statistics and regression model, will be used to analyze the data. Measures of the central trend will be calculated, such as percentages, frequencies, mode, median and mean, where applicable. In addition, the study will use multiple linear regression to analyze the data.

Table 1 – Commercial banks spent for Innovation expenses in 2020 year (in thousands)

id	bank	Innovations expenses in thousands 2020 year
1	Kaspi Bank	30 818 000
2	ForteBank	6 051 000
3	People's Bank of Kazakhstan	5 593 000
4	Home Credit Bank Kazakhstan	3 162 499
5	Eurasian Bank	2 543 336
6	Bereke Bank	2 135 000
7	Otbasy Bank	1 533 370
8	Altyn Bank	776 539
9	Bank RBK	471 419
10	Nurbank	409 123
11	VTB Bank Kazakhstan	384 590
12	Bank CenterCredit	357 000
13	Freedom Finance Bank Kazakhstan	330 068

14	Bank of China in Kazakhstan	304 966
15	KZİ Bank	166 811
16	Al Hilal	130 893
17	Citibank Kazakhstan	58 129
18	Shinhan Bank Kazakhstan	46 595
19	Zaman Bank	27 798
20	Commercial and Industrial Bank of China in Almaty	19 809
21	First Heartland Jusan Bank	9 259

Source: audited financial reports

According to this table, Kaspi bank take first place between commercial banks in Kazakhstan.

The objective of the study was to determine the impact of bank innovations on financial performance of commercial banks in Kazakhstan between 2016 and 2020. The objective was assessed by use of secondary data and the subsequent analysis based on the variables of the study. From the findings, financial performance of commercial banks in Kazakhstan increased over the 5 year period as shown by the ROA mean values.

Table 2 – Changes in ROA

id	bank	ROA in 2016	ROA in 2020
1	Al Hilal	7,0%	0,9%
2	Bank RBK	0,5%	1,3%
3	Bereke Bank	0,5%	1,9%
4	First Heartland Jusan Bank	9,0%	6,0%
5	ForteBank	1,0%	2,5%
6	Home Credit Bank Kazakhstan	12,1%	5,9%
7	Kaspi Bank	1,9%	9,4%
8	KZİ Bank	4,1%	2,6%
9	VTB Bank Kazakhstan	-3,5%	1,6%

10	Altyn Bank	2,8%	2,7%
11	Bank of China in Kazakhstan	1,9%	2,1%
12	Freedom Finance Bank Kazakhstan	0,1%	1,8%
13	Bank CenterCredit	2,8%	0,7%
14	Eurasian Bank	0,2%	0,6%
15	Zaman Bank	3,7%	0,9%
16	People's Bank of Kazakhstan	2,5%	3,4%
17	Nurbank	0,6%	-6,4%
18	Otbasy Bank	3,6%	1,9%
19	Citibank Kazakhstan	5,5%	5,6%
20	Commercial and Industrial Bank of China in Almaty	4,7%	2,0%
21	Shinhan Bank Kazakhstan	2,1%	1,7%

Source: computed by author

Descriptive statistics were done to obtain brief informational coefficients that summarize a given dataset, which can be either a representation of the entire a sample of a population. Descriptive statistics include the mean, median, and mode, while measures of variability include standard deviation, variance, minimum and maximum variables, kurtosis, and skewness.

	COVID	FOREIGN	GROWTH_RATE	INNOVATORS	INNOVATORS_2Y	INNOVATORS_SQ	ISLAMIC	OPERATIONAL_EFFICIENCY	RD_LOG	SIZE
Mean	0.400000	0.390476	1.029635	0.047479	0.037902	0.003202	0.142857	-0.058435	12.45600	16.64717
Median	0.000000	0.000000	0.057334	0.036412	0.033137	0.001098	0.000000	0.512208	12.59000	16.56730
Maximum	1.000000	1.000000	71.12580	0.205361	0.192617	0.037101	1.000000	0.896572	17.24000	20.27920
Minimum	0.000000	0.000000	-0.899467	0.001128	0.000000	0.000000	0.000000	-51.91800	7.240000	11.87670
Std. Dev.	0.492248	0.490197	7.214785	0.044077	0.042218	0.007042	0.351605	5.122996	2.121734	1.801904
Skewness	0.408248	0.449000	9.067985	1.812770	1.890812	3.432998	2.041241	-10.02060	-0.181259	-0.149937
Kurtosis	1.166667	1.201601	87.08745	5.895043	6.680209	14.78835	5.166667	101.9398	2.741416	2.567190
Jarque-Bera	17.62153	17.67781	32373.30	94.17545	121.8202	814.2182	93.45486	44584.43	0.867496	1.212964
Probability	0.000149	0.000145	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.648075	0.545266
Sum	42.00000	41.00000	108.1117	4.985298	3.979674	0.336205	15.00000	-6.135671	1307.880	1747.953

Sum Sq. Dev.	25.20000	24.99048	5413.525	0.202048	0.185369	0.005157	12.85714	2729.489	468.1823	337.6731
Observations	105	105	105	105	105	105	105	105	105	105

Table 3 – Descriptive statistics

Source: computed by author

To perform the analysis, the data will be entered into the Stata version 16 program along with variables and values for calculating correlation coefficients. The value of the Arellano–Bover/Blundell–Bond model indicates the strength of the linear relationship between the variables, reflecting its level from weak to strong.

Table 4 – Bank Growth Arellano–Bover/Blundell–Bond model

VARIABLES	(1) ROA
L.roa	0.532***
	(0.0987)
innovators	9.156*
	(5.546)
rd_log	0.720***
	(0.277)
operational_efficiency	0.843**
	(0.429)
size	-0.674**
	(0.324)
covid	0.423**
	(0.178)
foreign	-3.758***
	(1.390)
growth_rate	-0.00595
	(0.0133)
Constant	4.037
	(2.937)
Observations	84
Number of id	21

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: computed by author

According to table, Innovation, Operational efficiency, Covid-19 variables had positive impact to financial performance. One percent increase in an Innovator index

increase the Return on assets by 9.156 percent. Operational efficiency had positive effect with 99,5% confidence level, it may mean that applying innovations could optimize operational revenue. There are confidence level is 99%, so it is reliable. Indicator of Foreign commercial banks had negative effect; it may be because they are expenses for innovation are reflected in main branches exactly overseas. In addition, company size and growth rate had negative effect.

4.2 Conclusions

The study concludes that there is a positive relationship between financial innovations and the financial performance of commercial banks in Kazakhstan. Competition between banks and the global trend towards technology has led to constant innovation. The development of financial technologies was positively influenced by Covid-19, this period was the peak of the development of innovations for the remote use of commercial banking services.

Taking into account the steady growth in the use of banking services via mobile phones over a five-year period and the corresponding increase in the financial performance of commercial banks in Kazakhstan over the same period, the study concludes that the positive impact of banking services via mobile phones as an innovation on the financial performance of commercial banks in Kenya over a five-year period.

The improvement in financial indicators was achieved as a result of a reduction in the cost of financial transactions, which can be attributed to financial innovations. Commercial banks introduced technological innovations, which included mobile banking and online banking, innovative terminals. The strategies for introducing innovative products adopted by commercial banks were deposit management, payments, loans, car loans and mortgages. The introduced institutional innovations were insurance services, credit bureaus and Islamic banking. The research revealed that Islamic banking is less innovative and adheres to more conservative types of banking services. In turn, foreign banks do not have a strong relationship like Kazakhstani ones,

this is due to the fact that they invest in innovations in their country much more and this is reflected in the financial statements of the main branches.

The introduction of these financial innovations has led to an increase in the financial performance of commercial banks. Financial innovations have also led to improvements in banking products and services. Banks can use more innovations in customer service and technology. The Bank can take measures to improve its operations and become more competitive by training its staff, investing in high technologies and listening to the needs of its customers.

4.3 Recommendations

The study recommends that Kazakhstan's regulatory authority create a supportive environment that promotes innovation in banks so that they can take full advantage of innovative strategies. Compliance with regulations and policies will allow banks to profit from technological innovations in the field of products, markets and technologies. Without an appropriate policy, banks will not be able to function effectively in the market and make a profit. Based on the results and conclusions of this chapter, it is recommended that commercial banks strive to increase profits, expand their customer base and invest using market innovation strategies. Previous studies also confirm the need to use strategies aimed at meeting customer needs, fighting competitors, entering new markets and creating value through pricing if the goal is to increase business profitability.

It is also recommended that banks strive to expand the product range, replace products, improve products, change their positioning and introduce new products in order to be more productive, grow faster, invest more and earn more profit. Successful product development requires quality systems, a good information flow, specialization and support from management in the formation of competitive strategies. The power of product innovations that can strengthen the competitive position of companies cannot be underestimated.

The study also recommends that commercial banks actively implement the introduction of new products, reduce costs, improve the innovation process and comply with regulations affecting the profitability of the bank. This will allow companies to better focus on customer needs, while new products themselves will become a source of marketing momentum. It is also important that firms ensure adaptation to new technologies to cope with a rapidly changing technological environment. Technological innovations facilitate the flow of information and its rapid delivery to recipients. Effective implementation of technological innovation strategies requires a reliable infrastructure and sufficient funding, and employees must have the appropriate skills and knowledge in the field of new technology, which can be developed through regular training to ensure their readiness and support for the introduction of new technologies in the bank.

APPENDICES

Appendix I: Commercial Banks in Kazakhstan

1. Kaspi Bank
2. ForteBank
3. People's Bank of Kazakhstan
4. Home Credit Bank Kazakhstan
5. Eurasian Bank
6. Bereke Bank
7. Otbasy Bank
8. Altyn Bank
9. Bank RBK
10. Nurbank
11. VTB Bank Kazakhstan
12. Bank CenterCredit
13. Freedom Finance Bank Kazakhstan
14. Bank of China in Kazakhstan
15. KZİ Bank
16. Al Hilal
17. Citibank Kazakhstan
18. Shinhan Bank Kazakhstan
19. Zaman Bank
20. Commercial and Industrial Bank of China in Almaty
21. First Heartland Jusan Bank

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