

# The impact of digitalization and artificial intelligence on sustainable development and energy efficiency of the Georgian banking sector

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**Abstract.** In modern times, the importance of using digital technologies plays a great role. This issue is particularly important for the banking system, to provide them quality customer service and respond to market challenges at the right time. Commercial banks participating in the banking system of Georgia have the potential to achieve effective results of transformation into digital banks in a short period of time. Based on the above, the aim of the research is to identify the innovations embedded in Georgia's commercial banks and analyze their implications. Proper activity of commercial banks and development in the right direction are key components in ensuring financial stability, which highlights the significance of the mentioned topic. Theoretically, this research contributes to the broader academic discourse on digital transformation in the banking industry. Practically, such research provides valuable insights for policymakers, banking executives and other stakeholders in the financial industry. The research utilizes both qualitative and quantitative methods. Overall, the study analyses innovative technologies introduced by leading banks in Georgia and their role in innovative banking within the sector.

## 1 Introduction

In the current era, digital technologies have established themselves in almost all fields and moved each direction to a new stage of development. The digitization process is global and irreversible, although it is quite long-term, so it is important to accelerate the mentioned processes. In the wake of technological changes in the world, it becomes possible to digitize any banking service, accordingly, the demand of users also changes. That is why each bank's priority should encompass the adoption of new digital technologies.

The main stimulus for the operation of commercial banks is profitability. For this purpose, any bank constantly tries to offer improved services to customers, which in turn is reflected in profitability indicators. Therefore, it is crucial to evaluate the impact and role of innovations on the profitability level of banks, which is a focus of research.

According to the authors based on research [1, 2] artificial intelligence is an essential tool for fraud detection and risk prevention. Research is about the importance and challenges of

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adopting artificial intelligence in the banking industry in Malaysia. It is also mentioned that absence of regulatory requirements, data privacy and lack of relevant skills and IT infrastructure are significant challenges of artificial intelligence adoption.

Article [3] examines the acceptance rate of digital transformation in the banking sector in Greece. The results of this article prove that the majority of the respondents (members of the Federation of Banking Employees of Greece) agree that digitization allows them to carry out a larger volume of work in a shorter time and more easily.

About Digital experience study was conducted in Indonesia [4]. The findings of this study are relevant to companies that are going to enter the digital banking industry. The six variables that were found to have a main influence on the intention to use (economic value, social influence, firm reputation, perceived ease of use, product features, and rewards) can be used by companies to create strategies.

A number of studies describe the positive impact of the digitization process, including: Digitalization and bank profitability: evidence from an emerging country [5-8]. The purpose of this study is to reveal the impact of digitization on the level of bank profitability among banks in Vietnam. The findings of the research reveal its positive impact on the bank's profitability. This statement is further supported by the research: Digital banking and Bank Profitability in Nigeria [9]. All the banking digital channels examined in this study contribute significantly to the level of profitability in Nigerian banks.

## **2 Research methods**

Quantitative research is conducted as well as qualitative methods. In the context of quantitative research, such issues are discussed as in the banking sector of Georgia: the volume of remote banking transactions, the number of digitally active users etc. Meanwhile, the qualitative method is used during the study of existing digital products or services.

## **3 Results and discussion**

The banking sector represents one of the most developed sectors in Georgia. Consequently, there is a significantly high level of competition, prompting banks to continuously strive for innovation adoption in order to differentiate themselves and increase their market share.

In the financial sector, fintech companies are preferred for innovation adoption, which encompasses various types of services, including banking services. Through fintech companies, the banking market has improved traditional forms of finance for both consumers and businesses. Indeed, the provision of services by fintech companies facilitates the adoption of innovations such as mobile banking, cryptocurrencies, open banking and others.

The digital transformation of the banking sector is impossible without the adoption of technologies such as Cloud Computing, Blockchain, Artificial Intelligence, Robotic Process Automation (RPA), Open Banking, and others. These technologies are constantly evolving, and the banking sector must ensure timely integration of these processes, otherwise, they will simply fail to compete and fall behind in the market.

The digital transformation of the banking sector is crucial in determining the competitiveness of banks. It is not just a trend but a necessary priority for growth and success. Several factors underscore this:

- **Cost efficiency:** Digitization enables banks to streamline operations and reduce the need for physical infrastructure. Internet banking and related operations significantly decrease operational costs. The reduction of mentioned costs contributes to the possibility of obtaining higher profits.

- Increase the number of customers: Through digital banking, customers get convenience and accessibility. It allows users to conduct banking operations and receive services anytime, anywhere. Customer satisfaction translates into increased usage of banking services, which increases the bank's revenue.
- Expanded markets: Digitization of banking services breaks down geographical barriers, allowing banks to attract customers who do not have physical access to bank service centers. As the number of users increases, revenue streams and profits increase accordingly.
- Data analytics and personalization: A large amount of data can be analyzed through modern banking platforms. Using such algorithms, banks can gather valuable information about customers' behavior. With this approach, banks can increase profitability by offering personalized products and financial recommendations.
- Innovation and Competitive Advantage: The continuous innovation process is essential in the banking industry to gain a competitive advantage. By having digital products, banks can differentiate themselves in a highly competitive environment, which is also a prerequisite for revenue growth.

In today's ever-evolving financial industry, artificial intelligence plays a crucial role, further accelerating the digitization process. The integration of artificial intelligence in banking operations has revolutionized paradigms, enabling financial institutions to adapt to the changing dynamics of the market and meet the needs of customers in the digital age.

Banks have started using artificial intelligence in business processes, particularly in the decision-making process for credit issuance. Artificial intelligence can analyze customer behavior and credit ratings to determine their creditworthiness. Besides, the banking sector widely implements and efficiently utilizes innovative technology - RPA (Robotic Process Automation). This is a software robot capable of performing repetitive tasks based on predefined rules and logic. Consequently, banks can automate a large part of their work, while reducing time, human resource costs and operational risks [10].

Automation of robotic processes is a fairly common technology in Georgian banks. According to the annual report [11], the credit portfolio of TBC Bank increased by 25% in 2022, and the growth was largely influenced by the number of highly automated microloans. During the year, 77% of such loans (up to 100,000 GEL) were processed automatically. The Bank of Georgia is also working on the digital lending model, which in 2021 developed an evaluation system, pre-approved limits and a monitoring system, as a result, the level of automation of the retail lending process was 70% [12]. The mentioned banks primarily prioritize digitalization, aiming to increase automation levels in their credit processes. Offer Hub is a Bank of Georgia project that automatically analyzes customer preferences based on their behavior on various platforms and provides relevant recommendations. It is one of the main tools for increasing customer engagement, integrated into the Bank of Georgia mobile application.

One of the best examples of practical use of artificial intelligence in the banking sector is Chatbots. In their banking practice, Chatbots enable banks to provide services to customers 24/7. Moreover, Chatbots equipped with artificial intelligence can analyze customer behavior and be trained to understand the client's needs. Apart from delivering fast service to customers, Chatbots offer personalized banking services. One of the pioneering financial Chatbots in Georgia is "T-Bot," adopted by TBC Bank back in 2017. It was an innovative financial assistant that paved the way for similar bots in other banks as well. Another example in Georgia's banking sector is the virtual assistant with artificial intelligence integrated into the Internet banking system, capable of performing tasks such as sending statements, checking balances, and blocking/unblocking cards. It closes about a third of the user's requests [13].

Another significant role of artificial intelligence is its assistance to banks in fraud prevention. With the constant increase in transactions, the need for control also rises. Through continuous monitoring facilitated by artificial intelligence in financial services, banks can detect fraudulent transactions and respond to cybersecurity threats at an early stage. In Georgia's banking sector, TBC Bank has a sophisticated AML (Anti-Money Laundering) system, which enables them to protect clients' transactions through monitoring and identifying suspicious activities. The automated system helps the group detect organized money laundering cases and predetermined patterns. This approach has great value, as otherwise the financial costs increase considerably, due to the fact that the process of mechanical analysis of these transactions requires a lot of time from AML officers. An automated process collects such incidents and submits them to AML officers for further action. The Bank of Georgia has introduced an artificial intelligence tool that analyzes user behavior and detects potential fraud. In addition, the Bank uses a transaction monitoring system to identify and report suspicious transactions. This allows for the implementation of automated monitoring based on a list of sanctions.

The role of artificial intelligence extends to the process of data collection and analysis. Financial institutions process millions of transactions daily. In the processing of such large volumes of data, the role of artificial intelligence is indispensable. In addition to data collection, AI can analyze and forecast them. Unlike traditional methods, artificial intelligence can reveal correlations among data sets. Besides forecasting, the information thus obtained can be utilized for increasing sales.

The process of digitization in the banking business reduces costs in the long term, but it requires significant initial investments in technological or human resources. Such a trend is also evident in both Georgia and TBC banks, notably, TBC Bank's operational expenses increased by 23.3% compared to the previous year according to the 2022 report. The increase in administrative and other operational expenses was primarily attributed to IT investments and business development. As for the Bank of Georgia, operating expenses during the year were 581.7 million GEL, which is 26.1% more than last year. The annual increase was mainly driven by business growth and continued investments in the IT sector.

The level of concentration in the banking sector of Georgia is high [14, 15], according to the 2023 report on sustainable finance status report published by the National Bank of Georgia, the two largest banks own 77% of the total banking assets, these banks are "Bank of Georgia" and "TBC Bank" [16]. The fact that these banks hold a dominant position indicates that banking trends are primarily defined by them. Among them, digitalization and innovation play a significant role, in precisely defining the chosen banks. Therefore, it is crucial to delve into the process of digitalization of these designated banks.

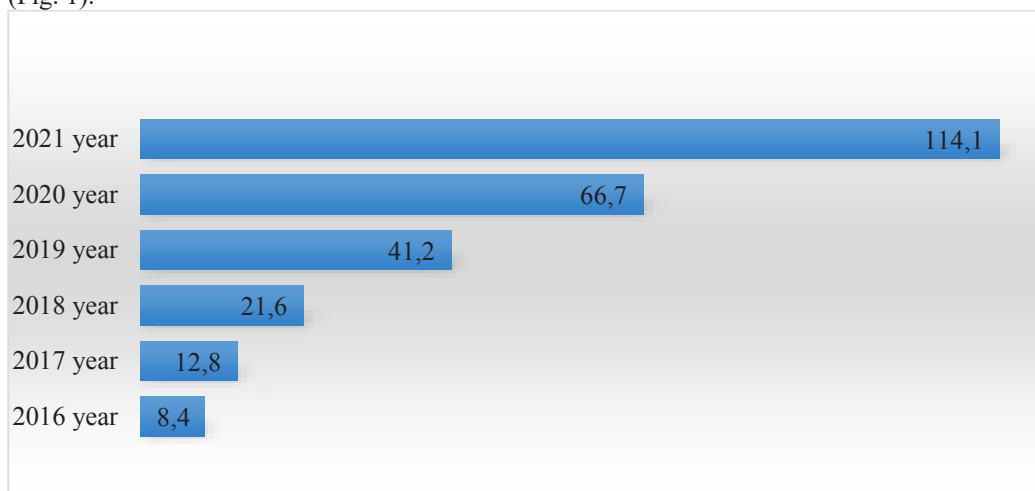
The Bank of Georgia created the initial version of Internet and Mobile Bank in 2006. Various features were added to the initial version, and in 2017, the bank released an updated version of the mobile banking application. Internet and mobile banking usage has significantly increased in recent years. In 2018, mobile banking introduced functionalities for loan borrowing and repayment. In 2019, the Bank of Georgia launched a new Internet banking platform, "iBank for Business," targeting micro, small, and medium-sized enterprises, as well as corporate clients. This service aimed to simplify business transactions and their administration for users. Regarding mobile banking, a Personal Financial Manager (PFM) was added. The PFM tool serves for analyzing and categorizing expenses, it studies the financial behavior of the user, and providing recommendations based on obtained results [17].

In 2020, the Covid pandemic turned out to be a great opportunity for banks, digitization of certain processes became essential, which was recognized as a crucial step towards digital transformation. The banking sector swiftly adapted and transitioned to remote operations.

During the pandemic period, the Bank of Georgia added significant functionalities to digital channels, including: digital cards, fully remote customer loan issuance, online chat, strong authentication, P2P payments, and digital onboarding [18]. In 2021, the Bank of Georgia introduced a business mobile application.

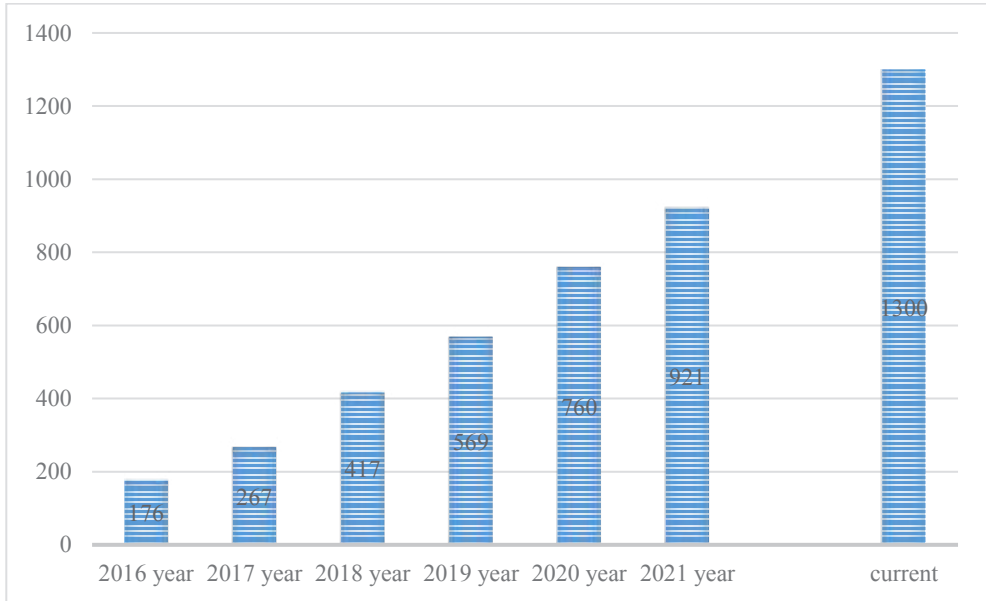
In addition to the mentioned digital products, the Bank of Georgia now offers the following payment methods: contactless payments, Apple Pay/Google Pay, QR codes, and BNPL (Buy Now, Pay Later). Through the use of artificial intelligence systems, the bank's internet platform allows users to consolidate accounts from other banks and verify them in one place. Leveraging artificial intelligence technology, the bank also provides a virtual assistant capable of completing over 20 different tasks. Moreover, personalized business offerings based on artificial intelligence can be accessed by business clients through the bank's Internet banking platform. Businesses can also request and activate credit limits or repay loans directly within the Business iBank.

The Bank of Georgia's innovative solutions are reflected in the increasing number of customers. It is important to highlight the indicators of digitalization within the bank over the years. Below is the number of Mbank and iBank transactions by year in the Bank of Georgia (Fig. 1).



**Fig. 1.** The number of Mbank and iBank transactions by year. Source: Compiled by the authors based on the data of JSC Bank of Georgia management reports [19].

As we can see, there have been significant changes, especially in recent years, and there has been a significant increase in the amount of retail transactions that are carried out remotely.



**Fig. 2.** The number of active users of Mbank and iBank. Source: Compiled by the authors based on the data of JSC Bank of Georgia management reports [19].

As depicted in Figure 2 in addition to transaction volumes, the number of digital users is consistently increasing with fast-paced trends. Users are actively growing in digital channels due to increased opportunities [19].

As previously noted, there are two leaders in the innovation race in the market. TBC Bank has also embraced digital technologies, as early as 2018 when the TBC Group launched Georgia's first fully digital neobank - Space. The mentioned bank changed the traditional approaches and introduced completely remote products to the market. Despite successful functionality, in 2024 Space exits Georgia's market and shifts its focus to the international market.

The stages of TBC Bank's digital service development are provided in Figure 3.



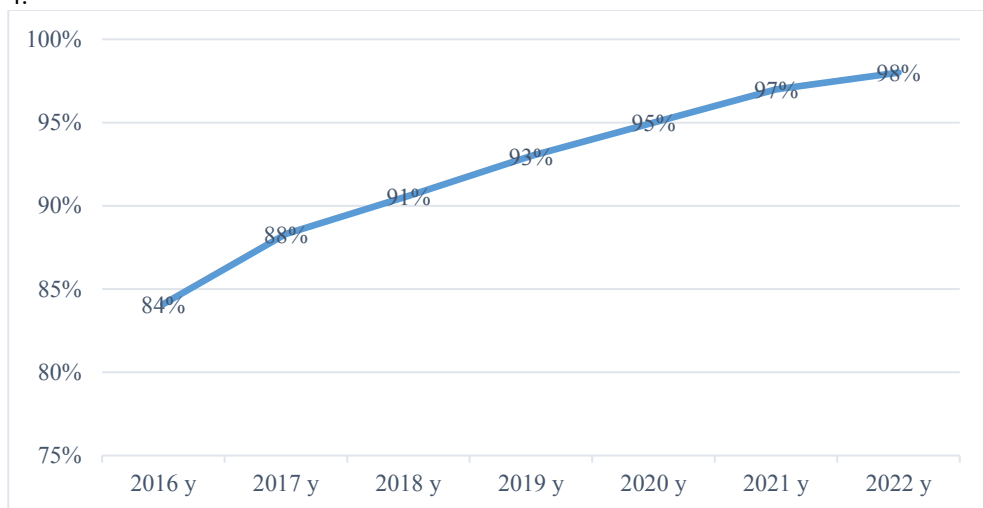
**Fig. 3.** The stages of TBC Bank's digital service development. Source: Management report of JSC TBC Bank [20].

In 2020, TBC Bank introduced a fully digital registration process that allows customers to go through the identity identification payment process and become TBC customers. The bank also

introduced a virtual digital card, which is an alternative to the traditional plastic card. Online platforms for mortgage loans and installments were also created. For business users, functionality has been added that provides increased data analytics capabilities, such as sales analysis by day of the week and time of day, evaluating the effect of discounts on sales and customer loyalty [21].

The Internet bank also allows users to consolidate all accounts of a client from various banks in Georgia into one space and verify them [22]. Additionally, the end-to-end credit process has been digitized for refinancing loans and offering BNPL (Buy Now, Pay Later) limits.

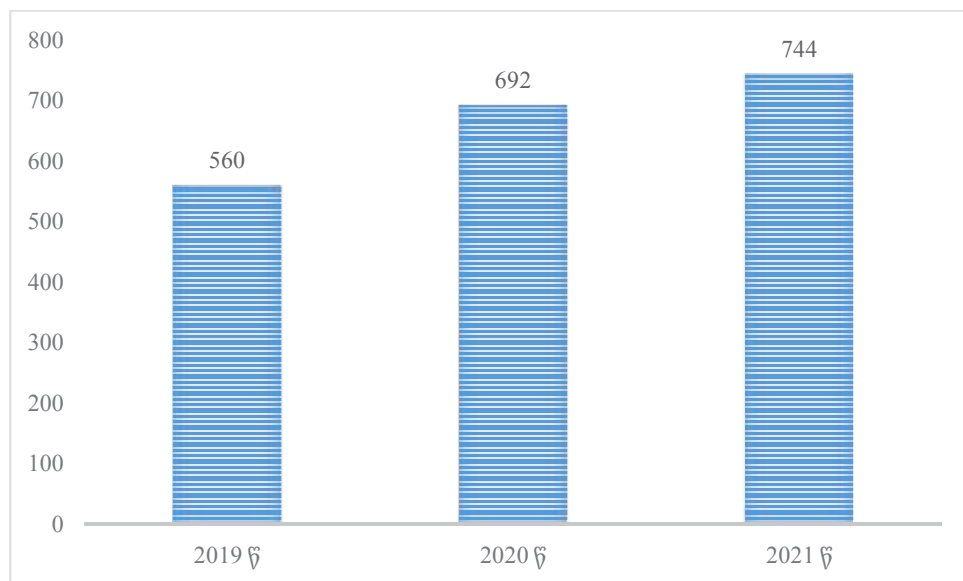
The high level of development of digital services of TBC Bank is indicated by the coefficient of retail offloading ratio. This ratio shows the share of transactions performed through remote channels outside of branches. The diagram shows the indicated ratio – Figure 4.



**Fig. 4.** Retail offloading ratio. Source: Compiled by the authors based on the data of management reports of JSC TBC Bank [22].

As we can see, almost the complete majority of retail transactions are completed through remote channels, which once again points to the fact that digital transformation is replacing traditional banking.

Regarding the number of retail digital users, the data is given below (Figure 5).



**Fig. 5.** The number of retail digital users. Source: Compiled by the authors based on the data of the management report of JSC TBC Bank [22].

Apart from the mentioned banks, digitalization processes actively continue in other commercial banks within Georgia's banking sector. Commercial banks actively utilize Internet and mobile banking. Internet and mobile banking allow for: account balance checking, transfers within the bank as well as outside, opening or closing deposits, bill payments, currency conversion, card ordering, and other transactions. In addition to this, most banks have integrated Google Pay and Apple Pay.

I think the main challenge faced by the majority of Georgian commercial banks is the lack of fully remote services. In most cases, if a user is not a client of a specific commercial bank, they cannot open an account remotely, thus they cannot access other services as well. In many cases, even to open an account remotely, a visit to the branch at least once is necessary. In addition, in such a case, when the customer is interested in credit products, it is only possible to fill out the application remotely, directly issuing the credit product remotely without visiting the branch is possible only in a small number of banks. This challenge applies not only to retail, but also to business clients.

Full integration of digital channels in commercial banks is crucial as market demands evolve and increase on a daily basis. In the backdrop of Georgia's banking practices featuring digital banking concepts, it's significant that other banks can also adapt and implement such approaches. It's noteworthy that National Bank of Georgia has started working on the principles and regulations for digital banking licensing, and the first digital bank "JSC Paysera Bank Georgia" appeared on the Georgian market, which successfully passed the test mode. Furthermore, two new digital banks, "JSC Hash Bank" and "JSC Pave Bank Georgia", also received licenses from the National Bank of Georgia. These banks mark a significant step towards more innovation and technological advancement in Georgia's banking sector.

Pave Bank Georgia JSC intends to operate as a digital bank which aims to serve technology-driven companies. It is going to integrate financial products and link them with digital assets and programmable accounts. Using innovative technologies, the bank aims to offer personalized technological solutions to corporate clients. As for JSC "Hash Bank", it will focus on the maximum simplification and accessibility of banking services with the help of modern financial technologies, as well as on the integration of the latest technological products developed in accordance with international standards [23].



Each bank strives to respond to market demands and implement digital innovations. It is important to discuss the indicators of the profits of commercial banks in Georgia. It is interesting to see how the distribution of profits among banks is divided, so let's examine their distribution based on the percentage indicator – table 1 [24].

**Table 1.** Share of net profit in the banking sector by banks.

	<b>2023</b>	<b>2022</b>	<b>2021</b>	<b>2020</b>	<b>2019</b>	<b>2018</b>
<b>JSC TBC Bank</b>	39.8%	43.8%	45.3%	45.7%	42.8%	43.0%
<b>JSC Bank of Georgia</b>	47.9%	42.5%	39.9%	41.6%	40.2%	34.1%
<b>JSC Liberty Bank</b>	3.0%	2.7%	2.3%	-0.7%	2.9%	5.7%
<b>JSC Basisbank</b>	2.6%	3.2%	2.1%	3.3%	2.9%	3.7%
<b>JSC Credo Bank</b>	1.4%	1.9%	2.0%	1.5%	2.3%	2.0%
<b>JSC Cartu Bank</b>	1.1%	1.8%	1.6%	1.3%	1.8%	2.6%
<b>JSC ProCredit Bank</b>	1.6%	1.8%	2.2%	3.9%	2.2%	2.6%
<b>JSC TeraBank</b>	1.1%	1.3%	1.5%	0.5%	1.6%	2.0%
<b>JSC Halyk Bank Georgia</b>	0.7%	0.6%	0.8%	0.3%	0.9%	1.2%
<b>JSC PASHA Bank Georgia</b>	0.1%	-0.1%	-0.2%	-2.6%	-0.7%	0.3%
<b>JSC Isbank Georgia</b>	0.6%	0.5%	0.6%	1.3%	0.5%	0.3%
<b>JSC VTB Bank</b>	0.0%	0.0%	1.8%	3.6%	2.3%	2.7%
<b>JSC Ziraat Bank Georgia</b>	0.3%	0.2%	0.2%	0.4%	0.3%	0.3%
<b>JSC Silk Bank</b>	-0.3%	-0.3%	-0.1%	-0.1%	0.0%	-0.5%
<b>JSC Paysera Bank Georgia</b>	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Compiled by the authors based on the data of the National Bank of Georgia [24].

As analyzed, the majority of the profits are distributed between two banks in the banking sector of Georgia: Bank of Georgia and TBC Bank. Of course, the rate of profit does not depend only on the level of digitization, although it is one of the important factors that determine it. Additionally, significant emphasis is placed on digital technology integration within these banks in the Georgian market. Also, an important trend can be observed especially in recent years, when the level of digitization in the mentioned banks is increasing significantly: if in 2018, 77.1% of the profit was distributed to the mentioned two banks, in 2023 this indicator increased to 87.7%.

## 4 Conclusions

The banking sector of Georgia is a leading sector in terms of technological innovations, which is evidenced by the development of remote banking and the operation of digital banks. In the market of Georgia, the leadership of systemically important banks in the mentioned direction is highlighted, they are the first to use the mentioned technological innovations. This, in turn, contributes positively to their advancement, as the majority of the profits in the banking sector are precisely distributed among these banks.

Georgia's banking sector, like most technologically advanced sectors, has the prospect of being fully digitized. However, it is important to involve all participants of the banking sector in the mentioned process. There is indeed a problem in Georgia as there is an asymmetry in the level of digitization. Moreover, most of banks do not publish information about digitization trends, strategies and statistics.

In conclusion, Georgia's banking sector has significant prospects for digital transformation, but it requires efforts and involvement from all participants in the banking sector to be successful in this process.

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