LEGAL, INNOVATIVE AND SCIENTIFIC APPROACHES TO STUDY MODERN DIGITAL BANKING

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Abstract. Banking system, from its origin to these days, have undergone many changes including legal intervenes, technological implementations, innovations resulting in scientific disputes. The research paper examines terminology including direct bank, home bank, online bank, e-bank, virtual bank, digital bank, neo-bank studied by different methods in literature. Moreover, this article scrutinizes legal, technological and chronologic approaches to research bank industry, in order to find future tendencies in the field. Furthermore, the digital transformation of banking sector of Uzbekistan has been analyzed in this paper, underlining study questions for future research.

Key words: Digital bank, Fintech, Systematic Literature Review, Technological approach.

1 INTRODUCTION

The advancement of technology and its systematic introduction into every aspect of human life has fundamentally changed the concept of banking, which has been formed for centuries. Due to uneven development around the world, today we can see from traditional manual banking services to BAAS ("Bank as a Service") [1] i.e. banking services that are processed without human intervention in cloud technology. Global competition, demanding customers and a transparent economy are forcing many banks to move away from the technology that once drove their business success, but today it does not provide enough flexibility and scale for further development.

2 LITERATURE REVIEW

The development of the bank as a result of technology integration has been analyzed by scientists based on different approaches and methodology. According to the channels of banking services to customers, the terms direct bank, home bank, internet bank, online bank, virtual bank, digital bank, neo-bank and smart bank have been reflected in scientific and theoretical and legal documents. For example, Indriasari et al. [2] in their research study and analyze 67 articles using the keyword "digital bank" and from 2015 to the end of the study - to 2022, this term is interpreted technologically and theoretically in a systematic literature review. they learn based on the method. According to the results of the research, in 2019-2021, this term was widely used and was used together with the latest technologies - cloud, blockchain, big data, AR/VR, open banking, security QR code. The result highlights issues related to technology, organization, people, process, environment, customers, security, and risk, which become challenges in digital banking innovation.

A. Ziouache and M. Bouteraa [3] describe and compare traditional banks, digital banks and neo-banks in their research work. According to their conclusions, traditional banks that have become large financial institutions provide remote banking services while maintaining branch services, while digital banks rely on existing financial institutions to provide online and mobile banking services without branches. Neo-banks are cloud-based start-ups that provide mobile banking services based on unique software and technological advancements and represent a new era of banking evolution.

Although the penetration of technology into the banking industry by customers began in the late 1950s with the introduction of the first credit cards and ATMs, the automation of bank internal accounting began earlier. In this regard, we define the entry of the concept of "open bank" into the banking sector and regulatory legal framework as a starting point for an innovative approach to research. It was this point that created the legal basis for the beginning of the era of fintechnologies. According to A. Wolska [4] in his research: the banking sector is shifting from traditional closed

models to a more open and innovative framework, emphasizing the collaborative relationship between established banks and FinTech companies.

If we look at the history of the concept of "open bank", as a factor that accelerated the emergence of both local and global competition, this term is recognized by most scientists as "the financial revolution of the last 10 years". This concept originated in 2003 with the introduction and clarification of the idea of "Open Innovation" studied by Henry Chesbrough [5], according to which it refers to the idea that certain types of information should be available to everyone without copyright restrictions, patents or other control mechanisms.

In his famous book, Chesbrough (2003) [6] defines open innovation as follows: "Open innovation means that valuable ideas can come from inside or outside the company and go to market inside or outside the company."

Unlike the traditional closed innovation model, which relies solely on internal research and development for innovation, open innovation provides a paradigm shift.

At the heart of the idea of open innovation is the recognition that valuable discoveries and innovations often come from outside established organizations, particularly from start-ups. The essence of this is that it requires the adoption of inbound open innovation strategies to absorb external knowledge and outbound open innovation strategies to exploit underutilized innovations from internally developed innovations.

Since the publication of Chesbrough (2003) [6], the concept of open innovation has received considerable attention in both academic research and practical business applications [5]. In particular, the idea of an open bank aimed at introducing and considering specific changes in the banking sector, incorporating the principles of open innovation, has emerged.

Open banking refers to allowing bank customers to voluntarily share their financial information from their commercial bank accounts with other organizations through application programming interfaces or APIs. It basically allows commercial bank customers to share data with a third party, such as a fintech company [7]. When fintech companies get access to the reliable data, complementary financial services will arise for customers, without effecting on the current functions of traditional banks. As researchers Jones and Tonetti [8] underlined in their work that, data distinguishes itself from other assets owing to its non-rivalrous nature; it can be utilized simultaneously by several parties without losing its value.

As the statistics of countries adopting open innovation shows uptrends in financial products consumption among countries where implementation of open banking has accelerated the adoption of fintech, it played a key role to enroll unbanked people to financial circulation gradually. Furthermore, data-sharing provisions may increase fintech companies' abilities, resulting in narrower competition gap with traditional banks. However, this eventually may lead traditional banks to transform current trends even faster, while they have a strong potential for research and development. In this case, some literature [9] stresses the probability to force banks to increase asset risks and reduce bank capital. Here further research is suggested to define the state.

3 METHODOLOGY

In this research, Technology Acceptance Model (TAM) is used to dive in to deep of the research. In banking sector, the adoption of technology is different according to time, location and legal acts. Therefore, literature on a chronological order is reviewed (table 1), then the list of technologies implemented in banking is created including time and location. Then the latest adopted laws are studied logically supporting current technology usage in banking.

In order to fulfill the drawbacks of TAM model, further analysis, comparison has been done to add value. Here the theoretical part has been justified by the Uzbekistan banking system operations and legal basis.

Firstly, after the adoption of open banking in Uzbekistan, Fintech industry of the Republic has made a significant growth in the number of physical clients, most of whom were unbanked or underbanked.

Secondly, there the role of government as an innovator against monopoly showed its strength to privatize government banks, to make amendments and to implement laws.

Thirdly, the interest of foreign investors to the banking and fintech field remained high due to rapid growth of startups.

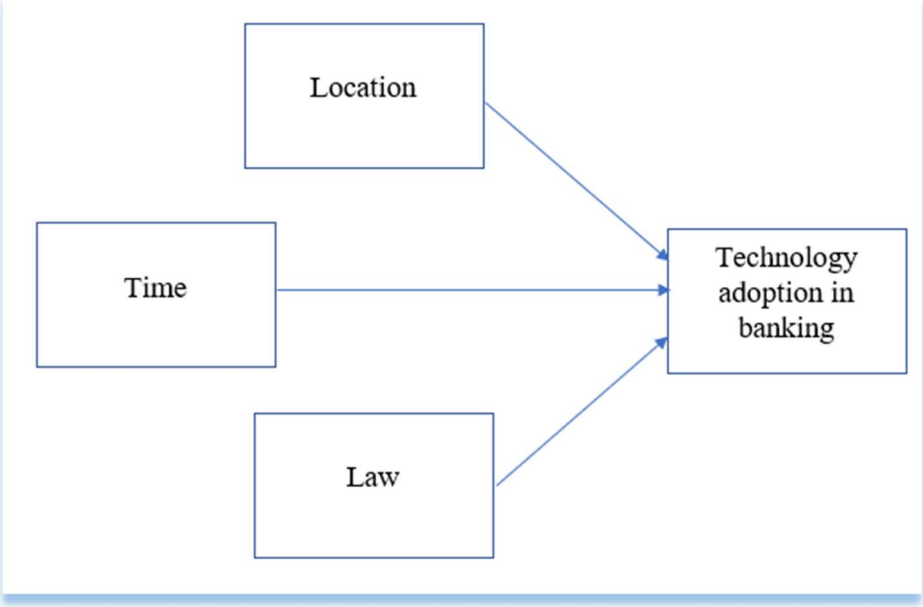

Figure 1: Technology Acceptance Model (TAM) used in this research made by author.

3.1 Chronologic Approach

Table 1: Gradual Development of Banking in decades from 1950 to 2024

#	Decade	Introduced technologies
1	1951-1970	Research has been done to automate banking services with technologies such as MICR, Magnetic Ink Character Recognition and ERMA to automatically verify transactions.
2	1971-1980	Banking services are fully automated with the help of computers. With the help of screen terminals, bank clients can access their account numbers in real time, and scientific research and software experiments were conducted on the concept of "Home Banking".
3	1981-1990	"Home Banking" was created. Customers can access Home Banking services 24/7 from 6:00 a.m. to midnight. Internet banking service was offered for the first time in Great Britain and was called "Home link". First Direct Bank was one of the first to provide telephone banking services.
4	1991-2000	The first online banking service was launched in the USA. For the first time, online banking website bankofamerica.com was created and there was no need for special banking software anymore, customers could access the bank's website 24 hours a day. The first pure Internet bank, First Security Network Bank, appeared and in 1997 became a fully virtual bank.
5	2001-2010	As online services have evolved, The Federal Financial Institutions Examination Council has developed rules and regulations. During this period, bank branches began to merge and carry out banking operations of consumers through kiosks and online services. Mobile banking service and mobile applications have been created.

#	Decade	Introduced technologies
6	2011-2020	Online banking trends continued to develop. In particular, the mobile banking service is rapidly becoming popular. Branchless Direct banks have increased in number and have been adopted by many countries, especially geographically, during the Covid-19 pandemic.
7	2021-present	In developed countries, banks began to reduce their physical branches. Artificial intelligence-based budget tools and mobile payment platforms have become popular in the field of digital banking. Big data, cloud technologies, machine learning and blockchain innovations are increasingly being applied to the banking industry to provide a more personalized approach to customers and improve efficiency.

In Table 1, the chronological development of banking throughout the world has been involved in short form. This may seem as not efficient for future forecast or to draw concrete patterns on what is being discussed above, which is why the table 2 appears to provide a broader opinion. The second table describes single technology utilization by specific country in a specific time with details:

3.2 Technological approach

Table 2: Technological Advancement of Banking from 1950 to 2022

Year	Technology	Country	Innovation
1950's	Automated system for bank with MICR – magnetic ink character recognition	The USA	- Processing cheques
1955's	ERMA – electronic recording machine for bank accounting	The USA	- Automated bank accounting; - Processing cheques
1958	Credit cards - BankAmericard	The USA	- Payments ledger; - Closing bank cheques a month
1967	First ATM – Automated Teller Machine	The Great Britain	- Paper cheque is accepted; - Cash provided
1979	Point of Sail terminals	The USA	- Accounting transactions in point of sale
1980's	Home Banking Modem for TRS-80 computer	The USA	- Payments; - Checking the balance; - Application for credit; - Access games; - Budget and - Tax calculations

Year	Technology	Country	Innovation
1982	Prestel Videotex; Prestel Viewlink; BBC microcomputer; telephone line; Tandata Td1400 keyboard	The Great Britain	- Transactions; - Payments - Regulating credits; - Comparing costs; - Ordering for products; - Checking menu of local restaurant; - Checking the list of property; - Organizing holidays…
1983	Vidéocompte – video account, videocomputer; Minitel Point of Sales	France	- Checking balance; - Meeting with bank consultants; - Ordering for cheque books; - Transactions
1989	First Direct – first telephone and internet banking services	The Great Britain	- Kredit cards; - Loans; - Savings; - Mortgage; - Stock exchanges
1990's	SMS-banking		- Text communication with banks
1995	Security First Network Bank; website	The USA	- Account checking directly; - Payments; - Review of cheques
1996	First Bank software for personal computers	Canada	- Account checking directly; - Payments; - Review of cheques; - Transactions
1998	Paypal P2P transactions	The USA	- Electronic P2P payments
1999	Wireless Application Protocol (WAP)	Norwey	- First mobile banking using WAP
2007	First mobile application fully operating banking services	Scotland	- Scotland Royal Bank first introduced mobile app
2008	Blockchain, cryptocurrency		- First digital currency based on decentralized system
2011	Google Wallet and Android Pay virtual wallet	The USA	- Payments through websites and smartphones
2012	J.P.Morgan Chase produced credit cards with chips	The USA	- Advanced security of bank cards

Year	Technology	Country	Innovation
2015	Data-sharing with third parties via Application Programming Interface based on Open Banking Innovation		- Fintech companies - Fintech applications; - Payments;' - E-commerce; - Investments; - Savings
2017	Real-time payments network (RTP)	The USA	- 24/7 faster payment solutions
2022	ChatBoxes and Virtual Assistants		- Consultation for banking; - Forecasting; - Automatic payments

As can be seen from the table 1, the detailed information about bank transformation including the factors of time, location and technology illustrates broadly. The data given in a chronological order to make it more logically acceptable for further research. Further analysis is provided in the next section.

3.3 Legal Approach

In this subsection, the most influential legal acts and laws have been analyzed according to their scale. However, it should be noted that, economies are divided into 2 groups about licencing new form of banking services even though regulators appreciate advanced technology-based banking's potential makes a profit in terms of inclusion, customer experience and competition. According to literature, they tend to follow one of two models:

1. Traditional banking licenses. Many countries, including the United States and European Countries, regulate digital banks with standard banking license.
2. Specific digital-banking licenses. Regulators in jurisdictions including Chinese Mainland, Hong Kong SAR, Malaysia, the Philippines, Saudi Arabia, Singapore, South Korea, and the United Arab Emirates have created digital-specific licenses, often including terms that specify what products are allowed, which segments digital banks should target, and what physical presence is permitted. Under South Korea's digital license, for example, KakaoBank was able to offer a full range of products at launch [10].

According to the Hong Kong Monetary Authority ("HKMA") once in 2018 defined a branchless bank as a "virtual bank", proposed to rename it as "digital bank" using the questionnaire among virtual bank organizations and responsible people, emphasizing that the latter accurately indicates current tendencies to put more emphasis on the business models and financial technologies adopted by the VBs rather than their form of presence [12]. This case took place in October, 2024 which clearly exemplifies that the time affects the usage of certain terminology for developing system. Similarly, the Republic of Uzbekistan adopted "digital bank" in legal documents, but after some time it was omitted, meaning that banks no matter how they put their functions forward whether in branches or in cloud, their main criteria is transparency, legacy and profitability for the country [13].

Table 3: Legal Documents for the Regulation of Banking

Year	Legal Document	Value
1978	United States Electronic Fund Transfer Act	- The Electronic Fund Transfer Act (EFTA) protects consumers when transferring funds electronically. - The EFTA was enacted in 1978 as a result of the increased use of ATMs.

Year	Legal Document	Value
		- Protection under the EFTA includes transfers made via ATMs, debit cards, direct deposits, point-of-sale, and phones [11].
2007	Directive of the European Parliament and the Council on the market of financial instruments	- It regulates the provision of investment services in financial instruments by online banks and the activities of traditional stock exchanges and alternative trading platforms.
2014	Regulation (EU) No. 910/2014 of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation)	- Provides a predictable regulatory environment to ensure secure and seamless electronic communications between authorities, businesses, citizens and the public.
2015	Directive 2366 of the European Parliament and of the Council on payment services in the internal market (PSD2)	- The current rules aim to better protect consumers when making online payments, encourage the development and use of innovative online and mobile payments through open banking, and make cross-border European payment services safer.

To sum up the aforementioned table-structured data, the usage of information and communication technologies in banking sphere have pushed some regulators to produce laws and legal acts on online banking, digital banking, neobanking; while open banking and its implementation firstly introduced by regulations in some countries.

4 RESULTS AND DISCUSSION

From the literature reviewed, this can be concluded that, the introduction of each technology in banking has played the role for marketing to inform people about the process of transformation which can be another affecting factor for terminology diversity.

It should be mentioned that scientists and researchers similarly showed some distinctions and similarities analyzing online, digital, branchless or neo-bank. One of the famous writer of banking theories – Brett King suggested the distinction of bank evolution by Bank 1.0, Bank 2.0, Bank 3.0 and Bank 4.0 [14] as he has written his books using them. Some of other theorists also studied further.

The author of this article suggests that from open banking point of view, we can see the two side of modern banking system: front office and back office.

Today's banks offer different channels for front office services:

- Branches;
- Call centers;
- Website;
- Mobile app.

If we turn these channels with their technology name, the result is:

- Branch banking – traditional bank;
- Call-centers – telephone banking;
- Website – internet banking;
- Mobile app – mobile banking.

As we have known that the aforementioned channels can not fully cover what we understood the bank is, the three technology-based bank channels remain under the umbrella term of digital banking.

Back office of the banks today uses automated technologies, including:

- Real-time payment platforms;
- Accounting;
- AI integrated customer checking;
- Evaluating risks;
- CRM and others.

Assessing the scope of automated technology, we see distinction between neo-banks which operate automatically utilizing AI. This phenomenon creates to several ways to stay in the economy for operating incumbent banks and new banks. Incumbent banks may have to accelerate the process of digital transformation for saving clients and minimizing operational costs. Challenger banks, on the other hand, may enter the economy with fully automatic cloud-based banking platform. In two cases, the conclusive factor remains trust of clients as it has been when first bank started to operate.

5 CONCLUSION

In conclusion, the evolution of banking, driven by technological advancements and the emergence of concepts such as "Bank as a Service" (BAAS) and open banking, represents a significant transformation in the financial sector. The integration of technology has not only redefined traditional banking services but also facilitated the rise of digital banks, neo-banks, and various innovative banking models that prioritize customer experience and operational efficiency. The literature reviewed reveals the critical role of key technologies such as cloud computing, blockchain, and big data in reshaping banking practices and addressing challenges related to security, risk, and customer engagement.

The shift from traditional banking to a more open and collaborative framework highlights the need for established banks to adapt and innovate in response to the rapidly evolving market landscape. As the financial revolution unfolds, the concept of open innovation serves as a guiding principle, encouraging financial institutions to embrace external ideas and partnerships with FinTech companies. This collaborative approach is essential for fostering innovation, enhancing competitiveness, and meeting the evolving demands of customers in an increasingly digital economy.

Ultimately, the banking sector stands at a crossroads, where the ability to leverage technology and foster open relationships will determine its future trajectory. As we move forward, it is crucial for stakeholders within the industry to remain agile and responsive to changes, ensuring that they not only survive but thrive in this new era of banking. The ongoing journey of digital transformation will continue to shape the financial landscape, and those who embrace these changes will likely lead the way in redefining banking for generations to come.

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