
APPLYING BANKING DIGITIZATION MECHANISMS TO REDUCE BANK CREDIT RISKS: AN ANALYTICAL STUDY OF A SAMPLE OF IRAQI COMMERCIAL BANKS FOR THE PERIOD FROM (2010-2021)

A.P.Dr. Ahmed Sabeeh Attiya

Al-Mustansiriya University /College of Administration and Economics

Baghdad, Iraq

dr. Ahmed-sabeeh@uomustansiriyah.edu.iq

Researcher: Inam Abdel Zahra Rahmah

Al-Mustansiriya University/College of Administration and Economics

Baghdad, Iraq

Inam Adbalzahra Rahmah

1995anaam@gmail.com

Abstract

The current research dealt with two important variables: banking digitization as an independent variable, which is of great importance for processing, storing, and transferring data, as it works to improve customer relationships, generate more competitiveness, save costs, increase accuracy, and reduce banking risks, and credit risk as a dependent variable, which is the basic pillar in banking. Banks, which affect their work, and non-performing loans are one of their causes. Therefore, the research aimed to know the relationship between banking digitization and credit risks by analyzing the indicators of banking digitization and their relationship to avoiding credit risks.

The research problem focused on the main question, which is: What is the role that it contributes to? Banking digitization in reducing bank credit risks? The research assumed the existence of correlation, influence, and causal relationships between banking digitization and credit risks in the research sample. The researchers followed the descriptive analytical approach.

The research community included a sample of Iraqi commercial banks, namely (the National Bank of Iraq, the National Bank of Iraq, Commercial Gulf, and Bank of Baghdad), and for a period lasting (12) years extending from (2010 - 2021), as reliance was placed on data from the annual report of each bank and data provided by the Central Bank of Iraq, which were used in the practical aspect, and hypotheses were tested. The research was carried out through a set of financial analyzes and using the Excel program to extract growth rates.

The research produced a set of results, the most prominent of which is the existence of a link and impact between banking digitization and credit risk in the research sample, as well as the existence of a causal relationship between these variables.

Keywords: banking digitization, credit risk.

Introduction

Banking digitization is the most important factor in developing banking services, as customer needs have changed and require the provision of a banking environment free of traditional systems. Today, they require more customized banking products and services.

The traditional banking network, which consists of the infrastructure of physical branches, is more and more threatened by information technology represented by forms of automated interaction with the customer and requires the application of new mechanisms, including (bank cards, ATMs, telephone banking services), which involve relatively lower costs and allow customers to choose from them, and the extent of customer demand and their continuity in dealing with the bank depends on its ability to meet their requirements and needs are fully met and at the lowest possible cost, effort and time. To ensure that this goal is achieved by banks and that the desired goals are reached, it is necessary to implement innovative mechanisms for digital banking services to confront credit risks.

To cover the research topic, the research was divided into three sections. The first section dealt with a theoretical framework for the mechanisms of applying banking digitization. The second section presented bank credit risks in terms of importance and methods of confrontation. The third section presented the practical aspect of analyzing the mechanisms of applying banking digitization to reduce credit risks. In several Iraqi commercial banks for the period from (2010-2021), the research concluded with a set of conclusions and recommendations related to the research topic.

First: the research problem

The application of banking digitization is one of the most important topics that researchers specializing in the financial and banking field are interested in, and their interest in it has increased recently through their demand to transform from traditional systems to digital systems because digital transformation saves cost and effort and improves the operational efficiency of the financial and banking sectors.

Despite the positive developments, there are some crises witnessed by the banking sector that led to the insolvency or bankruptcy of many operating banks, the impact of which was reflected in the economies of developing and developed countries alike, and the majority of previous experiences confirm that most of the causes of these crises are linked to the increase in banking risks, especially risks resulting from credit.

The causes of credit risks are due to the lack of adherence to the principles of credit risk management, and leniency in considerations for granting credit. It has become necessary for financial and banking decision-makers to reconsider the controls that govern the processes of granting credit and search for new and advanced means and mechanisms to reduce credit risks based on what the research problem can be embodied as follows:

1-Are their new mechanisms to apply banking digitization to reduce the credit risks to which the bank may be exposed?

2-Does the application of digital banking mechanisms play a role in reducing bank credit risk indicators?

Second: The importance of research

The importance of the research lies in shedding light on one of the achievements of financial technology, represented by banking digitization, and the extent of its benefit in shifting from paper transactions to electronic transactions. The importance of research also focuses on the novelty of the topic of banking digitization and its importance in the business world because it contributes to the development of the financial infrastructure of banking operations and its reflection. This is in customer satisfaction and competition between banks.

The importance also lies in studying the credit risks facing the banks in the research sample and knowing the methods and procedures that limit those credit risks. The importance of this research is highlighted in the following points:

1. Explaining the application of new mechanisms and the introduction of modern digital systems to reduce effort, time and speed in completing banking operations and their positive effects on banking work and reducing credit risks.
2. Identify the most important digital systems used in the research sample, which are Iraqi commercial banks and their role in reducing bank credit risks.

Third: Research objectives

The research aims to achieve the following objectives:

1. Applying new and advanced mechanisms to reduce credit risks.
2. Determine the role of banking digitization in reducing credit risks and study the reality of the Iraqi banking sector, specific to the research sample, which is represented by Iraqi commercial banks.
3. Analyzing the importance of applying banking digitization to the Iraqi commercial banks, the research sample, and its relationship to avoiding credit risks by analyzing the data of those banks digitally and comparing that to the risks they were exposed to or avoided.

Fourth: Research population and sample

The research population is represented by Iraqi commercial banks, while the research sample was represented by (3) banks, namely (the National Bank of Iraq, the Bank of Baghdad, and the Gulf Commercial Bank), out of 70 banks for the period (2010-2021). The research sample was chosen after excluding Islamic banks. Due to the nature of the work of these banks, some other banks were excluded because they were newly established and did not cover the period of the research. Some banks were also under guardianship and other banks had no published data for previous years as they operated after 2015, as shown in the table.

Table (1): Banks of the research sample

current capital	capital upon incorporation	year of incorporation	Name of the bank
250 billion	400 million	1995	1 National Bank of Iraq
250 billion	25 million	1995	2 Bank of Baghdad
300 billion	600 million	1999	4 Gulf Commercial Bank

Source: Prepared by the researchers based on the annual reports of the banks in the research sample.

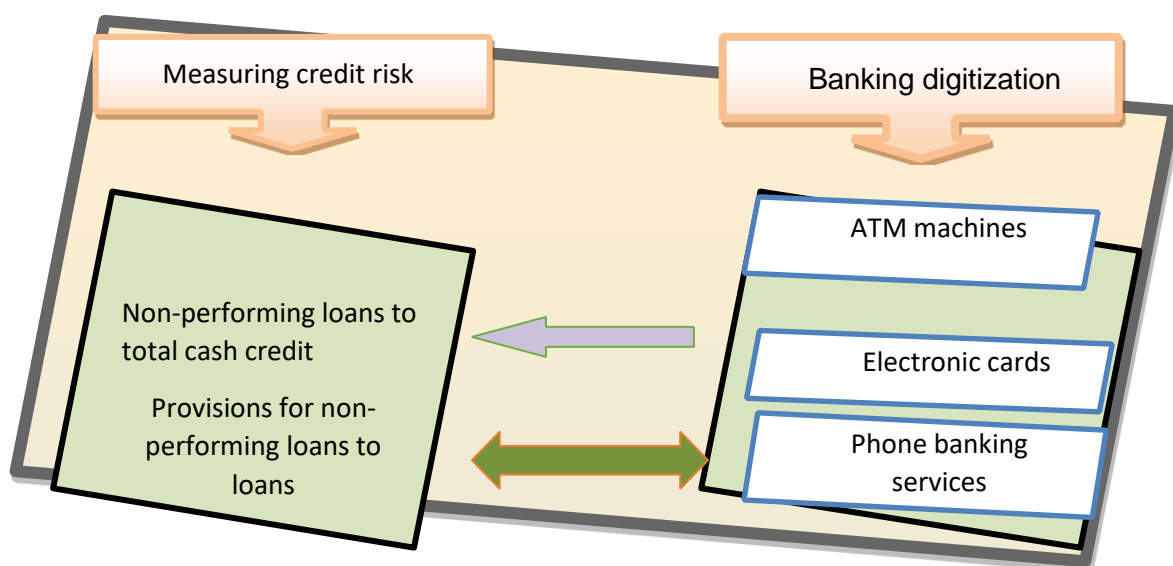
Fifth: Research hypotheses

To achieve its objectives, the research starts from a basic hypothesis that says (the application of banking digitization mechanisms has a role in reducing or limiting credit risks in Iraqi commercial banks) and from this hypothesis the following sub-hypotheses branch out:

1- The application of banking digitization has a role to play in enhancing the performance of the Iraqi banking sector and generating more competitiveness.

Sixth: Research plan

Figure (1) Hypothetical diagram of the research



Source: Prepared by the researchers

The second section: The theoretical framework of the research

First: The concept of banking digitization

The term digitization is one of the new concepts in financial and banking thought. The term digitization briefly refers to the process of representing physical objects or attributes with a digital series of “bits” and “bytes,” for processing them with computer algorithms easily and effectively. Digitization has been defined as the use of Digital technology, data and digital information to transform business processes, business models and work procedures, to create digital business models to improve and raise the efficiency of performance (Berghaus & Back, 2017:82). The purpose of digitization is to enable automation and increase the quality of information and data security, as well as its structure and collection. So that it can be used by the most advanced business applications the expected result of introducing digitization is more efficient and effective operations, better time, and lower costs: (2021, Niemand, et.al), Digital transformation involves using digital technologies to remake a process to become more efficient. The idea is to use technology not just to replicate an existing service in digital form, but to use technology to transform that service into something significantly better (Cziesla, 2014:29). Digitization achieves seamless performance. And a hassle-free experience for customers, and provides new technology-based services to its customers such

as ATMs and credit cards (Shetty & Joyshy, 2021: 126). The implementation of the digitization process in the banking sector can be observed in two parts as follows:

- a. Improving business processes within the financial institution to achieve better work quality, efficiency, reduced operating costs and thus better profitability (Niemand, et al, 2021:318
- b. Automating banking operations by providing digital services that enhance the role of payment systems and electronic payment service providers to achieve financial inclusion.

Table (2): Some definitions of banking digitization

Concept	researcher
An any-day, any-time, anywhere banking system that consists of a variety of alternative delivery channels, products, and services developed and deployed by a banking facility or microfinance institution so that consumers can access banking information and conduct financial and non-financial transactions. Financial transactions using an electronic device such as ATMs, phone banking, etc.	(Sheikh & Karjaluoata, 2015:3)
Converting all traditional transactions into electronic transactions, relying completely on computer applications and mechanisms, so that cash and manual transactions are reduced to contact transactions, benefiting from the capabilities of various technologies in the processes of storing, searching and retrieving data and information, and using communication technologies in transactions. Finance and banking with customers to the greatest extent possible.	(Saeed, 2023: 554)

Source: Prepared by the researchers based on what was reported by some writers and researchers.

From the above, banking digitization can be defined: as banks’ application of digital technology in their business, services, and operations, in processing and analyzing their data, in interacting with their individuals, in executing their transactions electronically, and in using advanced computer technologies to reduce banking risks, allowing customers to withdraw money, apply for loans, and make payments. Online or on their smartphones.

Second: The importance of banking digitization

Banking digitization is represented by the technological revolution that changed the nature of the banking system from a traditional system to a digital system. The importance of banking digitization can be enhanced in several points, the most important of which are:

- a. Providing financial and banking services in an easier and faster way without resorting to waiting for a long time.
- b. Reducing costs for banks and customers through the use of non-cash transactions and the use of ATMs, and making the cost of creating a bank website online incomparable to the cost of establishing a new bank branch and the buildings and equipment it requires. Automating banking operations and services reduces costs, and thus the bank’s profitability increases. Because of automated applications that replace manual work (Shehadeh, 2022:70).

c. The relationship between customers and the bank takes another form, as transactions take place between them remotely, which saves the customers and the bank a lot of time, effort, and cost (Youssef, 2012: 122).

d. The emergence and spread of the Coronavirus gave an impetus to remote transactions in all fields, including banking transactions, to reduce the chances of infection, and in light of facing the risks of using cash payment methods in various transactions, it is preferable to rely on digital technology tools, including contact payment methods, so banks turned to... Digital transformation to reduce traditional banking services in exchange for expanding digital banking services (Zahri, Khamis, 2021: 119)

Third: Characteristics of banking digitization

Banking digitization is characterized by many characteristics, the most important of which are:

a. Relying on digital technology such as cloud computing, artificial intelligence, machine learning, the Internet, smartphone applications, and blockchain, as digital applications help collect and store huge amounts of data, and it may be very difficult to maintain the security of this data, as just one breach can mean the arrival of huge amounts of data. Private information is in the hands of hackers, or bank competitors, as the risks in banks are no longer limited to traditional financial and operational risks, but rather their scope has expanded to include the risks associated with banking digitization, the most important of which are cyber risks and the risks of outsourcing, given the smart systems witnessing... Hacking and piracy (Aql, Zuhri, 2020: 217)

b. Using data to create value. Banking digitization depends on the use of big data, especially personal data derived from customers and the active participation of users on social media. Managing data and rationalizing its use is the process of creating value. On the other hand, the availability of big data and the ease of granting credit using technology. Digital technology may contribute to encouraging banks to expand in granting credit, which creates a kind of credit bubble and leads to increased credit risks.

c. Opening the way for small-sized banks to expand their activities globally, without the need to open branches outside the country or increase the workforce, as all customers can be reached through the digital banking service (Al-Shabani, Al-Sharifi, 2022: 585).

Fourth: Mechanisms for implementing banking digitization

a. Automatic Teller Machine (ATM):

It is an electronic device that allows authorized users, who use machine-readable plastic cards, to withdraw money from their account or obtain other services, such as inquiring about the balance, transferring money, and accepting deposits. It was used in the early 1970s when it became one of the daily needs of customers (Jassim and Muhammad, 2020: 121), ATMs were the first known machines to provide electronic access to customers. These machines enable the customer to perform tasks such as withdrawing cash and inquiring about the account balance without the assistance of a bank representative. The more complex devices also allow customers to print their account book and deposit money. And reaching a credit limit (Al-Sudani, 2022: 48).

b. Electronic bank cards (plastic cards):

Cards are one of the means of payment that have spread widely throughout the world. In the early seventies, the world witnessed the entry of many plastic cards into banking activity, where hundreds of millions of individuals deal with them. These cards were given several names, including credit cards, debit cards, Electronic payment cards, electronic money, bank card, loyalty card (Masoudi, 2016: 49). The card is known as a magnetic card that its holder can use to purchase most of his needs or pay for some services, without the need to carry large amounts of cash that may be exposed to the risk of theft, loss, or damage (Al-Baghdadi, 2018: 102). Bank cards are issued by a group of international organizations and financial and commercial institutions, including:

- Visa International: It is the largest international company in issuing credit cards. Its establishment dates back to 1958 when the Bank of America issued the blue, white, and gold cards (Cafe, 2012: 153)

- Master Card: Master Card International: is the second largest international company in issuing credit cards, based in the United States of America. It owns the Bank Net network for the payment system, and the cards include the Silver and Gold Master Card, the Business Master for businessmen, the Stand Card Master and the Master Card. Courtesy Affinity Card and Ceres Card (Masoudi, 2016: 62)

- Credit Card: A credit Card is a plastic card that the customer can use when the bank or financial institution that issues it grants a revolving line of credit to the holder of this card, meaning that this customer is permitted to overdraft within a certain ceiling that is agreed upon in advance, and the method of payment when The customer pays for his purchases of goods and services (Abdul Rahman, 2019: 230).

- Debit card: It is the card issued by banks that allows its holder to pay for his purchases by withdrawing directly from his current accounts in the bank (Al-Najjar, 2016: 89), meaning that instead of borrowing from the card issuer and paying later, as is the case with the card By credit card, the customer transfers the money belonging to him to the seller when he uses this card. If the debit card is on the line, the money transfer usually takes place during the same day in which the purchase transactions are carried out, but if the debit card is offline. Debit Card), the transfer takes place in some subsequent days and can be used via automated teller machines (ATM) and points of sale (POS), as well as the Internet (Abdul Rahman, 2019: 269).

- Prepaid card: A prepaid card is a card that is not linked to a bank account but is loaded with a certain prepaid balance, and shopping is done through it within the limits of the balance loaded into it (Rahim et al., 2017: 212).

Fifth: Techniques for applying banking digitization

1. Digital Signature

It is a small digital file consisting of letters, numbers, and electronic symbols issued by one of the specialized governmental and internationally recognized bodies, and it is called the Digital Certificate. It stores all the person's information, the date and number of the certificate, and its source. Usually, two keys are delivered with this certificate, one public and the other private. The public key is the one that is published in the directory for all people,

and the private key is the customer's electronic signature (Cafi, 2012: 195). It can be briefly defined as a digitally encrypted communication method that authenticates transactions of all kinds that take place across Internet pages. This type of signature transforms the document. The written form is transformed from the normal writing style into a mathematical equation, and no one can return it to the prescribed form except the person who has the special equation for that, which is called the key. This type of electronic signature is considered safe and the latest in technology (Abdel Qader, 2013: 318).

2. Banking digital archiving:

Archives are special programs for storing important documents by organizing them according to precise scientific methods that facilitate the process of storing, preserving, and retrieving them when needed (Abdul Rahman, 2019: 190).

Traditional archiving is the cornerstone on which digital archiving was built using technology. The process of implementing activities may change, but the activities and functions of archiving remain the same, even if they are in a new environment, as both traditional and digital archiving have their backgrounds and main gaps, which affect the entire archiving process.

The second section

Bank credit risks - importance and methods of confrontation

Banking risks are among the topics that have received the attention of researchers, as well as regulatory and supervisory authorities. This interest is not the result of a coincidence in banking, but rather due to the development taking place in technological progress, as banks are exposed to several risks, including credit risks, which focus on the credit that banks grant to their customers, and we will focus on In this section, we focus on non-performing loans.

First: The concept of bank credit risks

In general, risk means the uncertainty of the occurrence of a loss (Moussa et al., 2012: 25), but risk means the possibility of a deviation occurring in the future such that the goals desired to be achieved differ from what is expected (Emett, 1997), and the word risk in the foreign language indicates "Risk" refers to the risk of exposure to loss or damage, and risk is also known as unexpected and unplanned losses as a result of the fluctuation of the expected return on investment, i.e. the deviation of the actual numbers from the expected (Brigham & Ehrhardt, 2008:202).

Risk is an integral part of banking, especially with the increasing intensity of competition, technological development, the increase in the volume of banking transactions, and the need for digital banks. Therefore, banks are facing various banking risks that vary in degree of seriousness from one bank to another, as credit risk represents the oldest form of risk in the world. Financial markets and these risks are the riskiest types of risks faced by banks, which are affected by the bank's revenues and capital, resulting from the customer's failure to fulfil his obligations promptly (Al-Maliki, 2013: 50).

Therefore, banks are now attaching importance to risk management to ensure the continuity of the bank and not expose it to bankruptcy. Most banking experts believe that risks and credit are compatible in the sense that each is linked to the other. This means that the bank

cannot avoid risks and debt default by 100%. Therefore, the bank can take some Measures to reduce risks by carefully selecting customers and taking adequate guarantees.

The Central Bank plays an important role in reducing credit risks through credit supervisory tools and controlling the performance of banks in a way that guarantees the safety of their financial centres and prevents them from collapsing, which is what it has taken care of. The Basel Committee, in the International Settlements Clause, established unified standards and rules to control the performance of banking. Credit risk is defined as the losses resulting from the borrower's refusal or inability to pay what is due in full and promptly (AbdelRahman, 2017:75).

It is also defined as the financial losses that occur as a result of the borrower's failure to fulfil his contractual obligations with the bank (Jorion, 2009: 431), and loans are considered one of the largest and most important sources of credit risk to which most banks are exposed (Al-Maliki, 2013: 55).

Second: The reasons for the occurrence of credit risks.

Summarizing the most important reasons that lead to the occurrence of credit risks as follows:

a. The general economic conditions in the country decline and the occurrence of emergency circumstances, regardless of customers' circumstances that are difficult to control such as unemployment, recession, inflation, and changing interest rates (Al-Bayati, 2017: 81).

b. Competition between banks, as banks must provide excellent services at lower prices than their counterparts in the market, and this negatively affects the bank's returns, as banks are forced to provide many facilities to attract customers, and this leads to increased risks, and there is no doubt that competition has credit risks to income and management. , due to the narrowing of the profit margin (Al-Attabi, 2017: 32).

c. The bank does not have an effective information system, as the management must constantly obtain accurate and comprehensive reports about the bank's customers to be able to make a sound credit decision, otherwise it will lead to the occurrence of significant credit risks (Agyepong, 2015:17).

d. Ineffective monitoring processes, as the bank must monitor the borrower after granting him the loan, such as monitoring his company's performance, its position in the market, and the decisions he takes within the company to evaluate his work and constantly follow up on his activities.

Third: The most important indicators for measuring credit risks

There are measures based on financial analysis ratios that can be used to know the extent of credit risks, and they are represented by the asset quality indicators approved within the bank according to the warning system, which is calculated as follows:

- Non-performing loans/total cash credit: Where the numerator refers to non-performing loans, while the denominator represents total cash credit. An increase in this indicator indicates an increase in the bank's credit risk because this reflects an increase in cash credit represented by short-term loans and banking facilities that the bank must face in the event of failure. Payment by borrowers on time.

- Provisions for doubtful loans/total loans: This indicator shows the bank’s readiness to confront loan losses by making provisions for doubtful loans.

The Third Section

Analyzing the mechanisms of applying banking digitization to reduce bank credit risks
Automated teller machines (ATM)

We notice from Table (3) the spread of the number of ATMs at the National Bank of Iraq to expand the scope of digital services and ease of withdrawing and paying money. Thus, it reached (3) machines in 2010, distributed among the bank’s branches. After this period, the number of ATMs increased to reach (160). device in 2021, which is a good indicator for the application of banking digitization.

Khaleej Commercial Bank deployed ATMs in its branches to benefit customers from the services provided by the ATMs. Thus, it reached (4) machines in 2010, and in 2013 it increased to (25) machines. After this period, the number of ATMs increased to reach (56.) device.

In the year 2011, the Bank of Baghdad began deploying ATMs. The number of machines reached (10) distributed among the bank’s branches. Their number increased until it reached its highest level during the research period in 2021, reaching (71) machines with a growth rate of (9.23). %).

Table (3): Number of automated teller machines (ATM) for the research sample for the period (2010-20)

Bank of Baghdad		Gulf Commercial Bank		National Bank of Iraq		Years
Growth Rate (%)	Number of ATMs	Growth Rate (%)	Number of ATMs	Growth Rate (%)	Number of ATMs	
	3		4		3	2010
233.33	10	75.00	7	0.00	3	2011
80.00	18	185.71	20	40.00	5	2012
22.22	22	25.00	25	37.50	8	2013
31.82	29	12.00	28	20.00	10	2014
17.24	34	0.00	28	16.67	12	2015
17.65	40	14.29	32	29.41	17	2016
17.50	47	0.00	32	15.00	20	2017
4.26	49	6.25	34	47.37	38	2018
12.24	55	5.88	36	15.56	45	2019
18.18	65	8.33	39	70.59	153	2020
9.23	71	43.59	56	4.38	160	2021
	36.92		28.42		39.5	Average
	71		56		160	maximum limit
	3		4		3	Minimum Limit
	20.52		13.31		53.85	Deviation

Source: Prepared by researchers based on the Central Bank of Iraq, Information Technology and Electronic Payments Department, Operations Department.

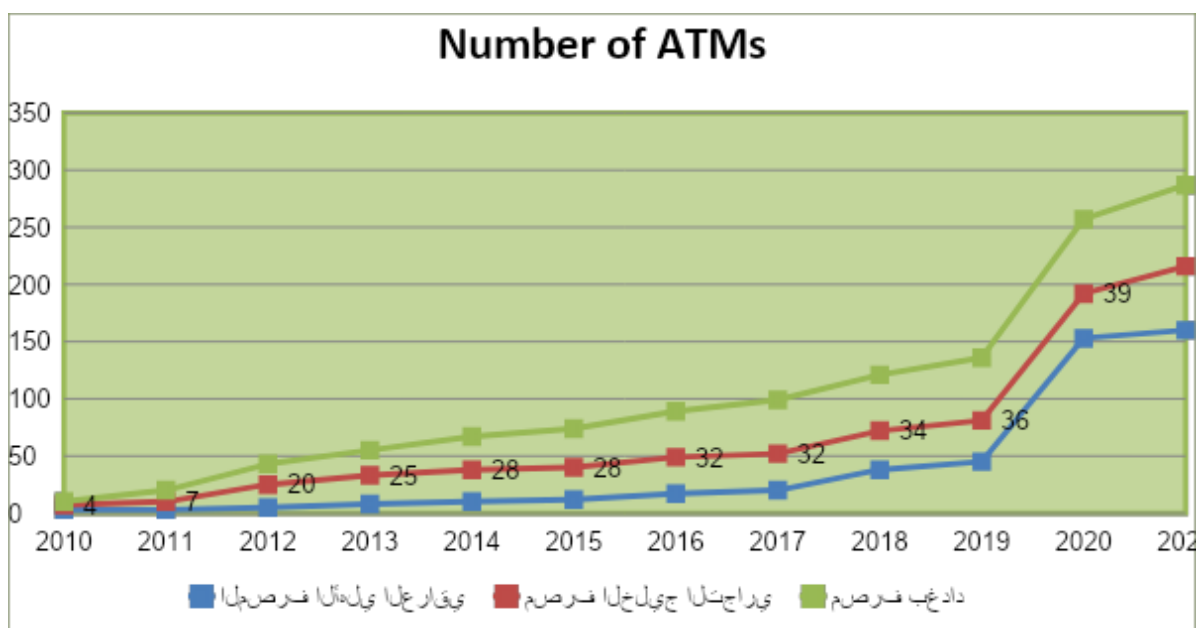


Figure (3): Number of automated teller machines (ATM) for the research sample for the period (2010-2021)

Source: Based on the table: Number of Automated Teller Machines (ATM) for the research sample for the period (2010-2021)

Electronic cards

It is a plastic card with dimensions and technical specifications, with a global standard, subject to the approval and supervision of the Central Bank. It is a special card issued by the bank to customers to enable them to obtain goods and services from some stores and places. From Table (4) it is noted that the National Bank of Iraq uses modern technologies in Completing its work compared to the banks in the research sample, the bank has adopted a special banking system called (I.C.B.S). This system specializes in electronic cards and automated teller machines to provide the best banking services to customers to enable it to increase its customer base because this system provides efficiency in work, speed, completion and ability.

On the development of banking work, the number of electronic cards of the National Bank of Iraq reached its highest value in 2021, amounting to (91,755) cards, and its lowest value in 2010, amounting to (978) cards. It decreased by (17,501) cards in 2020 from 2019 and increased again in 2021. To reach its highest value, which is a good indicator.

It turns out that Khaleej Commercial Bank has sought to apply modern technologies in completing its work since 2013, and that the bank's goal in applying these technologies is to develop the bank's work so that it can provide the best banking services to customers. Thus, the bank has used a special banking system called (BANKS), and this system helps with the speed in completing the work as well as the ability to develop the work. This system specializes in electronic cards and ATMs in its work.

Thus, the bank began issuing electronic cards of various types in the year 2010, when the number of cards reached (7450) cards, and after that, the number of electronic cards issued

by the bank increased to reach the year 2014. (63,886) cards, and after that the number of electronic cards issued by the bank continued to increase as a result of the bank offering various electronic cards with multiple uses. Thus, the number of cards reached (92,964) cards in 2016, and the demand for electronic cards issued by the bank continued to increase until it reached the year 2021. To (130,107) cards, with a growth rate of 12.36%, of various types. The Bank of Baghdad began using modern banking technologies and systems to carry out its work in 2010 to develop payment methods to provide the best banking services to customers. This technology that the bank uses depends on a special system called (BANKS). This system specializes in electronic cards and ATMs, and thus the bank began issuing electronic cards of various types to customers, as the number of electronic cards issued by the bank in 2010 reached (977) cards of various types, and the use of cards continued to increase until it reached (20,990) cards in 2018, with a growth rate of 47.57%.

Table (4): Number of electronic cards for the research sample and for the period (2010 - 2021)

Bank of Baghdad		Gulf Commercial Bank		National Bank of Iraq		Years
Growth Rate (%)	Number of electronic cards	Growth Rate (%)	Number of electronic cards	Growth Rate (%)	Number of electronic cards	
	977		7450		978	2010
2.56	1002	32.48	9870	2.66	1004	2011
2.10	1023	-6.61	9218	7.37	1078	2012
11.44	1140	232.15	30618	2.04	1100	2013
169.65	3074	108.66	63886	7.91	1187	2014
0.00	3074	37.10	87589	7.75	1279	2015
173.55	8409	6.14	92964	-0.78	1269	2016
69.15	14224	7.51	99947	331.28	5473	2017
47.57	20990	10.34	110286	228.39	17973	2018
19.60	25104	1.07	111465	35.66	24382	2019
42.07	35666	3.88	115790	-28.22	17501	2020
31.11	46762	12.36	130107	424.28	91755	2021
	15947		85187		26392	Average
	46762		130107		91755	maximum limit
	977		7450		978	Minimum Limit
	31791		37097		30263	Deviation

Source: Prepared by the researcher based on data from the Central Bank of Iraq, Information Technology and Electronic Payments Department, Operations Department.

Figure (4): Number of electronic cards for the research sample and for the period (2010 - 2021)

Source: From the researcher's work, relying on data from the Central Bank of Iraq, Information Technology and Electronic Payments Department, Operations Department

Second: Analysis of bank credit risk indicators in Iraqi commercial banks, the research sample

1- Non-performing loans to total cash credit

It is one of the important and basic indicators for measuring the quality of assets and credit risks. It is represented by overdue debts, or what some call non-performing loans, to the total monetary credit granted (loans and debit current accounts), the details of which are recorded in the published annual reports of the Central Bank of Iraq and among the financial stability reports. It is also considered one of the indicators for measuring the quality of assets and credit risks.

Financial safety indicators due to the importance of such an indicator, and that a rise in this percentage has a negative interpretation for banks, which means an increase in banks' exposure to credit risks as a result of this default compared to the credit granted, which requires them to take the necessary measures to limit its increase and more effectively in granting credit in a manner consistent with merit. Credit and the ability of the parties to repay. The ratio is measured through the following equation:

Table (5): Ratios of non-performing loans to total cash credit (%)

Minimum	Maximum	Al Ahli	Al Khaleej	Baghdad	Years/ Banks
0.063	0.252	0.063	0.252	0.158	2010
0.106	0.241	0.106	0.113	0.241	2011
0.026	0.341	0.099	0.026	0.341	2012
0.048	0.207	0.055	0.048	0.207	2013
0.073	0.217	0.073	0.116	0.217	2014
0.126	0.244	0.126	0.142	0.244	2015
0.138	0.695	0.195	0.138	0.695	2016
0.084	0.582	0.359	0.084	0.582	2017
0.090	0.831	0.226	0.090	0.831	2018
0.111	0.807	0.111	0.131	0.807	2019
0.094	0.901	0.094	0.097	0.901	2020
0.041	0.941	0.041	0.098	0.941	2021
		0.129	0.111	0.514	Average
	0.970	0.359	0.252	0.941	Maximum
0.008		0.041	0.026	0.158	Minimum
		0.091	0.056	0.308	Standard deviation

Source: Based on the annual reports of the banks in the research sample for the period (2010-2021)

2- Coverage ratio (provisions for non-performing loans to non-performing loans)

It is considered one of the important and complementary indicators to the asset quality indicators, which is the coverage ratio for the allocations specified by legal procedures and in proportion to the size of credit with non-performing debts or non-performing loans. An increase in this ratio has positive connotations, unlike the previous indicator, if it is taken into consideration as a precautionary aspect of the credit risks that arise.

To which banks are exposed as a result of granting credit as an essential part of banking work, while some view it as an increase in allocations as a negative result of not employing these funds in investment activities, and thus they are cumulative or fixed amounts to prevent the risks resulting from granting credit, and among different points of view, their decrease is considered... It serves as an alarm bell about the size of the large risks that the bank may be exposed to if its allocations for these debts are not sufficient.

This indicator represents the percentage of the provision for loan losses in the bank divided by the total non-performing loans. The percentage of provision for loan losses is determined according to the guidelines issued by the Central Bank, The percentage of allowance for loan losses was determined according to the duration of late payment, the guarantees provided, and the credit rating of the loans. The coverage ratio is measured from the following equation:

Table (6): Coverage ratio (provisions for non-performing loans to non-performing loans) %

Minimum	Maximum	Al Ahli	Al Khaleej	Baghdad	Years/ Banks
0.564	3.893	1.111	1.408	0.564	2010
0.545	5.256	0.719	1.418	0.545	2011
0.470	6.453	0.623	2.231	0.470	2012
0.506	7.694	1.191	0.969	0.506	2013
0.356	3.960	1.585	0.506	0.356	2014
0.311	1.790	0.899	0.311	0.506	2015
0.224	14.301	0.630	0.355	0.224	2016
0.260	15.460	0.438	0.939	0.260	2017
0.189	9.709	0.535	0.939	0.189	2018
0.206	15.059	0.819	0.679	0.206	2019
0.243	1.207	0.652	0.939	0.243	2020
0.266	1.285	0.759	0.939	0.266	2021
		0.830	0.969	0.361	Average
	15.460	1.585	2.231	0.564	Maximum
0.189		0.438	0.311	0.189	Minimum
	3.893	1.111	0.531	0.146	Standard deviation

Source: Based on the annual reports of the banks in the research sample for the period (2010-2021)

The third section

Applying banking digitization mechanisms to reduce credit risks for the banks in the research sample

The following is an explanation of the analysis and discussion of the relationship between banking digitization indicators and credit risks, based on data from the banks in the research sample.

To analyze the relationship between indicators of banking digitization and credit risk, a sample consisting of three Iraqi commercial banks was chosen: (Al-Ahli, Baghdad, and Commercial Khaleej). For each of these banks, data on credit risk indicators was recorded, namely (non-performing loans to total cash credit, provisions for non-performing loans to non-performing loans), and data on digitization indicators (electronic cards, ATMs) were also recorded.

In the context of the research, it was found that the Iraqi commercial banks, the research sample, had applied banking digitization to varying degrees, as was stated in the indicators of banking digitization in those banks for the period from 2010 until the end of the period under study.

When analyzing the relationship between the application of banking digitization and bank credit risks, it was found that there is a significant relationship. These risks are significantly reduced after applying banking digitization indicators, and this supports the study's hypothesis, which indicates that the use of banking digitization leads to improving the effectiveness of the performance of commercial banks, enhancing competitive advantage, and reducing the risks to which they are exposed, especially in the areas of granting and returning credit. The following is an analysis of those results: According to what was stated in the first and second sections.

First: The National Bank of Iraq

Through the application of banking digitization, represented by ATMs, the bank started with (3) ATMs in 2010 and rose to (160) ATMs in 2021, in a state of continuous increase, the bank is deploying ATMs and according to the instructions issued by the Central Bank regarding the transformation. Towards electronic payment methods in all state institutions and obliging administrative units to stop traditional direct payment and shift towards payment via electronic cards. This requires the provision of modern, advanced and more widespread means of payment, which is what the bank's data showed in Table (3), which has expanded significantly despite the circumstances it is going through.

In the country and during the researched period, the application of banking digitization mechanisms reflected in reducing credit risks for the National Bank of Iraq after it was noted that banking digitization indicators have been increasingly applied during the researched period in the National Bank of Iraq. It is necessary to note the extent of its impact on reducing or reducing bank credit risks.

Through analyzing the indicators of these risks, it was observed from the bank's data that the ratio of non-performing loans to the total cash credit, which indicates the percentage of bank default compared to the size of cash credit, where high percentages of it indicate the bank's exposure to financial risks, and it was noted that this percentage was recorded on average, it is negligible, as the highest amount reached (0.35%) in 2017. This means that the percentage of less than 1% of cash credit is exposed to bank default.

Defaulting here does not indicate abstention from repayment permanently, but rather the borrower may go into temporary financial hardship and may recover in the next stage to resume paying the resulting debts or installments. In any case, the ratio of non-performing loans to the total credit with this bank has recorded a continuous decline and at very comfortable rates. It indicates that the application of banking digitization has contributed very significantly to reducing the risks of bank default.

The coverage ratio also recorded low rates, which indicates the ratio of provisions for non-performing loans to the total non-performing loans, as the bank's data indicates that it has allocated very small amounts to cover non-performing loans, which indicates that the bank is using the total amounts available to it for investment purposes and not freezing some of them.

To cover troubled debts, the bank's data indicated that the highest percentage of the amounts allocated for coverage purposes reached (1.5%), which indicates that the remaining resources of the bank will be employed to grant credit and investment employment, which will provide

it with high percentages of profits that enhance its performance and sustainability in banking, which is proven by the current study, is that the use of modern methods, the most important of which is banking digitization, which has greatly reduced direct dealing between the customer and bank employees, and even dealing electronically.

From the previous analysis, it is clear that the role of applying digitization in banking through the use of (electronic cards, and ATMs) has led to a significant decrease in the indicators of banking default for the National Bank of Iraq and spared it from the problem of exposure to bankruptcy or banking delay due to its continuity of work and contribution to supplying the sectors. With the required credit to support sustainable economic development.

Second: Gulf Commercial Bank

By tracking the digitization indicators of Al Khaleej Commercial Bank, it becomes clear that the use of electronic cards is increasing, as the bank has sought to apply modern technologies in carrying out its work since 2010, and the bank's goal in applying these technologies is to develop the bank's work and develop its services to reduce the risks to which it is exposed.

The bank has used a special banking system called (BANKS), and this system helps speed up the completion of work. This system specializes in electronic cards and ATMs in its work, issuing different types of electronic cards until it reached (130,107) cards in 2021, as it is noted that the highest bank Average among the other banks in the research sample, which averaged (85,187) cards, and this increase was accompanied by a continuous development in the use of ATMs for the same period, as the bank started with (4) ATMs in 2010 and rose to (56) ATMs in the year 2021.

After it was noted that banking digitization indicators have been increasingly applied during the period studied for Al Khaleej Commercial Bank, it is necessary to note the extent of its impact on reducing bank credit risks. Through the analysis of bank credit risk indicators, it was found that the ratio of non-performing loans to the total cash credit reached its highest (0.25%). In 2010, it was a low percentage and a subsequent decrease in the percentages. This is attributed to the bank's policy to reduce the risks of non-performing loans relative to the credit granted.

This means that the greater use of the application of banking digitization mechanisms led to a decrease in credit risks represented by non-performing loans, and certainly the coverage ratio recorded low rates as well, which indicates the ratio of provisions for non-performing loans to the total non-performing loans, as the highest ratio for the provision for loan losses to the total loans was It reached (2.23%) in 2012 and is considered relatively high, and the bank's degree of risk is relatively high due to the losses that result from not recovering part of the bank's loans granted, while the bank achieved the lowest default rate in the year (0.31%) and this indicates that the bank has a margin of safety. To recover a portion of its loans, the decrease in the ratio of the provision for non-performing loans to the total loans reflects the strength of the credit policy drawn up by the bank.

Finally, credit risk indicators indicate that the rates are low compared to the rest of the banks, and this indicates that whenever the bank seeks to use electronic payment systems, it enhances the competitive advantage and reduces credit risks.

Third: Bank of Baghdad

By observing the indicators of banking digitization implemented by the Bank of Baghdad during the period under study, it was noted that the bank used the electronic card system to develop payment methods to provide the best banking services to customers, as the bank's data indicated a noticeable development in the number of these cards, which increased from 977 cards in 2010 to 46,762 cards in 2021, with high growth rates, the highest of which reached (173.55%) in 2016. This is evidence of the digital development taking place in the bank. As for ATMs, an increase in the number of payment machines was shown from 3 machines in 2010 to 71 machines. It is subject to increase in the coming period.

The results of the analysis showed the impact of the application of banking digitization in reducing the bank credit risks of the Bank of Baghdad after it was found that the ratios of the non-performing loans index to the total monetary credit in the Bank of Baghdad had taken a fluctuating trend of decrease and increase during the research period, as its lowest value was in 2010 when it reached (0.15%), and that the decrease in the percentage of non-performing loans is a positive matter for the soundness of banking and the stability of the banking sector, as it indicates that banks have become more cautious in granting credit, and this matter increases the financial sobriety of the bank and reduces the possibility of it stumbling in the short term.

As for the highest level in the year 2021, where it reached (0.94%). This indicates a percentage of less than 1% of loans exposed to bank default. As for non-performing loans to capital, they became high in the Bank of Baghdad when compared to the other banks in the research sample, where they were the highest on average and reached (0.403%). Through the results of the analysis, it is clear that the coverage ratio (allocations for non-performing loans to non-performing loans) is less than 1%, and the highest percentage was in 2010, when it reached (0.564%), which is consistent with the lack of use of electronic payment tools at that time and the lack of caution in allocating sufficient amounts for non-performing loans, but over time the percentage decreased to reach (0.189%) in 2018.

This means that the application of banking digitization will be reflected in the coverage ratio of the Bank of Baghdad. Through the analysis of the results, it becomes clear that the use of banking digitization has a role in reducing bank credit risks for the Bank of Baghdad, and this is what the results showed during the research period, where the impact of indicators (electronic cards, ATMs) on credit risk indicators is noted, which are (non-performing loans to total cash credit, allocations Non-performing loans to non-performing loans) It turns out that the relationship is inverse between banking digitization and credit risk, as the greater the application of banking digitization leads to a reduction in credit risks.

Section Four: Conclusions and Recommendations

Conclusions

The current study presents the most important conclusions that I reached based on what was revealed by the results of the financial analysis of the research data in the third section. These conclusions can be summarized as follows:

1. The results of the research hypothesis agreed that there is a relationship between banking digitization and bank credit risks.

2. Experiences in the applied aspect of the banks in the research sample have proven that there is a relationship between the use of banking digitization mechanisms to mitigate the severity of bank credit risks.
3. The most important finding of the research is that the higher application of banking digitization mechanisms leads to a decrease in credit risks, and vice versa, and this was clear in the banks sampled in the research.
4. The diversity of digital services provided increases the efficiency and performance of banks because it contributes to reducing costs and time, and limits credit risks.

Recommendations

1. The necessity and importance of banks and financial institutions adopting and applying banking digitization mechanisms for their major role in reducing bank credit risk rates.
2. The necessity of exploiting the mechanisms of implementing digitization to reduce bad debts, detect credit risks early, and work to avoid and prevent these risks to the greatest extent possible.
3. Expanding digital services, taking advantage of digital technology to quickly identify borrowers' credit, to reduce credit risks.

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