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MASTER'S THESIS

ASSESSMENT OF THE RISK PLANNING MECHANISM IN BANKING SECTOR

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MAGİSTR DİSSERTASİYA İŞİ

BANK SEKTORUNDA RİSK PLANLAŞDIRILMASI MEXANİZMLƏRİNİN QİYMƏTLƏNDİRİLMƏSİ

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INTRODUCTION

The modern banking system is constantly faced with new risks in the face of changes in financial markets, global economic challenges and technological developments. Since banks' activities fulfill the function of financial intermediation, risk management is of great importance for the sustainability and effective functioning of banks. The concept of risk should be evaluated not only as a threat, but also as a factor that can provide strategic advantages when managed correctly. The examination of contemporary approaches to risk management in the banking sector and the analysis of international experiences in this field are of great scientific and practical importance. Especially for Azerbaijani banks, the correct implementation of risk management is of great importance in terms of developing financial markets and attracting foreign investment.

Actuality of the topic: Changes in global financial markets, economic crises and factors testing the stability of the banking system make risk management even more important. Banks' exposure to credit, liquidity, interest, foreign exchange and operational risks affects their financial stability and role in the economic system. In this context, the development of scientific approaches in the field of risk management and the study of their practical applications are of great scientific and practical importance.

Aims and objectives of the research: The main purpose of this thesis is to examine the theoretical and practical aspects of risk management in the banking sector, to analyze the international experience in this field and its applications in the local banking sector. The following tasks were determined to achieve this goal:

- Explain the importance of the concept of risk for the banking sector;
- Determine the main types of risks in the banking sector and examine their effects;
- Analyze modern risk management methods and implementation mechanisms;
- Review international experience and evaluate the possibilities of their implementation in the Azerbaijani banking sector.

Object and subject of the study: The object of the study is the risk management process in the banking sector, and the subject is the risk management mechanisms in the banking sector, the methodologies applied and their effectiveness. In particular, risk management strategies in the banking sector, international regulatory norms and mechanisms applied to reduce risks in the local banking system were addressed as the main subjects of the research.

Research methods: Various scientific methods were used in the research. Within the framework of the analytical method, scientific approaches and theories regarding risk management in the banking sector were analyzed. Using a comparative method, risk

management methods applied in the banking systems of different countries were compared and their advantages were determined. Real statistical data and application examples were examined based on the empirical method. In addition, the risk level in the banking sector was measured with economic-statistical methods and its effects were evaluated based on various statistical indicators and databases. In addition, existing scientific resources in the field of risk management were examined using the literature review method and their results were used as the basis of the research. In this study quantitative method was used. Quantitative methods were regression, building correlation models, explaining the results.

Scientific novelty of the research: The scientific novelty of this research is to explain the concept of risk in the banking sector based on new approaches, to systematically classify modern risk management methods and investigate their application possibilities, to analyze the mechanisms of impact of international financial crises on the banking sector, to put forward new suggestions for risk management in the Azerbaijani banking sector and to offer practical solutions.

Practical significance of the study: The results of the study have practical significance in terms of providing suggestions for effective risk management for the banking sector. It can contribute to improving the risk management strategies of banks, increasing financial stability and preventing possible crises. It is also thought that the results of the thesis study may be useful for banking sector regulators and bank managers.

Structure of the study: The research work consists of an introduction, 3 chapters, 9 subchapters, conclusions and suggestions, and a list of references.

CHAPTER I. THEORETICAL FOUNDATIONS OF RISK PLANNING IN THE BANKING SECTOR

1.1. The concept of risk and its importance for the banking sector

The concept of risk began to be expressed in the 14th-15th centuries, but it is seen that fundamental studies on risk started during the Renaissance period.

In the mid-17th century, the famous French mathematician Pascal developed a logical approach and theory (similar to today's probability theory) in response to a question about how to divide the stake in an unfinished game of chance when one player was ahead. This laid one of the most important foundations of today's concept of risk. Thanks to this, it was first thought that people could make decisions with the help of numbers and make predictions about the future.

The philosophy of risk management should focus not on fearing and avoiding risks but on consciously taking and effectively managing them. Within this framework, risk management has continued to develop.

In the 19th century, Abraham de Moivre introduced the concept of the normal distribution structure, also known as the bell curve, and discovered the standard deviation. The basis of modern risk management concepts, including approaches ranging from game theory to chaos theory, is based on developments from the 17th century to the 28th century (Taleb N. N., 2007: p. 3).

When researching the concept of risk management, it is observed that there have been significant changes in international financial markets and the banking system, which is a fundamental element of these markets, in the last twenty years.

A thesis that brought a different dimension to these developments was presented by Harry Markowitz in 1952. Markowitz took a step in measuring risk and formulated techniques for creating optimal portfolios. Later, in 1958, James Tobin incorporated cash, the most liquid and risk-free asset, into Markowitz's theory. According to Tobin, investors essentially divide their savings into a portfolio consisting of a risk-free investment instrument and risky assets when making their choices (Markowitz H., 1952: p. 86).

Due to the nature of the universe, risks arising from the unknown will always exist. The important thing is to anticipate that these risks may occur, accept them, and develop preventive measures. Sometimes, thanks to the unknown, we can also achieve gains in the future. Knowing the existence of risks allows us to develop measures against them (Evren B., Akçay B., 2005: p. 385).

An important milestone in risk management is the 1988 Basel Accords. This regulation, which covers the credit risks of banks, has been revised several times over time to respond to developments in financial markets and has become an important step for subsequent regulations.

Risk management is about reducing risks and turning the process in our favor by creating strategies and plans, rather than avoiding risks.

If we randomly asked people on the street what they understand by the concept of "risk," it is likely that we would find the following common points in all their answers:

1. First and foremost, risk is a concept that evokes uncertainties about the future.
2. Secondly, risk suggests the possibility of something "negative" or "contrary" to expectations arising from this uncertainty (Kaplan R. S., Mikes A., 2012: p. 57).

Risk is an indicator of how much we deviate from an expected outcome. In the case of the business we establish, there is a possibility that it will either succeed or fail. However, if we conduct market research and quantify potential negative outcomes, we can be considered quite advanced in risk management. We can reduce the probability of unfavorable outcomes.

In this context, risk management can be defined, in its simplest form, as “taking conscious precautions to reduce the probability of an unfavorable outcome or increase the probability of a favorable outcome regarding future uncertainties”.

In light of this, we can list the following concepts related to risk:

Uncertainty: The distribution of possible outcomes both for and against. The more widespread the distribution, the greater the uncertainty and risk. The future is uncertain. If there is no uncertainty, there is no risk.

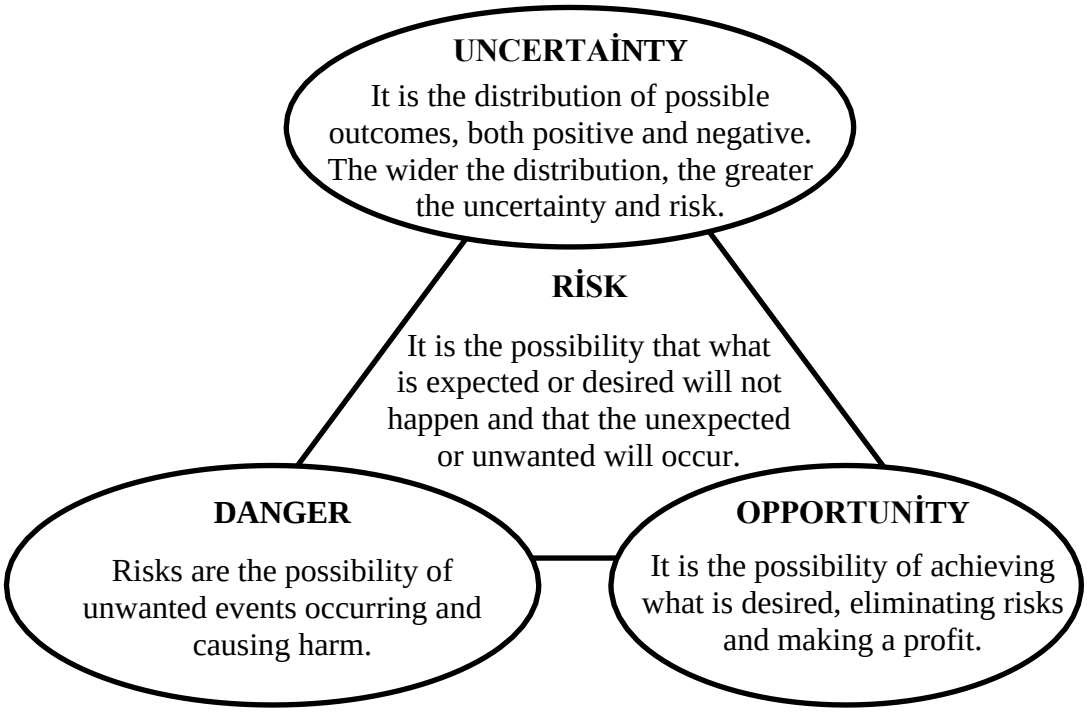


Figure 1.1.1. Financial Risk (Ayhan A., 2006: p. 1).

There are certainly goals for managing the risks that have existed for years. Particularly in financial markets, fluctuations have greatly increased the importance of risk management.

International financial markets experienced a significant transition period in the 1980s and 1990s. During this period, the increase in the number of banking transactions and the complexity of transactions, the rise in competition, and the uncertainties in the markets caused banks to face larger and more diverse financial risks. Globalization was the most important change during this period, with the international markets becoming more globalized. Over time, markets worldwide have transformed into a broader market by eliminating barriers to the free movement of capital. An example of the intense interaction of markets is the Asian Crisis, which holds a significant place. The start of the Asian Crisis is considered to be the devaluation of Thailand's Baht by 40% in July 1997. With this devaluation, the currencies of Malaysia and Indonesia were also devalued. The crisis, which also shook countries like Singapore and Hong Kong, ultimately spread to South Korea and reached a level that threatened the global economy.

Another change encountered during the transition period was the increasing volatility of international markets. When market prices fluctuate in an up-and-down pattern, increased volatility in the markets means that market participants face greater uncertainty and the associated risks. The result of the volatility in international markets became evident in the 1990s, with frequent crises occurring in financial systems (Kaval H., 2000: p. 23).

A financial crisis occurring anywhere in the world affects other countries as well. As a result, the importance of risk management has increased. Countries have decided to act collectively to protect themselves from financial market fluctuations. Thanks to these joint decisions, the banking sector has also come under regulation, and efforts have been made to mitigate the effects of crises to some extent.

From a banking perspective, risk, in its simplest form, is the probability of the bank incurring a loss. When analyzed from a risk perspective, a bank does not necessarily have to suffer a loss due to a loan default. For example, if a bank grants loans to both high-risk Company A and low-risk Company B at the same interest rate, even if both loans are repaid with interest on time, the bank has still suffered a loss by failing to price the risk correctly. In banking, "risk and return" must be considered and managed together.

The goal of risk management is not to prevent a bank from taking risks. On the contrary, since banking is inherently a risk-taking business, avoiding risks altogether would not allow a bank to survive. Risk management in banking has two fundamental objectives:

- To improve the bank's financial performance.
- To prevent the bank from encountering losses that are too large to absorb or accept.

Undoubtedly, like any commercial enterprise, the primary goal of banks—unless they have a specific mission—is ultimately to maximize profit and provide the best return on the capital invested by shareholders. This can only be achieved through high financial performance. Therefore, it is impossible to separate risk management in banking from the fundamental purpose of establishing and operating a bank. In financial performance measurement, risk management may replace traditional financial ratios derived from financial statements, such as 'return on assets' (net profit/total assets) or 'return on equity' (net profit/total equity), with more accurate 'risk-adjusted returns'.

The expectation of banking regulatory authorities from risk management is to ensure that banks take risks proportional to their capital and to guarantee in advance that any losses incurred during adverse situations can be covered by capital. In other words, the goal is to prevent unexpected losses from exceeding the bank's equity and spreading to external liabilities—such as deposits collected from the public—by implementing precautionary measures today. This can only be achieved through the establishment and maintenance of highly effective risk management systems in banks.

A good risk management system also acts as insurance by preventing capital from remaining idle if the bank has the opportunity to take risks and invest. In this sense, there is no conflict between the expectations of regulatory authorities and those of bank shareholders and managers regarding risk management. This is what differentiates risk management systems and risk-based capital adequacy regulations from ordinary mandatory regulations. Banks should not implement these regulations merely to comply with the law or out of fear of sanctions but for the well-being of the bank and its shareholders.

In the risk management process, it is essential to identify the risks that may arise. These risks vary across different industries. Factors such as customer profiles, the markets in which the bank operates, and geographical diversification all influence risk variations. Naturally, risks that are not identified cannot be managed.

Decisions regarding profitability and liquidity are always made under conditions of uncertainty. To mitigate this uncertainty, predictions are made. The fact that predictions do not match actual outcomes to the same degree or that prediction errors create a loss constitutes risk itself. In banks, decisions based on incorrect predictions create risks not only for profitability but also for liquidity.

A bank being profitable yet unable to make payments on time or being able to make payments on time but at a level of profitability that does not satisfy its shareholders are among the most fundamental risks that threaten the bank's future.

Banking is essentially an activity of risk management. In modern banking, which has been reshaped by trends such as the development of foreign trade, capital markets, financial liberalization, and globalization, risk management has become an indispensable function for banks, which are institutions built on trust.

As in all businesses, every action taken or not taken in banks carries risk. The existence of risk necessitates its management. Knowing and measuring risk enables banks to determine preventive measures before risks materialize and to plan responses for when they do, thus enhancing preparedness against potential risks.

The purpose of risk management in banking is to measure in advance the magnitude of potential losses the bank may face during extraordinary market conditions and to be prepared for such situations. Therefore, risk management is of great importance, especially in the banking sector, which is the backbone of financial markets. For this reason, the types of risks must first be identified, and appropriate preventive measures must be taken using different methods for each type of risk.

1.2. Classification of risks in the banking sector and their causes

Banking is built on the principle of managing risks to ensure that a bank can continue to operate as a healthy, secure, and profitable institution. One of the key reasons banks are subject to strict oversight and regulation is the liquidity mismatch in their asset and liability structures.

As a natural consequence of their core financial intermediation functions, banks' balance sheets present an inverse structure compared to businesses in other sectors. Unlike other enterprises, banks do not operate primarily with their own funds but rather take on risks due to the placements they make using externally sourced funds. The continuity of their operations depends on the effective management of these external funds.

The most technically challenging aspect for banking authorities, regulatory bodies, and banks is determining the adequate level of capital for banks in the face of certain adverse losses. These identified adverse losses are used by regulatory authorities to set the required capital levels that banks must hold against their risks.

The globalization of international banking, the expansion of banks as unified entities operating on a larger scale in multiple countries, the increasing transaction volume of derivative products, differences in capital adequacy regulations between countries creating competitive

advantages for some banks, and the rapid movement of capital across borders have all necessitated global regulations in addition to local banking regulations (Şakar H., 2002: p. 263).

To address these issues, the Bank for International Settlements (BIS) has begun establishing rules and standards for banks operating on a global scale. Its functions include strengthening market supervision, preventing unfair competition, and implementing capital adequacy regulations, among other responsibilities.

The Bank for International Settlements (BIS) was established in Basel, Switzerland in 1930 as part of the Young Plan established by the Treaty of Versailles. Its initial function was to regulate the collection and payment of World War I debts. Today, the BIS is one of the main institutions supporting the activities of central banks and equivalent regulatory bodies in the international financial system. This institution, which is jointly owned by 55 central banks, provides services only to central banks and financial regulatory bodies. The main functions of the BIS are as follows:

- Setting and implementing standards in the global banking sector
- Collaborating with international and local banks to ensure financial stability
- Providing research and analytical services to central banks
- Strengthening risk management and control mechanisms in financial markets

As the most important global institution of the international banking sector, the BIS contributes to the shaping of the regulatory framework in the banking sector by taking a leading role in defining capital adequacy and risk management principles through the Basel Committee (McCauley R. N., 2012: p. 21).

The Basel Committee on Banking Supervision (Basel Committee): Established at the end of 1974 following major crises in international foreign exchange and banking markets, the committee was initially called the "Committee on Banking Regulations and Supervisory Practices." It operates with 12 member countries—Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. The committee aims to create a forum for cooperation among member countries on supervisory matters and, from a broader perspective, to improve global supervision and enhance the quality of banking regulation. Member countries are represented in the committee by both their central banks and institutions officially responsible for banking supervision.

The Basel Committee's work aims to eliminate regulatory discrepancies and gaps in international banking supervision. While its regulations do not carry legal enforcement, they have become widely adopted worldwide due to their role in establishing global standards. Decisions made by the Basel Committee generally serve as guidance for national supervisory

and regulatory authorities, offering detailed regulatory recommendations and supervisory standards.

In order to manage and regulate capital in the international banking system, the Basel Committee published its first basic framework document in 1988 under the name of the Basel Capital Accord (Basel I). This agreement aims to increase the resilience of financial institutions and strengthen credit risk management. The 1988 Basel Accord was the first international regulatory framework to impose uniform capital adequacy requirements on banks. According to the agreement, the minimum capital adequacy ratio of banks against credit risks was determined as 8 percent as of the end of 1992. The aim of this regulation is to implement a risk-focused approach in order to ensure the sound operation of commercial banks and to prevent possible financial crises (VanHoose D. D., 2007: P. 3684).

Credit risk: One of the fundamental activities of a bank is lending. Credit transactions require making accurate decisions regarding the creditworthiness of individuals or institutions borrowing from banks. While these decisions are not always correct, the creditworthiness of borrowers may decline over time due to various factors. For this reason, every loan issued by banks carries a risk.

In general, credit risk may be perceived as being limited to the balance of credit accounts. However, the concept of credit risk is much broader and encompasses many different aspects. If a borrower fails to fulfill any of their obligations, it creates credit risk for the bank. While the largest source of credit risk stems from the commercial and individual loans granted by the bank, other factors related to banking activities also contribute to credit risk. It refers to the possibility of the bank incurring losses due to borrowers failing to meet their obligations to the bank fully or partially in a timely manner (McCauley R. N., 2012: 19).

Credit risk is defined as the probability that one party in a transaction may fail to fulfill its obligations to the other party. Potential changes in net profit and market value of shares due to a borrower's failure to make principal and interest payments on time occur when a bank extends credit or acquires bonds. Credit risk also includes the deterioration of a counterparty's creditworthiness. A weakening of a customer's creditworthiness does not necessarily mean that they are already experiencing payment difficulties, but it serves as an indicator that such difficulties may arise.

Credit risk is directly related to liquidity and interest rate risks. It arises from the inability to collect cash placements, which typically generate interest income, in full and on time. Additionally, in off-balance-sheet transactions that generally generate commission income, banks may be required to fulfill customers' non-cash commitments if the customer

fails to do so. In such cases, if the customer is unable to reimburse the bank for the amount paid, it further contributes to the bank's credit risk.

The emergence of credit risk occurs within a broad and complex process that is not easily defined. The risk formation process begins with the initial attempt to grant credit to a customer and continues to exist, either explicitly or implicitly, even when it does not manifest in clear indications.

For most institutions, credit risk is the most significant risk. Although it originates from the credit portfolio, credit risk also arises from other banking activities, such as investment and trading portfolios, asset securitization, interbank borrowing, and overnight deposits. The quality of loans, investment portfolios, and other risks provides crucial insight into an institution's future profitability. Quantitative disclosures should reflect issues related to credit and other assets.

Credit risk management can be used as a strategic tool by senior management in areas such as performance measurement, capital allocation among business units, fund management, provisioning, and credit pricing. If risks can be measured in a more correlated and structured framework across the organization, they can be utilized for performance evaluation. When risks are incorporated into any performance measurement, the returns generated within the organization can be assessed in relation to the risks taken (VanHoose D. D., 2007: P. 3688).

Market risk: Market risk is one of the important risk categories that exposes financial institutions to potential losses arising from changes in market conditions. This risk is directly related to changes in the value of financial instruments and has a multifaceted structure. Market risk, including interest rate risk, stock position risk and exchange rate risk, regularly affects the balance sheet and off-balance sheet positions of financial institutions. Failure to manage these risks can seriously affect the financial stability of banks.

When assessing market risk, the risk of the transaction portfolio is of great importance. International accounting standards and requirements directly affect how banks reflect market risk in their commercial activities. In this context, the role of foreign exchange risk, one of the important subcategories of market risk, comes to the fore.

Market risk refers to the risk of a decrease in the value of a contract, financial instrument, financial asset, or portfolio position when market conditions change. Market risk is a constant presence and depends on the variability of market parameters, including interest rates, stock indices, and exchange rates. Like all banking risks, market risk is multifaceted and dynamic (Saunders A., Cornett, M. M., 2020: p. 103).

Liquidity risk: Liquidity risk arises when a bank fails to properly manage the decline in its liabilities or lacks sufficient resources to accommodate the growth in its assets. A bank

facing liquidity difficulties may be unable to secure the necessary funds by rapidly increasing its liabilities or converting its assets into cash at reasonable prices. In extraordinary circumstances, insufficient liquidity can lead to the bank's inability to meet its obligations. Liquidity risk can be broadly defined as the cost of obtaining funds in a short time to meet deposit withdrawals and loan demands. It occurs when a bank is unable to meet its liability obligations, generally due to customers seeking to liquidate their positions and investments. The primary goal of liquidity management is to prevent situations where net liquid assets become negative.

Liquidity risk in banking refers to the challenge banks face in meeting sudden withdrawal requests from depositors. Banks can generally estimate the daily cash requirements they need to hold. While they maintain a certain level of cash, they may also respond to unexpected and large cash withdrawals by converting their existing assets into liquid assets or resorting to borrowing (Leblebici T. D., 2006: p. 7).

Interest risk: This risk, also referred to as interest rate sensitivity, represents the adverse effects on net cash flows and the values of assets and liabilities caused by interest rate fluctuations. Interest rate risk impacts both the bank’s revenues and the economic values of its balance sheet and off-balance-sheet items.

One of the most typical risks for banks, interest rate change risk, arises from fluctuations in the pricing of the bank’s marketed products, leading to reductions in expected or projected profits. As long as the cost of short-term funds remains lower than the returns from long-term funds, banks obtain a maturity transformation premium. Since this advantage is exclusive to banks, it is referred to as a subjective or structural premium or structural margin. Banks frequently engage in this transformation by acquiring and selling funds at fixed interest rates. Interest rates are generally determined at the time contracts or transactions are made and cannot be altered until maturity (Ertürk H., 2010: s. 68-69).

In such cases, if deposit interest rates increase before a loan matures, the bank is forced to pay a higher interest rate for short-term deposits that renew frequently, such as one-month deposits. However, it cannot adjust the interest rate on the long-term investment loan it has already issued. As a result, the bank continues to collect returns based on older, lower fixed interest rates, ultimately reducing its profitability. This risk, arising from insufficient precautions against interest rate fluctuations, is referred to as interest rate change risk (Kaval H., 2000: p. 89).

In variable-rate transactions, both asset and liability interest rates can fluctuate. However, these changes may not occur at the same rate. If the price elasticity of assets is lower

than that of liabilities during periods of rising interest rates, assets may not fully adjust to new interest rates, causing the bank to miss out on potential alternative interest income.

General market risk is determined by the effect of interest rate movements on debt instruments with interest-based returns, as well as associated repo transactions and derivative instruments. The remaining maturity period is used as a criterion for fixed-rate securities, while the time until the next repricing date serves as a criterion for variable-rate securities (Çağıl G., Köse A., Omağ A., 2010: p. 89).

Exchange rate risk: It arises when there is no foreign currency of the same amount and type on both the asset and liability sides of a bank's balance sheet. If the national currency appreciates against foreign currencies, a bank with a surplus in assets will incur a loss because it will receive less national currency for the same foreign exchange, while a bank with a surplus in liabilities will make a profit because it will be able to settle its debt with less national currency. In the event of depreciation of the national currency, the opposite will occur. As a result, a bank with an asset surplus will make a net profit, while a bank with a liability surplus will incur a loss. These profits or losses will be reflected in the bank's accounts as "Revaluation Profit or Loss" (Kaval H., 2000: p. 252).

In banking terminology, particularly when the national currency depreciates, if foreign currency assets exceed foreign currency liabilities, it is referred to as a long position; conversely, if foreign currency liabilities exceed foreign currency assets, it is referred to as a short position.

Exchange rate risk is calculated based on all of a bank's foreign currency assets and liabilities, irrevocable off-balance sheet liabilities denominated in foreign currency, receivables related to non-cash loans, forward foreign exchange transactions, swap transactions, and derivative contracts that involve exchange rate risk. The gold position is also considered within the scope of exchange rate risk.

The Banking Regulation and Supervision Agency (BRSA) defines exchange rate risk as "the probability of banks incurring losses due to changes in exchange rates resulting from all their foreign currency assets and liabilities".

The intensification of international capital movements, the elimination of borders between countries, and financial liberalization worldwide have allowed capital flows, particularly from developed countries to developing ones, to move very quickly. These flows have facilitated resource acquisition both for countries and for banks, increasing the volume and diversity of foreign currency transactions in banks' balance sheets.

There are three main conditions that cause exchange rate risk: a floating exchange rate system, a fixed exchange rate system, and a change in the exchange rate regime. The floating

exchange rate regime is a system in which exchange rates are determined by market conditions and are not subject to intervention, making fluctuations in exchange rates a significant risk factor. The fixed exchange rate regime is a system where the value of a currency is pegged to another country's currency. Changing the exchange rate regime means that the country's currency no longer influences exchange rate changes.

Country and transfer risk: In international credit transactions, the risks associated with the country of the borrower, in addition to the individual or institution receiving the loan, are also important. Country risk is particularly significant when loans are granted to foreign governments, public institutions, and organizations. An extension of country risk is transfer risk. These risks arise when the borrower's obligations cannot be fulfilled because they cannot be defined in terms of the national currency.

A country may not allow its own currency to be converted into other currencies and transferred abroad. However, the direct counterparty may still be willing and able to make the payment.

Transfer risk refers to the risk that the repayment amounts owed to foreign lenders, due to loans or securities purchased, are withheld by the country's government. Banks generally have limited influence over country risks.

The risks turn into losses when the borrower is unable to repay the principal or interest for various reasons, or when the borrower makes the payment but the bank cannot collect it. Sometimes, the borrower fails to repay the loan for various reasons (such as a worsening economic situation, bankruptcy, or intentionally). In such cases, customer risk turns into a loss. Sometimes, even if the borrower wishes to repay the loan or does repay it, the bank cannot collect it. This may occur because the borrower is an overseas customer, and due to certain disruptions in that country, foreign currency transfers are not possible. As a result, the bank is unable to collect the payment. When the borrower fails to repay the loan, it is referred to as "Creditworthiness Risk", whereas when the borrower repays the loan but the transfer cannot be made, the risk is referred to as country risk (Kaval H., 2000: p. 60).

Transfer risk refers to the restrictions on the movement of capital, payments, production, people, and technology in or out of the country due to government policies. These practices are typically implemented by all countries. Countries, especially through tariffs on exports and imports, impose certain restrictions. Every country's government, as its primary responsibility, focuses on protecting its citizens and businesses, which leads to the implementation of such practices (Politik risk yönetimi ve anlaşmalar, 2019).

Risk of non-payment: The risk of non-payment is the result of the risks taken and the capital at hand, including credit risk, interest rate risk, liquidity risk, market risk, and operational risk.

All risks represent potential losses, and therefore, all risks should be quantified as potential losses. Protecting against these losses is possible with sufficient capital, and the measurement of all potential losses from various risks should be carried out. Capital must be at a level that can cover losses from all risks. The necessity of risk management is to calculate the sufficient capital ratio by quantifying these principles through measurements.

The main objective of capital adequacy is to ensure the availability of sufficient capital against all risks. This is the capital necessary for the bank to remain secure.

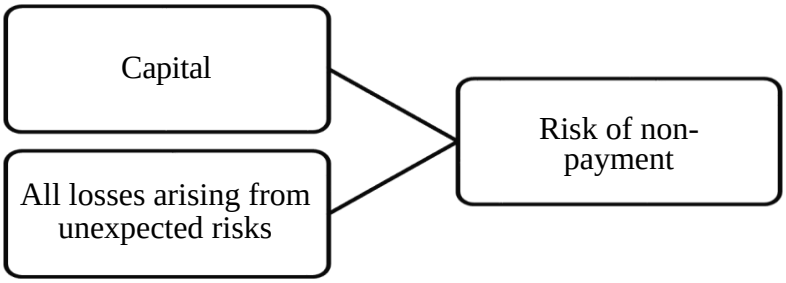


Figure 1.2.1. Global risk management and default risk (Alkin E., Savaş T., Akman V., 2001: p. 118)

Operational risk: Operational risk can alternatively be defined as "any risk, other than absolute credit and absolute market risk, that may cause material or reputational loss to the bank, arising within the framework of organization, workflow, technology, human resources, regulations, management, and operational environment".

In our country, operational risk is defined by the Banking Regulation and Supervision Agency (BDDK) in the Regulation on Internal Audit and Risk Management Systems of Banks as the possibility of loss or damage due to failures in internal controls, overlooked errors and irregularities, failure to act in accordance with time and conditions by the bank's management and staff, mistakes in bank management, errors and disruptions in information technology systems, and disasters such as earthquakes, fires, and floods.

The Basel Committee defined operational risk in January 2001 as: "The risk of direct or indirect loss resulting from inadequate or failed internal processes, people and systems, and external events." This definition includes legal risks, but strategic risks, name and reputation risks are not included in the operational risk framework.

Operational risk covers a variety of disruptions that may occur in the daily operations of an organization. These risks can be divided into two main categories:

- System errors and deficiencies - technical failures in banking systems, cybersecurity vulnerabilities.
- Employee errors and ethical violations - incorrect accounting, fraud, abuse of authority.
- Inadequate internal control mechanisms - gaps in operating procedures and ineffective audits.
- Natural disasters - damage to banking infrastructure as a result of events such as earthquakes, floods and hurricanes.
- Terrorist attacks and other emergencies - events that may cause serious disruptions to the financial system.
- Legal and regulatory changes - changes in legislation and regulatory policies. (King J. L., 2001: p. 93).

Moreover, the increasingly complex and continuously changing nature of the products and services used by financial institutions makes it impossible for staff to be fully knowledgeable about all processes. This, along with employees who misuse their duties economically and engage in criminal activities such as corruption, theft, and fraud, leads to operational risks. These risks also stem from errors in transactions due to lack of knowledge and experience, loss of key personnel due to insufficient training, inadequate physical work environment arrangements, irregular staff transfers between units, the violation of the principle of job segregation by assigning multiple conflicting tasks to employees, and allowing employees to perform uncontrolled operations. Other factors include unauthorized actions taken by staff due to the absence of procedures and limits regarding processes and transactions, and the leakage of confidential institutional information by employees.

In this context, the factors causing operational risk can be examined under five separate categories: people, systems, processes, external factors, and legal risks.

Human errors, abuses, inadequate or malfunctioning internal controls and business processes, or technological infrastructure and systems pose a threat to the bank's security. After intense discussions about how these risks can be quantified, they were included in the new capital adequacy agreement under Basel II (Çağıl G., Köse A., Omağ A., 2010: p. 18-19).

Operational risk is the easiest to define but the hardest to measure. In all processes created to carry out banking activities, the risk that arises from the difference between the intended outcome and the actual outcome defines operational risk. This difference can sometimes stem from errors made by employees, customers, or automation systems. The resulting discrepancy can sometimes cause a financial loss, sometimes lead to an illegal transaction that may or may not result in a financial loss, cause a loss of reputation due to

mistakes in internal and external reports, or may not result in any outcome at all (Şakar H., 2002: p. 279).

Legal risk: Legal risk refers to the risk a business may face due to the legal nature of its internal structure or the transactions it conducts with external parties, and whether these transactions are legally traceable (Kahraman A., 2000: p. 48).

Legal risk refers to situations where receivables lose value due to insufficient or incorrect legal information and documentation, or where liabilities exceed expectations. Sometimes, existing laws may be insufficient to resolve legal issues related to the bank, or a court decision related to a specific case may negatively impact the banking sector, either partially or entirely. Additionally, laws related to banking and other commercial institutions may also undergo changes.

Reputation risk: Reputational risk is a type of risk that arises as a result of failures in a bank's operations or failure to comply with legal requirements, which negatively impacts the bank's reputation. Establishing and maintaining trust with customers, investors and other market participants is essential to the long-term sustainability of a financial institution. In this context, reputational risk can pose a serious threat not only to financial losses, but also to the bank's market position and business prospects (Dowling G., 2006: p. 138).

1.3. Risk measurement techniques, risk management and applications in banking

Risk management in the banking sector is a very important area in terms of ensuring the stability of the financial system and preventing possible operational threats. When banks actively operate in financial markets, they face risks such as credit, liquidity, interest, foreign exchange and market risks. Effective management of these risks plays an important role in ensuring the stability of the banking system and supporting economic development. In recent years, the importance of risk management techniques in banks has increased and many scientific studies are being conducted in this direction. In particular, factors such as global financial crises and uncertainty in the markets have once again highlighted the importance of effective risk management in the banking sector.

In his monograph İlgar Mammadov analyzed the main types of risks in banking activities, the theoretical basis of risks and approaches to their management. He also conducted scientific research on modern risk management systems and methods (Məmmədov İ., 2021: p. 6).

In her research study, Aysel Usubova analyzed various risk management models and techniques applied in banks and enterprises. Emphasizing the importance of risk management

at the institutional level, the author drew attention to the importance of establishing effective governance mechanisms (Usubova A., 2017: p. 10).

John C. Hull emphasizes the importance of risk management in financial institutions and analyzes in detail various types of risks (market, credit, operational and liquidity risks). He also describes modern methods and tools used in the management of these risks (Hull J. C., 2018: p. 21)

Philippe Jorion introduces the concept of "Value at Risk (VaR)" and explains how it can be applied to measuring and managing financial risks (Jorion P., 2006 p. 11).

In his study, Georgiy Dimitriadi emphasizes the importance of the risk management process in banks. He notes that each of the stages of risk identification, assessment and management plays a critical role in the overall performance of the bank. Dimitriadi states that risk management not only ensures the financial stability of the bank, but also increases its competitiveness and strengthens its trust in market participants (Георгий Д., 2019: p. 9).

Risk management is the determination (measurement) of how much risk is associated with the financial positions of individuals and institutions and bringing this measurement to an acceptable level of risk. The goal of risk management is to ensure the necessary arrangements for the business to continue its operations with stability, protect the goods and people within the organization, and preserve the company's ability to generate profits. Thus, risk management can be defined as the planning, organization, management, and control of the necessary resources and activities to minimize unexpected losses that may arise in the organization.

Managers are faced with various and numerous problems in achieving their pre-determined goals. The existence of these problems forces them to search for solutions and find them, or more clearly, it forces them to make decisions. The decisions that managers make must be rational (logical). Since decisions are related to the future, and the future is a reflection of uncertainty, the concept of "Risk" is clearly present. For this reason, it is important for the decision made to be considered a "Rational Decision".

Decision-making is the process of solving problems and identifying the opportunities offered by the environment. This process includes taking certain measures to eliminate the barriers that affect the business's efforts to reach its goal, removing the negative conditions created by the situation, and finding positive alternatives to replace them.

Risk Management is addressed under two main headings: "Risk Management Department" and "Internal Control Department", and both are directly subordinated to the board of directors. The scope of risk management includes "Risk measurement", "Monitoring of risks" and "Risk control and reporting". These responsibilities can be summarized as follows:

- Design and implementation of the system;

- Determining risk management policies and implementation procedures within the scope of strategies;
- Ensuring compliance with policies and implementation procedures;
- Understanding risks related to new transactions in advance and conducting necessary studies for adequate assessments;
- Monitoring numerically expressed risks and ensuring they remain within established limits;
- Monitoring the compliance of limit-risk on both a risk and consolidated basis;
- Ensuring that the results of measurement and monitoring are regularly and timely reported to senior management, including the board of directors (Yarız A., 2012: p. 178).

The measurement of credit, market, and operational risk in Basel II regulations includes not only standard approaches, which are relatively easy to apply, but also advanced measurement approaches based on sophisticated models. These regulations provide banks with the option to choose between approaches based on the structure of the market they operate in, data quality, and strategic needs. The Basel II regulations outline different approaches within their advanced framework, as shown in the table (Table 1.1).

Table 1.3.1. Risk measurement methods according to the Basel II consensus development level

LEVEL OF DEVELOPMENT	CREDİT RİSK	MARKET RİSK	OPERATİONAL RİSK
Simple	Standard approach		Basic indicator approach
Medium	Basic internal rating approach	Standard approach	Alternative standard approach
			Standard approach
Advanced	Advanced internal rating approach	Value at risk (var) approach	Advanced measurement approach

Source: (Crouhy M., Galai D., Mark R., 2000: p. 79).

Credit risk, as defined in banking legislation, is the financial risk that a bank faces as a result of a customer's failure to fully, partially or timely fulfill its contractual obligations. Although credit risk is generally considered limited to the balance of credit accounts, its definition is broader and can occur in a variety of financial transactions of a bank.

Although credit risk primarily arises from commercial and individual loans, other factors may also create this risk depending on the bank's field of activity. Credit risk can arise

from a variety of financial instruments, including on-balance sheet and off-balance sheet transactions:

1. Credit risk arising from bank and commercial accounts
    - Consumer loans and mortgage loans
    - Corporate and SME loans
    - Interbank credit transactions
2. Credit risk arising from off-balance sheet transactions
    - Acceptances and trade finance
    - Foreign exchange transactions and clearing systems
    - Bonds, options and futures
    - Guarantees and guarantees

Each of these transactions increases the bank's exposure to borrowers or other financial institutions (Crouhy M., Galai D., Mark R., 2000: p. 83).

Vintage analysis: This is performed to examine the timeframes in which loans become non-performing from the date of disbursement. The bank's commercial, consumer, vehicle, and housing loans, as well as its entire credit portfolio, are subjected to vintage analysis. Additionally, this analysis is used to identify the timeframes in which restructured loans become non-performing.

ROC analysis: The effectiveness of rating models is measured through validation analysis. ROC Analysis is one of the methods used in the validation of the rating systems used for corporate, commercial, micro, and individual loans within the bank.

Transition matrix: This is used to analyze the changes in the ratings of firms in the bank's rating system and to assess the fluctuations in the quality of the credit portfolio.

Risk plus: The expected and unexpected losses of the credit portfolio are estimated using the probability of default (PD), loss given default (LGD), and exposure at default (EAD) parameters.

Regression analyses: The effects of potential shocks in macroeconomic variables on the volume of the bank's problematic loans are examined using regression analyses.

Credit analysis: The distribution and development of loans are examined according to various criteria such as the borrower's ability to repay, loan maturity, interest rates and sector distribution. It assesses the risks associated with lending activities, analyzes loan repayment dynamics and assesses the financial stability of borrowers. In addition, credit analysis helps financial institutions and investors make informed decisions by considering factors such as

economic conditions, regulatory requirements and market dynamics (Altman E. I., 1968: p. 595).

The purpose of credit risk management is to maximize the bank's risk-adjusted return by managing the risks the bank may face within appropriate parameters. Banks must manage both the risks of the entire credit portfolio and the risks associated with each individual loan. Credit risks must also be considered alongside other risks. One of the key elements of a comprehensive risk approach in risk management is the effective management of credit risk. In Basel II, the fundamental management principle for all types of risks emphasizes that the bank should have a strategy clearly defined by its board of directors.

The models developed for calculating the exposure at risk (VaR) can be classified as parametric and non-parametric models. The variance-covariance methodology is considered a parametric method, while historical simulation and Monte Carlo simulation methods are referred to as non-parametric methods. Parametric methods are based on the assumption that asset returns follow a normal distribution and are dependent on a specified confidence level. Non-parametric methods, on the other hand, are not dependent on any parameters. In other words, they do not rely on any assumptions about the distribution of asset returns.

There is no definitive opinion on which method provides the most efficient results in VaR calculations. Analysts choose risk exposure methods based on their needs. The weakest point of VaR calculation methods is that they do not show the "worst-case scenario". As is known, probability distributions represent the range within a specified confidence interval. However, in real life, even though the probability is very low, events can occur outside of this range. While the probability is low, it cannot be said that such an event will never occur (Oktay S., Temel H., 2007: p. 169).

CHAPTER II. MAIN MECHANISMS IN RISKS MANAGEMENT IN BANKS

2.1. International experience in risk management

Risk diversification is closely linked to a systematic approach to identifying potential losses by clients and their groups, business sectors, geographic regions, and other relevant factors.

When referring to foreign experience in banking system risk management, it is necessary to identify the solutions on which the effectiveness of financial system stability management depends. The study of international practices in banking system risk management should be conducted specifically by examining concrete mechanisms for solving such problems. The main task is to diagnose potential weak points in the banking system as early as possible and to forecast possible threats. Solving this problem is closely related to the organization of effective banking supervision. It is through this mechanism that risk management of the entire banking system as a whole is implemented. At the same time, the tasks of identifying risks related to ineffective management and fraud in individual financial institutions—capable of causing significant harm to a large group of banking service consumers—and preventing systemic risks that could result in a chain reaction of interconnected bankruptcies among several systemically important banks are addressed. In this regard, banking supervision regulators should play a key role.

The specific powers of regulators in carrying out banking supervision vary significantly across different national systems. For instance, in the United States, Germany, France, and Japan, a mixed banking supervision system operates, in which the country's central bank shares supervisory responsibilities with other government bodies. In contrast, in Italy and the Netherlands, supervision of credit institutions is the exclusive prerogative of the central bank. However, for example, in the United Kingdom, Canada, and Switzerland, the central bank does not function as a supervisory authority (Kuppens T., Prast H., Wesseling S., 2003: p. 59).

In practice, banking supervision is carried out both remotely (desk-based), relying on the analysis of various periodically submitted reporting documents, and through on-site inspections. Although both methods are combined in the work of almost every supervisory authority, their ratio in each specific case is determined by the established characteristics of the regulator's activities. For example, while remote supervision prevails in the United Kingdom, in the United States, thorough on-site examinations of individual banking institutions are common.

A common feature of all existing banking supervision systems is the close interaction between regulators and the internal audit departments of the banks themselves. Such interaction allows for the most effective distribution of responsibilities in banking oversight and the establishment of an efficient system for transmitting information about potential threats.

In addition to direct contact with the internal control departments of credit institutions, some countries have created a system of cooperation between banking regulators and external independent auditors, who regularly conduct audits of commercial banks. In the United Kingdom, France, and the Netherlands, government supervisory authorities essentially delegate part of their inspection functions to private auditing firms, which helps simplify and expedite remote supervision procedures. In these countries, regulators receive annual balance sheets, monthly or quarterly reports containing information on a bank's solvency and liquidity, open currency positions, overdue debts, and credit risk assessments. These documents are certified by external auditors, who, in some cases, are required to promptly inform the supervisory authority about a bank's insolvency, liquidity problems, or inaccuracies in its financial reports (Singh D., 2007: p. 32).

This role strengthens the status of independent auditing firms but also imposes additional responsibilities on them. For example, the Bank of the Netherlands holds annual meetings with external auditors, who bear personal responsibility if their actions cause harm to a commercial bank.

The banking stability management system in the United States is one of the most developed in the world. A practical example of its functioning in modern conditions and a vivid illustration of the methods used by American regulators for risk management and assessment was the implementation of the so-called Supervisory Capital Assessment Program (SCAP) in 2009.

This program was essentially one of the elements of a strategy for managing the risks associated with the growing crisis phenomena in the American financial sector. Its goal was to assess the necessary capital increases and/or the feasibility of adjusting its structure for the largest banking institutions in the U.S. in the event of sharp adverse changes in financial market conditions (SCAP, 2009).

Under SCAP rules, 19 of the largest bank holding companies (BHCs) in the U.S., which control at least one banking organization, were required to conduct stress testing under the conditions established by regulators. Participation in the program was mandatory for all BHCs whose capital exceeded $100 billion as of the end of December 2008. This ensured that the testing covered institutions occupying the most significant positions in the banking services

market, accounting for two-thirds of the assets and more than half of the loans in the U.S. banking sector.

It is important to note that the stated goal of the program was to forecast and assess potential losses from adverse events rather than to verify the current financial condition and viability of banking institutions. Thus, SCAP was purely a project aimed at implementing specific tasks in banking risk management (SCAP, 2009).

The initial information received by regulators was processed by specially created expert groups, formed according to specific asset classes, while additional data and clarifications were requested from program participants. Based on the analyzed data, regulators developed benchmark values against which the indicators of individual banking companies were compared to assess potential losses and the availability of resources to cover them.

It is important to note that in form, SCAP was a multi-factor scenario stress test, closely resembling similar studies conducted by banking organizations in their day-to-day risk management practices. However, in essence, it was a project of an entirely different scale, enabling a comprehensive and all-encompassing assessment of a wide range of systemically important credit institutions simultaneously, using unified predictive data and a standardized methodology.

The SCAP framework included calculations of loan losses, losses from asset holdings in banks' investment portfolios, as well as other potential losses from trading activities. Additionally, it required an assessment of credit institutions' ability to absorb losses and determine an adequate level of capital necessary to sustain their operations under the most pessimistic macroeconomic scenario.

The evaluation had to be conducted across 12 different types of loans, short-term and long-term investments in securities, and, in some cases, assets held in a bank's trading portfolio. Regulators encouraged a higher level of detail in loss forecasting and the consideration of other risks that, in the opinion of the credit institution, could have a significant negative impact on its business processes (SCAP, 2009).

The calculation of loan losses had to be carried out based on the principle of provisioning for future, even unrealized, losses. This principle requires writing off debts whose repayment becomes doubtful. Applying this principle does not require banks to reassess their loan portfolios in response to fluctuations in financial market prices, including those related to expectations of changes in liquidity, as long as such fluctuations do not affect the likelihood of a borrower defaulting on their obligations.

The regulator provided participating banks with indicative interval values for losses on various asset types. However, credit institutions were allowed to deviate from these values

and use other estimates, provided they could justify their reasoning. The proposed indicative values were determined based on an analysis of relevant historical data, as well as the application of statistical quantitative methods to assess the impact of macroeconomic changes on the debt market. These methods were of particular importance, as the adequacy of historical data from previous years for forecasting in an environment of significant macroeconomic shifts and large-scale crisis trends was highly questionable.

Bank holding companies (BHCs) with trading account assets exceeding $100 billion as of December 2008 were also required to conduct an additional assessment of potential losses from trading activities, including losses associated with counterparty default risk or an increased probability of such default.

To determine the relevant indicators for 2009, banks were required to forecast interest income, non-interest income, and non-interest expenses. If the projected income figures were higher than in 2008, the respective financial institution had to provide strong justifications for its forecast.

The value of the SCAP program, as an example of a modern approach to risk management at the systemic banking level, lies primarily in two key characteristics.

First, SCAP demonstrates how effective interaction between government regulators and individual banking institutions can be practically implemented in risk management. The foundation of this interaction is not simply a mechanical division of responsibility levels among participants but rather close cooperation based on well-developed bilateral communication channels for implementing a comprehensive analytical project. This characteristic is also reflected in the way information is exchanged between supervisory entities and regulatory authorities, allowing for feedback, data clarification, and refinement. Furthermore, the regulatory values and parameters prescribed for analysis remain flexible and can be adjusted to fit the realities of a particular banking institution, provided proper justification is given (SCAP, 2009).

Second, SCAP is a project specifically designed and implemented to assess and manage banking system risks in a particular crisis situation. In other words, the banking regulator does not act as a passive observer, merely monitoring a predefined standard set of financial indicators for all situations. Instead, it takes on a leading role, swiftly developing and applying emergency, ad-hoc forecasting mechanisms.

Alongside the American banking risk management system, one of the most advanced risk management frameworks in the developed banking markets today is the UK’s banking risk management system. In addition to traditional tools for monitoring key banking industry indicators, British regulators have accumulated substantial experience in collaborating with

other national financial regulators and market participants—a valuable subject for further research. The objectives of such cooperation include organizing and testing risk management systems to handle various types of unforeseen emergency situations.

These exercises represent large-scale testing of the ability of a wide range of financial institutions, including banks, to maintain business continuity in the face of extreme risks. The testing process is based on simulating business processes under emergency conditions using pre-designed scenarios.

Since 2003, the risks that have been the primary focus of these regular assessments include natural disasters, pandemics, and terrorist attacks—events that could severely impact the financial sector's infrastructure and cause significant disruptions in the normal operations of financial institutions.

For example, the fifth MWE, conducted in November 2009 with the participation of more than 70 financial organizations (including banks), was based on the simulation of a combination of extremely adverse weather conditions, such as large-scale flooding and unusually heavy snowfall. The primary objectives of this exercise were to forecast the potential consequences of such a natural disaster on the business processes of participating companies, assess their ability to swiftly resume operations under force majeure conditions, and examine the impact such events might have on the interaction between market participants and regulatory authorities (De Boissieu C., 1990: p. 66).

The United Kingdom risk management model

In February 2008, a draft titled "Risk Management: Code of Practice" was published in the United Kingdom under the name BS 31100, and in June 2011, it was officially issued by the British Standards Institution as "BS 31100: 2011 Risk Management – Code of Practice and Guidance for the Implementation of ISO 31000" (Hopkin P., 2012: p. 57).

BS 31100 serves as a supporting application code for ISO 31000. It is a systematic and effective set of standards designed to provide guidance on risk management principles, models, frameworks, and processes to help achieve risk management objectives and manage risks across an organization (Hopkin, 2012: 64). These standards emphasize that the risk management system should be a continuous and evolving process within the institution’s strategic framework and its implementation (Ferma, 2003). BS 31100 also includes additional principles related to risk management that are not covered in international standards.

The key principles of BS 31100 risk management standards are as follows (Manigent, 2012):

i. Risk management should be structured to suit the organization.

ii. Risk management should be embedded in the organization's culture and personnel perception.

iii. Risk management should be systematic and structured.

iv. A common risk language should be established within the organization.

v. Risk management should be based on the most accurate information available.

vi. Risk management should clearly assess uncertainties.

vii. Risk management should be an integral part of the decision-making process.

viii. Risk management should be transparent and comprehensive.

ix. Risk management should be dynamic and adaptable to change.

x. Risk management should be continuous

xi. Risk management principles should be periodically re-evaluated.

Within the structure of the risk management system, the following aspects are included: roles and commitments, the establishment of a framework for managing risks (such as defining the risk management strategy, policy, culture, risk appetite, risk profile, and risk criteria; documenting roles, responsibilities, and authorities; identifying risk management techniques and tools), implementation of risk management, monitoring and evaluation processes, and addressing and improving system errors or deficiencies.

The BS 31100 standards consist of processes for examining, identifying, evaluating risks, determining appropriate responses, and reporting (Manigent, 2012).

The standards establish the principles and terminology of risk management, providing a foundation for understanding, developing, and implementing an effective enterprise-wide risk management system to enhance the likelihood of achieving organizational objectives. Based on best practices and experiences, the standards offer recommendations on the structure, processes, and application of risk management.

The fundamental principles of risk management are applicable to all organizations; however, the implementation technique varies depending on the scope, nature, complexity, and size of the institution. While other standards focus on minimizing losses, BS 31100 emphasizes how risks can be undertaken and transformed into value for the organization.

The use of BS 31100 standards provides assurance that risk management strategies and organizational objectives are being met and that risks related to specific areas or activities are being managed with the necessary precautions. The standards also ensure control over the risk management system and facilitate reporting to stakeholders (RIMS, 2011).

Canadian risk management model

The "Integrated Risk Management System" standards implemented in Canada have been published by the Treasury Board Secretariat (The President of The Treasury Board, 2004).

The integrated risk management system is a systematic and proactive process designed to ensure the understanding, management, and communication of risks across the organization. It is a continuous process that aims to integrate risk management into the organization's corporate strategy while shaping its risk management culture (Robillard L., 2001: 7). The system requires ongoing assessment of potential risks at all organizational levels and the consolidation of these assessments to prioritize necessary regulations and improvement decisions. It does not solely focus on risk reduction but also supports innovative activities to achieve the best possible balance between outcomes, costs, and risks. The system establishes principles for adapting a more holistic approach to risk management and encourages efforts to maintain balance at the corporate level. As a result, both employees and managers gain a better understanding of risk structures, leading to the implementation of a more systematic risk management model. The system consists of four interrelated components.

The first step in the integrated risk management system is defining the risk profile, which requires identifying the organization's field of activity and type of service. Establishing a risk profile enables an organization to recognize both internal and external risks and opportunities related to its operations, objectives, and resources. External risks are categorized as political, economic, social, and technological, while internal risks include management systems, ethical values, individual and corporate risk culture, risk tolerance levels, expertise in risk management, corporate policies, procedures, and processes. Identifying the organization's current risk management capacity helps understand deficiencies and errors. Determining risk tolerance is also considered necessary for creating a risk profile and managing risks effectively (The President of The Treasury Board, 2004).

The second component, establishing the integrated risk management function, involves developing a corporate risk management infrastructure that supports risk identification and management while ensuring the commitment of senior management. An effective risk management system must be aligned with the organization's objectives, strategies, service implementation methods, and culture (Robillard L., 2001: p.11).

The implementation of the integrated risk management system begins with identifying risk sources. Once risks are identified, they are prioritized based on impact and probability assessments. After ranking risks according to their likelihood of occurrence and potential impact on the organization, appropriate risk management responses are determined. Monitoring is conducted to evaluate the effectiveness of these responses. The monitoring process determines whether the risks and responses contribute to achieving the desired outcomes and, if necessary, leads to the development of new strategies and approaches (The President of The Treasury Board, 2004).

The final component of the integrated risk management system emphasizes the importance of institutional learning to ensure the continuity of risk management practices. This includes the development of training programs and the sharing of best practices and experiences in risk management (Robillard L., 2001: p. 21).

American risk management model

COSO is a voluntary private sector organization supported by five major professional financial institutions in the United States (The American Association, The American Institute of Certified Public Accountants, The Financial Executives Institute, The Institute of Internal Auditors, and The Institute of Management Accountants). It focuses on enhancing the quality of financial reports through effective external auditing, corporate governance, and business ethics (Arthur J., 2009: p. 21).

After realizing that the same need for an Internal Controls-Integrated Framework also existed for risk management, COSO initiated a study. COSO originally developed the corporate risk management framework in 1992 and updated it in 2002 to finalize its current form. The corporate risk management framework was designed to align with the COSO Internal Control-Integrated Framework. This alignment aimed to create a suitable environment for institutions to develop their risk management systems while investing in internal control (COSO, 2004).

The books published by COSO in 2004, titled Enterprise Risk Management-Integrated Framework and Related Application Guidance and Enterprise Risk Management-Integrated Framework and Related Executive Summary Framework, serve as primary resources for understanding the corporate risk management system and its components. In addition to good governance practices, a detailed document titled The Role of Internal Auditing in Enterprise-Wide Risk Management, which includes best practices for risk management, was prepared by IIA in 2004 and revised in January 2009 before being republished (COSO, 2004).

2.2. Risk profile and dynamics of the Azerbaijani banking sector

In recent years, Azerbaijani banking sector has undergone significant reforms. New regulatory policies and capital adequacy measures implemented by the Central Bank to ensure financial stability have helped the banking sector become healthier. Banks are moving towards more transparent and modern management systems, but changes in international markets and domestic economic shocks can still put the sector at risk. The risk profile of Azerbaijani banking sector is a complex system affected by both internal and external factors. Each risk area has its own dynamics, and their management is crucial for the sustainable development of banks.

The credit process, especially in transition economies, is continuously influenced by numerous risk factors that may lead to the non-repayment of loans within the contractually

specified period. Banks must thoroughly investigate and analyze the factors that may cause loan defaults. Such research is called creditworthiness analysis (Bağırov M. M, 2003: p. 70).

In 2021, according to official data, the share of problem assets in credit risk-exposed assets decreased. Credit risk refers to the risk of losses to a bank resulting from the debtor's failure to meet financial obligations to the bank in accordance with the terms of the contract or legislation, or failing to do so on time or in full. Credit risk-exposed assets include:

- Loans granted to legal and natural persons;
- Funds deposited in other banks;
- Financial leasing (leasing);
- Transactions conducted with the use of promissory notes;
- Bank guarantees and collateral in the form of sureties;
- Financing for the deferral of monetary claims (factoring);
- Other active transactions exposed to credit risk.

Problematic assets (substandard, doubtful, and hopeless assets) are credit-risk-exposed assets classified into risk groups II-IV (substandard - Group II, doubtful - Group III, hopeless - Group IV). The classification of credit-risk-exposed assets sets out the rules for the formation and use of special provisions to cover potential losses from these assets for the bank or non-bank credit and financial organizations.

Table 2.2.1. Ranking of banks by loan portfolio for 2021

№	Bank name	Total, AZN
1	Kapital Bank	111,764,000
2	International Bank of Azerbaijan	106,163,330
3	Pasha Bank	63,563,000
4	Xalq Bank	25,850,000
5	Unibank	24,191,340
6	Xalq Bank	22,614,000
7	AccessBank	18,328,715
8	Bank Respublika	14,075,640
9	Yelo Bank	13,788,612
10	Rabita Bank	12,489,000
11	Turan Bank	9,367,000
12	Expressbank	9,288,740
13	Premium Bank	8,303,000
14	Azerbaijan Industrial Bank	7,326,350
15	Muganbank	6,305,880
16	Yapı Kredi Bank Azerbaijan	6,239,010
17	Bank BTB	6,101,778

18	Ziraat Bank Azerbaijan	5,579,460
19	AFB Bank	5,213,200
20	Azer Turk Bank	4,899,000
21	Bank VTB Azerbaijan	3,643,820
22	Gunay Bank	3,380,640
23	Nakhchivan Bank	3,026,580
24	Bank Eurasia	2,918,060
25	Melli Iran Bank, Baku branch	785,360
26	National Bank of Pakistan, Baku branch	126,595

Source: (Central Bank of the Republic of Azerbaijan, 2025)

Currently, the methodologies for determining the financial condition of borrowers, their repayment capacity, and creditworthiness in the Republic of Azerbaijan do not fully correspond to the existing economic situation. According to these methodologies, it is difficult to find an enterprise that is "suitable" for a financially stable framework. Most of them are in a crisis situation, and reliable borrowers practically do not exist today. The situation of several enterprises is so dire that, due to a lack of funds to pay mandatory insurance premiums to the Social Protection Fund, legal entities were unable to take loans for salaries.

Analysis of the current situation of risks in banking activities

“Pasha Bank” manages all significant risks identified as a result of the annual assessment of the importance of risks and their identification procedures. Recently, the following types of risks are considered significant for the bank: credit risk, market risk, operational risk, liquidity risk, etc. (compliance risk, tax risk, strategic risk, business risk, regulatory risk, model risk, and reputational risk). The main goals and objectives of the bank's ERM (Enterprise Risk Management) system are as follows (Paşa Bank, 2025)

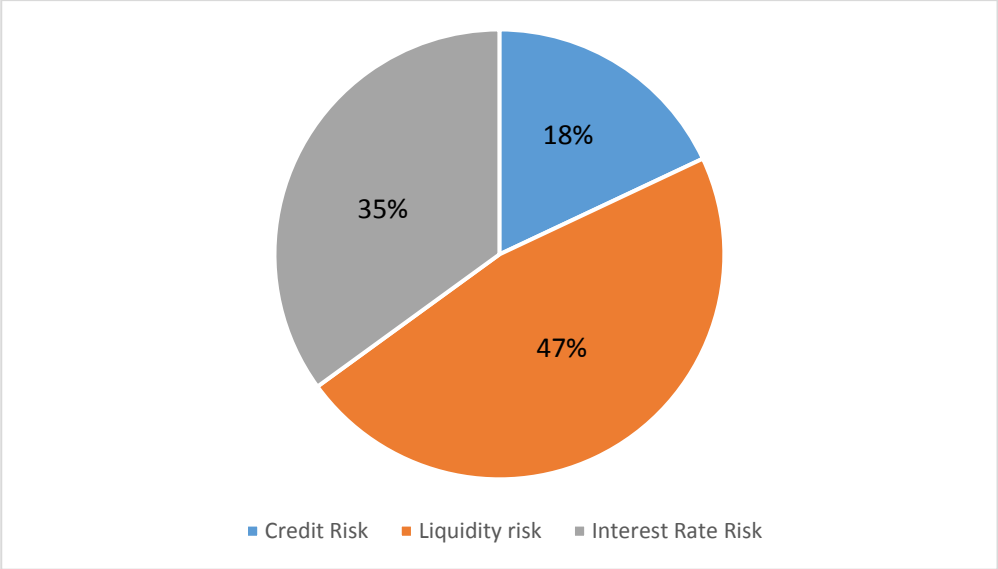
• Ensuring a general understanding of risks and strategic planning at the group level, taking into account the accepted level of risks;

• Identifying, assessing, collecting, and forecasting the level of significant risks, as well as controlling their levels;

• Ensuring and maintaining the acceptable level of risks and the adequacy of capital to cover significant risks;

• Ensuring the efficient allocation of resources to optimize the bank's risk factor or profitability.

Chart 2.2.1. Dynamics of the main types of risks of Pasha Bank in 2021, mln. Manat



(Compiled by the author based on Pasha Bank statistics for 2021)

Referring to graph 2.2.1 above, it can be concluded that the bank's risk structure is quite simple. The main type of risk of Pasha Bank is credit risk, which accounts for 47%.

Improving asset quality and minimizing risks has become one of the bank's main objectives. The bank is forced to significantly increase reserves for potential losses on loans, which has negatively impacted its financial results. Since 2021, there has been an increase in credit risks, while the share of overdue debt has decreased.

In terms of all ratios for the bank’s credit risk, the threshold has remained acceptable throughout the entire period. The decrease in the reserve ratio in 2019 indicates that the bank's defense against potential defaults on loans has fallen as of the reporting date. The quality of the loan portfolio in terms of repayment in 2021 is close to the optimal level, with a risk ratio of 0.94. The ratio of problem loans decreased in 2021, indicating a reduction in the share of problem loans in the total debt amount. Overall, the structure of the loan portfolio has not exceeded the acceptable level of default loans (Paşa Bank, 2022).

Currently, the largest banks in Azerbaijan are not yet significant on an international scale. One of the obstacles to implementing Basel II (and for now, Basel III) in Azerbaijani banks is the lack of operational risk management systems. Additionally, it is essential to improve corporate governance and internal audit systems within banks (Abdulllayev Ş. Ə., 2000: p. 79).

Basel II defines three methods for assessing operational risks: the Basic Indicator Approach (BIA), the Standardized Approach (SA), and the Advanced Measurement Approach (AMA). Under the third method, the bank uses its internal models to assess operational risks (Altman E., 2008: p. 128).

For this method, central banks require high-quality data across all areas of operational risk, and they allow the use of an enhanced method for regulatory reporting. Furthermore, the bank must have a professionally structured Risk and Information Management (RIE) scheme and an extensive statistical database on incidents.

The Advanced Measurement Approach (AMA) does not specify any particular modeling method but one of the general approaches in banking is the Loss Distribution Approach (LDA). With LDA, the bank first segments operational losses into units called "Units of Measure" (UoMs). For each UoM, the bank establishes the distribution of losses, reflecting its expected total losses, which can be projected over a one-year horizon. Given that data availability is a serious issue in the field, annual loss distributions cannot be constructed directly from the indicators of yearly losses. Instead, the bank will develop the distribution of frequencies describing the severity of the losses by counting the number of loss events and the amount of loss from each event. It is assumed that the frequency and severity distributions are independent. Combining these two distributions leads to the annual loss distribution (Əsgərova R., 2007: p. 20)

Modern technologies combine the latest achievements of artificial intelligence, numerical mathematics, statistics, and heuristic approaches. This allows for offering new perspectives in risk assessment. These approaches yield positive results even with small volumes of data. The table below provides information about the methods for estimating the probability of default.

Probability of Default (PD) is a financial term describing the likelihood of default within a given time horizon. It evaluates the probability that a financial institution's customer will fail to meet its debt obligations. PD is a key parameter used for calculating economic or regulatory capital in Basel II for bank management.

Table 2.2.2. Risk profile and dynamics of the Azerbaijani banking sector

Risk type	Definition	Cause factors	Dynamics
Credit risk	Risk arising from the possibility of non-payment of loans granted by banks to their customers.	Crises in the oil and gas sector, price changes, high-risk sectors and customers.	Credit portfolios are expanding in risky areas, the sector is linked to economic stability.

Risk type	Definition	Cause factors	Dynamics
Currency risk	Risk arising from foreign currency debts and international transactions.	Volatility in oil prices, depreciation of the manat.	Economic crises and currency fluctuations increase risk.
Source risk	Risk related to the availability and sustainability of banks' financial resources.	Limited deposit base, especially in small and medium-sized banks, insufficient financial resources.	Banks are moving towards more modern financial management systems, but there are still resource problems.
Liquidity risk	Risk arising from banks' inability to manage their free funds and cash reserves.	Reduction in cash reserves, market instability, changes in deposits.	Unstable market conditions and high reserve requirements increase liquidity risk.
Operational and corruption risk	Risks related to improper management of the bank's activities, corruption and governance problems.	Management problems, corruption.	Reforms are being carried out to increase the transparency and governance of banks.

(Made by the author)

The international rating agency "S&P Global Ratings" has upgraded the risk assessment of Azerbaijan's banking sector. The agency has changed the sector's risk outlook from "stable" to "positive".

According to S&P analysts, this positive trend reflects initiatives to improve the supervision and regulation of financial institutions within the framework of the Financial Sector Development Strategy for 2024-2026. If these initiatives are effectively implemented, they will enable further strengthening of banking supervision and regulation in Azerbaijan.

As of January 1, 2025, the assets of Azerbaijan's banking sector exceeded 53 billion manat, which represents a 7.8% increase compared to the same period in 2024. According to the Central Bank's data, last year the sector's credit portfolio increased by 18.7%, with the share of loans in assets rising from 44.4% to 48.9%. During the reporting period, the sector's liabilities increased by 7.6%, reaching 46.3 billion manat.

According to the results of 2024, the sector's net profit amounted to 1.4 billion manat, which is a 3% decrease compared to the previous year. Last year, banks' operating income grew by 17%, reaching 5.6 billion manat, while operating expenses increased by 25.6%, totaling 3.9 billion manat (azertag.az, 2025).

2.3. Risk forecasting and policies preventing the emergence of risk

Banking activities are one of the most important sectors of the economy, as banks play a key role in the financial system. In today’s changing environment, banking risks are becoming

more complex and can have a more significant impact on an organization, making it essential to have a reliable risk management system.

One of the important aspects of banking risk management is monitoring. The purpose of monitoring is to manage the quality of a credit institution's operations through continuous observation of its functioning and assessment of its financial condition to take specific measures to improve the stability of the organization (Голиков С. Е., 2020: p. 20). Risk monitoring enables a bank to promptly track risks and establish measures to minimize them. One of the monitoring tools is the use of risk analysis algorithms, which allow banks to quickly assess and classify potential risks. Other risk monitoring tools include constant observation and analysis of financial reporting, as well as conducting strategic analyses. These tools help banks monitor the dynamics and levels of risks within the organization.

Risk forecasting also plays an important role in a bank's planning and decision-making processes. Reliable forecasts help banks assess the likelihood of risks occurring and develop appropriate strategies and measures to minimize them.

Risk forecasting in banking can be carried out using expert assessments and mathematical models. One of the most common methods is the Delphi method, which involves forming a unified group opinion from several experts. A distinctive feature of this method is that experts express their opinions anonymously and individually while having the opportunity to learn the opinions of other experts.

For accurate risk forecasting, a bank requires precise, complete, and reliable information. Therefore, banks must always have access to up-to-date data, analytical tools, and models for predicting financial risks. This enables banks to anticipate future changes in the economic environment and make appropriate decisions to minimize risks.

Risk forecasting allows for predicting potential losses and determining strategies to minimize them. Risk forecasting is based on the analysis of data about the bank's financial condition, market evaluation, and the economic situation, which helps the bank make well-founded decisions (Дробыш И. И., 2018: p. 58)

A key role in forecasting and minimizing risks is the reliability of the bank. This depends on financial stability, the quality of risk management, and the implementation of pre-developed measures to minimize risks. The bank's reliability fosters trust among its clients and allows it to attract deposits and credit resources.

Most importantly, it should be remembered that risk monitoring and forecasting are continuous processes in banking activities. Since risks are constantly changing and new ones emerge, banks must continuously monitor their condition, assess risk levels, and forecast

potential changes in the risk environment. This will allow the bank to adapt to new conditions and enhance its reliability and financial stability.

The method of minimizing credit risks currently used by many banks in developed countries is based on:

- Adequate risk coverage and diversification
- Clear goal setting
- A well-defined system of delegated authority
- High-quality credit and other dossiers and documents used as a basis for transactions
- Thorough risk monitoring
- A structured information and management control system
- Effective departments managing non-repayments and operational losses

The main risk that a bank faces in its operations is credit risk. It arises when providing loans and is associated with the possibility of loan default or delayed payment. To minimize this risk, banks conduct thorough analyses of the creditworthiness of potential borrowers, taking into account their financial condition and credit history, as well as setting limits and taking measures to control debt repayment.

Market risk is the risk of losses to the bank arising from fluctuations in market prices due to changes in interest rates, foreign exchange rates, as well as stock prices and commodity prices. To minimize market risk, banks should diversify their asset portfolios, constantly monitor and analyze changes in financial markets, and use options, futures, and other tools to protect against potential losses from price and exchange rate changes.

Currency risk is also one of the significant types of risks for banks. It arises from fluctuations in currency exchange rates and can lead to losses in foreign currency transactions. To minimize currency risk, banks use various financial instruments such as forward contracts or options, conduct analysis, and forecast market trends (Сланов О. Т., Дзицоев Д. О., 2023: p. 101).

Operational risks arise due to negligence in the organization of the bank's operations, technical failures, or human factors. These can lead to data loss, theft of information and property, and other negative consequences. To minimize operational risks, banks implement monitoring and control systems, train staff, and develop emergency action plans.

Concentration risk arises from a high concentration of credit risks in certain sectors of the economy or with high-rated borrowers, leading to correlated returns on the relevant assets. To minimize this risk, banks set limits on the concentration of the credit portfolio for individual

borrowers and industries, and monitor changes in the economic environment that may affect the quality of the credit portfolio.

Liquidity risk is the risk that a bank may not be able to meet its short-term financial needs or contractual obligations due to a reduction in the level of liquid assets. To minimize this risk, the bank must balance its assets and liabilities, and constantly monitor and forecast liquidity indicators.

Demand risk arises when there is a mismatch between customer expectations and the bank's ability to provide certain financial services or products. To minimize it, banks should carefully analyze customer needs, provide the most in-demand services in the financial sector, and quickly respond to market changes.

Reputation risk reflects a lack of trust from investors, clients, and other parties, and can affect the bank's business relationships. To minimize this risk, the bank must provide high-quality customer service, adhere to high ethical standards, and maintain transparency in its operations (Məmmədov Z. F., İbrahimov Z. H., 2009: p. 203).

The reliability of the bank is a key factor in forecasting and minimizing risks. The bank must have sufficient liquidity and capital to withstand the risks inherent in the nature and scope of its operations. The bank's reliability lies not only in its ability to repay debts but also in the stability of its business model and management system. Banks with a good reputation and high reliability have more opportunities to attract customer and investor trust.

To enhance the bank's reliability and strengthen its market position, it is necessary to actively use risk monitoring and analysis methods, as well as develop appropriate strategies and mechanisms for risk minimization. Only in this way can a bank successfully function and provide clients with reliable and competitive services.

Risk monitoring in banks is carried out using various methods and tools, one of which is the collection and analysis of statistical data. Analyzing statistical data on bank risks allows for identifying the risks that may have the most significant impact on the bank and determining effective strategies for minimizing these risks. Modern technologies enable the collection and processing of large volumes of information, allowing banks to obtain up-to-date and accurate data on their operations and potential risks.

Using statistical methods and models allows for analyzing historical data and identifying patterns that may indicate potential future risks. For example, analyzing past financial crises can help identify potential factors that could lead to the repetition of such situations.

One of the key forecasting and risk minimization models in banking is the Value at Risk (VaR) model. This model allows for assessing potential losses that may arise from adverse

events and taking appropriate measures to prevent them. This method aggregates estimates of the consequences of various risk events into a single figure (Дробыш И. И., 2018: p. 51).

Banks have specific features related to their activities in the field of lending, so it is necessary to use specialized models and forecasting methods. For example, credit risk assessment models such as scoring models and credit portfolio models can be applied.

Evaluating the effectiveness and results of risk forecasting and minimization is an important step in a bank's operations. It allows banks to assess how effective and justified the applied methods and tools were. Based on this, the bank's management decides on the need to adjust current measures or implement new, more effective risk minimization measures in the future.

As additional modern ways of forecasting and monitoring risks in the near future, banks may actively adopt artificial intelligence. It is already used by banks to provide customer services and improve business processes. However, the full bloom of this technology may still be ahead. To this end, staff should develop competencies in artificial intelligence and other cutting-edge technologies.

New algorithms and methods for data analysis and structuring, capable of predicting and minimizing potential risks, should be developed. The impact of digital technologies on banking risks should also be studied, with particular attention paid to relatively new phenomena such as blockchain, cryptocurrencies, and properly assessing their impact on the stability and resilience of banks. The development of various documents and acts within the organization will play a significant role (Сланов О.Т., Дзицоев Д. О., 2023: p. 103).

In the future, banks will need to adopt more innovative methods for risk assessment and management, approach all risks comprehensively, and develop strategies to ensure effective forecasting, monitoring, and risk minimization.

Thus, one of the main tools in risk minimization is risk monitoring. It allows banks to track changes in the market and within the organization, and respond promptly to factors that may affect the bank's financial stability and operations.

CHAPTER III. ASSESSMENT OF RISK MANAGEMENT EFFECTIVENESS IN THE BANKING SECTOR: ON THE EXAMPLE OF AZERBAIJAN

3.1. Research model, hypotheses, data collection method and limitations

The assessment of the risk management system in banks is used by the supervisory authorities of many countries of the world. This method is generally used in the process of determining the final risk level as a result of the study of the risk profile and risk management system of banks.

The determination of the risk level is divided by the supervisory authorities into the main areas of activity of the bank, as in the case of Azerbaijan, and the risk level and risk management in each area of activity are assessed.

According to the basic philosophy of the approach proposed in the study, banks should take the necessary measures to adequately manage all the risks they may encounter, that is, they should establish an adequate risk management system. Banks are required to maintain capital against uncontrollable risks. In this regard, the risk management systems of banks should be established and operate in accordance with all the requests and recommendations of the supervisory authority and international “best practices”. This approach may also allow for the measurement of banks' operational risks in the future.

This study uses a quantitative research model to analyze the main factors affecting risk management. Using statistical methods, this study attempts to establish clear relationships in terms of both theoretical and practical applications.

The purpose of this study is to examine areas for improving the efficiency of bank risk regulation by analyzing the key factors affecting risk management.

The survey method was used as a data collection tool in the study. The survey questions were created as a result of the analysis of studies in the literature. The survey consists of 3 sections and a total of 15 questions, 4 questions measuring the demographic characteristics of the participants, 2 questions measuring the participants' experiences with risk management, and finally, 9 questions measuring the relationship between in-service training and education quality.

The participants of the study are respondents working in various fields. The sample of the study was selected using simple random sampling. The survey was applied to individuals working in the fields of finance, risk management, customer services, insurance, etc. During the data collection phase, a survey was sent to 117 people, of whom 114 responded to the

survey. A total of 8 surveys were removed from the data set due to incorrect answers. As a result, 106 surveys were finally included in the analysis.

In order to ensure ease of access to the survey and to ensure greater participation of the target audience, the survey was conducted online. In this context, a link to the survey form was sent to the participants via email and WhatsApp message. All questions included in the process of filling out the questionnaire and the responses from the relevant participants were carefully and promptly resolved by the researcher.

The scale questions within the study were created as a result of an extensive literature review. In addition to the scale questions, a demographic information form was used to obtain information about the participants. The questions prepared to measure the demographic structure of the participants were created by the author as a result of an analysis of many publications. In the study, except for the questions in the demographic information form, a 5-point Likert scale was used for all questions, where respondents were asked to indicate the most appropriate option for themselves with 1 = “strongly disagree” and 5 = “strongly agree”.

After the questionnaire was applied to the sample, statistical methods and the SPSS program were used to analyze the data obtained. In the data analysis, first a frequency analysis of the participants' responses to the questionnaire was conducted and the demographic results were interpreted. Then, reliability tests were applied. After determining the reliability, the research hypothesis was tested with regression analysis.

The hypotheses put forward during the study are as follows:

H_1: The application of modern risk management strategies in banks has a direct and positive effect on the improvement of financial indicators.

H_2: The use of modern technologies such as artificial intelligence and data analytics in the risk management process has a direct and positive effect on reducing the risk of loss of banks.

H_3: Professional development and training programs of specialists in the field of risk management have a direct and positive effect on increasing the efficiency of the risk management process of banks.

This study was conducted to increase the efficiency of bank risk regulation by analyzing the main factors affecting risk management. The study is limited to the population over 18 years of age and related to the research topic. Individuals who do not meet these criteria are excluded from the scope of the study.

Frequencies of responses aimed at identifying demographic characteristics

The distribution of the 107 people participating in the study according to their demographic characteristics (gender, age, income level, profession) is given in the tables below.

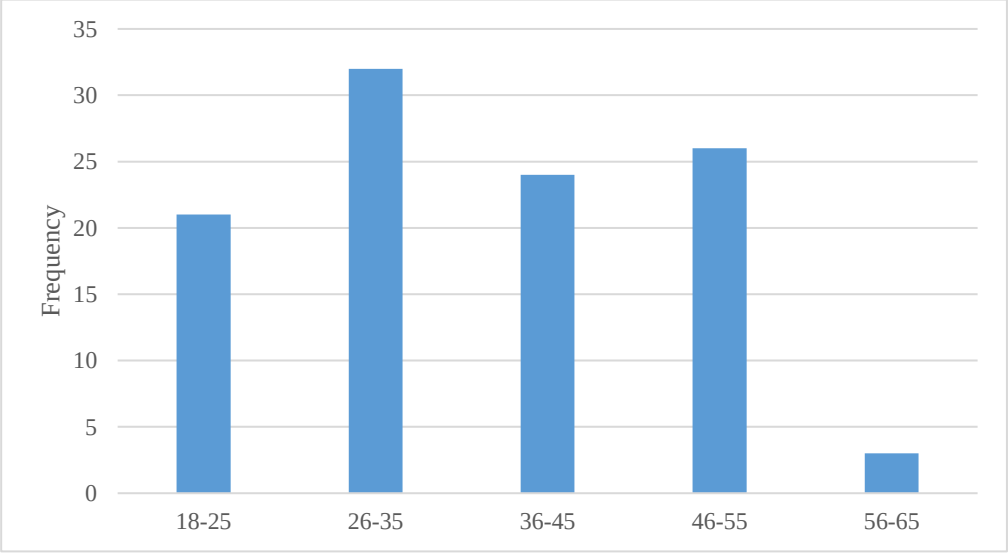
Table 3.1.1. Distribution of participants by age group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	21	19.8	19.8	19.8
	26-35	32	30.2	30.2	50.0
	36-45	24	22.6	22.6	72.6
	46-55	26	24.5	24.5	97.2
	56-65	3	2.8	2.8	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

By age group; the specific weight of 18-25 year olds is 19.8%, the specific weight of 26-35 year olds is 30.2%, the specific weight of 36-45 year olds is 22.6%, the specific weight of 46-55 year olds is 24.5%, and the specific weight of 56-65 year olds is 2.8%. The distribution of respondents by age group is clearly reflected in graph 3.1.

Graphic 3.1.1. Distribution of participants by age group



Source: Compiled by the author using SPSS software based on survey responses.

Table 3.1.2. Distribution of participants by gender

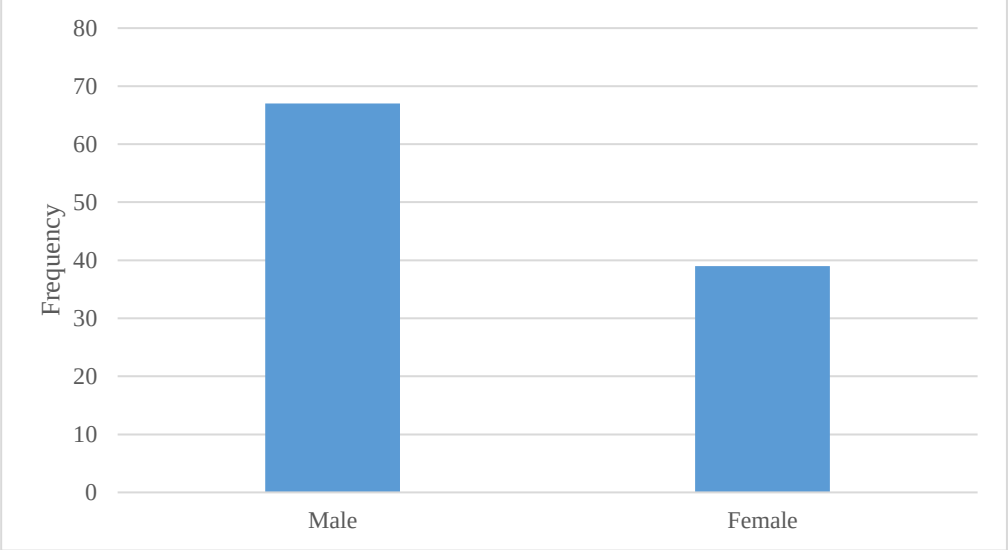
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	67	63.2	63.2	63.2
	Female	39	36.8	36.8	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

When examining the gender distribution, we see that 67 of the participants were male and 39 were female. In this context, it can be seen that the majority of the respondents in the survey were male.

The following graph shows the gender distribution of the respondents in graphical form.

Graphic 3.1.2. Distribution of participants by gender



Source: Compiled by the author using SPSS software based on survey responses.

Table 3.1.3. Distribution of participants by profession

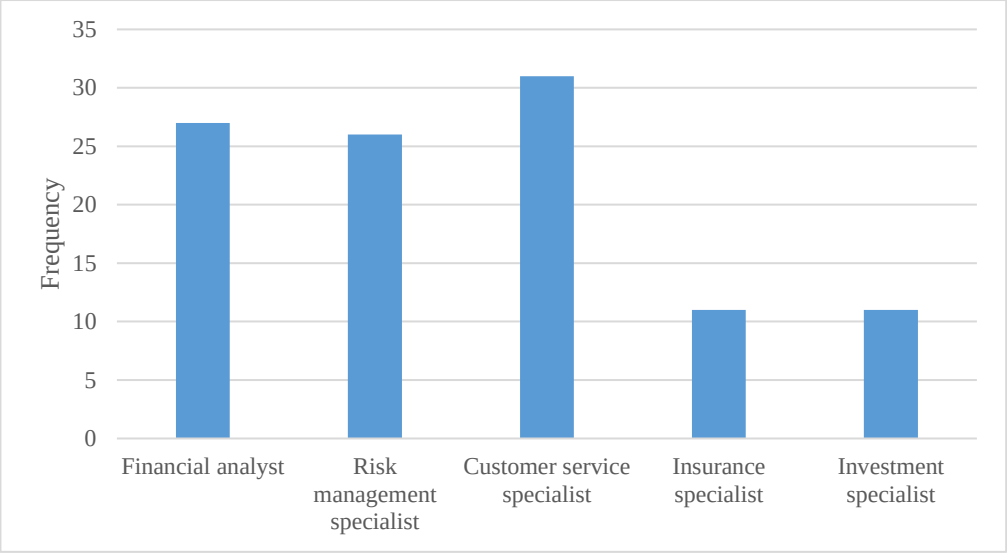
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial analyst	27	25.5	25.5	25.5
	Risk management specialist	26	24.5	24.5	50.0
	Customer service specialist	31	29.2	29.2	79.2
	Insurance specialist	11	10.4	10.4	89.6
	Investment specialist	11	10.4	10.4	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

When examining the occupational distribution of the participants, 27 people work in the field of financial analysis, 26 in risk management, 31 in customer service, 11 in insurance, and 11 in the investment field.

Let's look at the distribution of respondents by field of work in Graph 3.3.

Graphic 3.1.3. Distribution of participants by profession



Source: Compiled by the author using SPSS software based on survey responses.

Table 3.1.4. Distribution of participants by salary

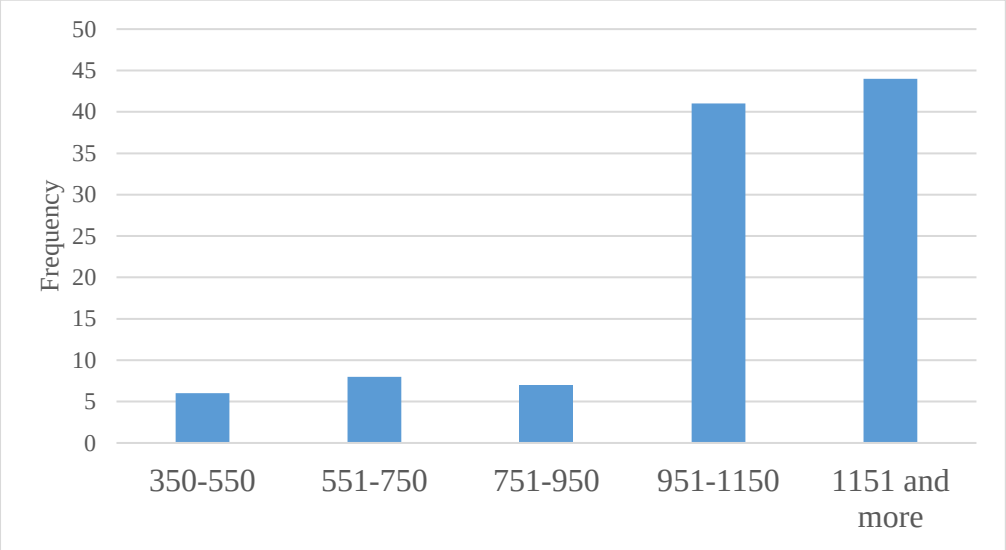
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	350-550	6	5.7	5.7	5.7
	551-750	8	7.5	7.5	13.2
	751-950	7	6.6	6.6	19.8
	951-1150	41	38.7	38.7	58.5
	1151 and more	44	41.5	41.5	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

When examining the distribution of participants by salary level, it was determined that 5.7% of them received a salary of 350-550, 7.7% received a salary of 551-750, 6.6% received a salary of 751-950, 38.7% received a salary of 951-1150, and 41.5% received a salary of 1151 AZN or more.

The distribution of respondents by salary level is clearly reflected in Chart 3.4.

Graphic 3.1.4. Distribution of participants by salary



Source: Compiled by the author using SPSS software based on survey responses.

Thus, the survey included people from various fields, most of whom were men, and those aged 26-35. The salary level of most survey participants was 1,151 AZN or more.

Table 3.1.5. Distribution of the most common problems in risk management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Inadequacy of data	8	7.5	7.5	7.5
	Lack of personnel	21	19.8	19.8	27.4
	Lack of modern technologies	28	26.4	26.4	53.8
	Stringency of regulatory requirements	36	34.0	34.0	87.7
	Other	13	12.3	12.3	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

When asked about the problems in risk management, 7.5% saw this problem in the inadequacy of information, 19.8% in the lack of personnel, 26.4% in the lack of modern technologies, 34% in the strictness of regulatory requirements, and 12.3% in other problems.

Table 3.1.6. Distribution to increase the efficiency of risk management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Increasing training	17	16.0	16.0	16.0
	Implementing modern software	33	31.1	31.1	47.2
	Simplifying regulatory requirements	31	29.2	29.2	76.4
	Other	25	23.6	23.6	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

When looking at the distribution of strategies to increase the effectiveness of risk management, 16 people see strategies such as increasing training, 33 people see strategies such as increasing the use of modern software, and 32 people see strategies such as simplifying regulatory requirements as effective tools.

Frequencies of responses aimed at identifying questions related to the research topic

Table 3.1.7. I positively assess the increase in financial income of banks with the improvement of risk management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	45	42.5	42.5	42.5
	Partially agree	23	21.7	21.7	64.2
	Neutral	14	13.2	13.2	77.4
	Strongly disagree	5	4.7	4.7	82.1
	Disagree	19	17.9	17.9	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The first question addressed to the participants was about how banks' financial returns affect the improvement of risk management. 42.5% of respondents completely agree with this idea, which shows that the majority of participants believe that risk management has a positive impact on financial returns. 17.9% strongly disagreed with this idea.

Table 3.1.8. I positively assess the decrease in credit losses of banks as a result of proactive risk management.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	20	18.9	18.9	18.9
	Partially agree	66	62.3	62.3	81.1
	Neutral	8	7.5	7.5	88.7

	Strongly disagree	2	1.9	1.9	90.6
	Disagree	10	9.4	9.4	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The second question addressed to the participants was about how proactive risk management affects banks in reducing loan losses. While 62.3% agreed with this opinion, 7.5% were undecided. 9.4% strongly disagreed.

Table 3.1.9. I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	32	30.2	30.2	30.2
	Partially agree	46	43.4	43.4	73.6
	Neutral	17	16.0	16.0	89.6
	Strongly disagree	2	1.9	1.9	90.6
	Disagree	11	10.4	10.4	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The third question addressed to the participants was about how the effective implementation of risk management strategies in banks affects loan interest income. 78 respondents believe that the effective implementation of risk management strategies in banks has a positive impact on increasing loan interest income. 13 people disagreed with this opinion.

Table 3.1.10. I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	37	34.9	34.9	34.9
	Partially agree	33	31.1	31.1	66.0
	Neutral	9	8.5	8.5	74.5
	Strongly disagree	8	7.5	7.5	82.1
	Disagree	19	17.9	17.9	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The next question shows the respondents' assessment of the impact of the application of modern technologies on banks' risk reduction more effectively. Overall, 66% of respondents believe that modern technologies minimize banks' risk of loss. 25.4%

believe that there is no relationship between the application of technologies and risk reduction.

Table 3.1.11. I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	50	47.2	47.2	47.2
	Partially agree	29	27.4	27.4	74.5
	Neutral	11	10.4	10.4	84.9
	Strongly disagree	7	6.6	6.6	91.5
	Disagree	9	8.5	8.5	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The next question addressed to the participants aimed to measure the impact of artificial intelligence tools on banks' more accurate risk forecasts. 74.6% of respondents believe that artificial intelligence tools effectively manage bank risks. 15.1% deny the impact of artificial intelligence, and 10.4% are undecided.

Table 3.1.12. I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	28	26.4	26.4	26.4
	Partially agree	50	47.2	47.2	73.6
	Neutral	10	9.4	9.4	83.0
	Strongly disagree	10	9.4	9.4	92.5
	Disagree	8	7.5	7.5	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

In the next question about the impact of the application of artificial intelligence on banks' rapid adaptation to market changes, 73.6% believe that artificial intelligence applications have a positive impact on banks' rapid adaptation to market changes. 16.9% of respondents disagreed with this opinion.

Table 3.1.13. I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	43	40.6	40.6	40.6
	Partially agree	40	37.7	37.7	78.3
	Neutral	4	3.8	3.8	82.1
	Strongly disagree	10	9.4	9.4	91.5
	Disagree	9	8.5	8.5	100.0

	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The next question addressed to the participants assessed the impact of professional training and development programs on increasing the overall operational efficiency of banks. 78.3% of respondents stated that professional training and development programs increase the efficiency of banks. 17.9% disagreed with this.

Table 3.1.14. I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	44	41.5	41.5	41.5
	Partially agree	40	37.7	37.7	79.2
	Neutral	4	3.8	3.8	83.0
	Strongly disagree	10	9.4	9.4	92.5
	Disagree	8	7.5	7.5	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

In the next question regarding the impact of developing the professional skills of specialists on improving the quality of banks' risk management decisions, 79.2% of participants believe that developing the professional skills of specialists improves the quality of banks' risk management decisions. 16.9% disagreed with this opinion.

Table 3.1.15. I positively assess the impact of developing training programs on strengthening customer trust.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	45	42.5	42.5	42.5
	Partially agree	14	13.2	13.2	55.7
	Neutral	29	27.4	27.4	83.0
	Strongly disagree	6	5.7	5.7	88.7
	Disagree	12	11.3	11.3	100.0
	Total	106	100.0	100.0	

Source: Compiled by the author using SPSS software based on survey responses.

The last question addressed to the participants was about the impact of the development of training programs on strengthening customer trust. 55.7% believe that the development of training programs strengthens customer trust. 17% disagreed with this decision.

3.2. Reliability analysis (KMO and Bartlett's Test) and Normality test (Skewness and Kurtosis values)

For reliability testing purposes, Cronbach's alpha coefficient (α) was calculated for each scale and is shown in the table below.

Table 3.2.1. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.751	.741	9

Source: Compiled by the author using SPSS software based on survey responses.

As is known, for any scale to be reliable, the Cronbach alpha value must be higher than 0.70. In our study, we can see that this value is greater than 0.70 (0.751) (Table 3.2.1).

Table 3.2.2. Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I positively assess the increase in financial income of banks with the improvement of risk management.	17.4811	24.881	.559	.864	.660
I positively assess the decrease in credit losses of banks as a result of proactive risk management.	17.6132	31.097	.274	.158	.735
I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income.	17.6509	34.325	-.012	.166	.691
I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss.	17.3962	24.242	.625	.875	.741

I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.	17.8019	28.541	.396	.260	.708
I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter.	17.5755	29.751	.346	.291	.721
I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.	17.7453	27.430	.493	.399	.686
I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.	17.7830	28.724	.400	.289	.708
I positively assess the impact of developing training programs on strengthening customer trust.	17.5189	34.747	-.067	.082	.712

Source: Compiled by the author using SPSS software based on survey responses.

The general statistics regarding the reliability analysis are given in Table 3.2.2. This table shows the variances of the variables, the correlation coefficients determining the density of the relationship between the variables, as well as the multiple correlation and Cronbach's Alpha value. According to this table, it can be noted that the item with the lowest correlation coefficient (-0.067) is the item “I positively assess the impact of developing training programs on strengthening customer trust.” This item may not be suitable for the scale. To increase the reliability value of the scale, this item can be removed. The item with the highest correlation coefficient (0.0625) is the item “I positively assess the impact of the

application of modern technologies on banks' ability to more effectively reduce their risk of loss.” This also increases the reliability of the scale.

Normality test

To determine the suitability of the variables for normal distribution, the Skewness and Kurtosis values were evaluated. These values between -1.5 and +1.5 indicate that the variables conform to the normal distribution condition. Skewness and Kurtosis values are given in the table below.

Table 3.2.3. Descriptives

			Statistic	Std. Error
I positively assess the increase in financial income of banks with the improvement of risk management.	Mean		2.3396	.14616
	95% Confidence Interval for Mean	Lower Bound	2.0498	
		Upper Bound	2.6294	
	5% Trimmed Mean		2.2662	
	Median		2.0000	
	Variance		2.265	
	Std. Deviation		1.50483	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		.785	.235
	Kurtosis		-.851	.465
I positively assess the decrease in credit losses of banks as a result of proactive risk management.	Mean		2.2075	.10445
	95% Confidence Interval for Mean	Lower Bound	2.0004	
		Upper Bound	2.4147	
	5% Trimmed Mean		2.1195	
	Median		2.0000	
	Variance		1.157	
	Std. Deviation		1.07541	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		.00	
	Skewness		1.541	.235
	Kurtosis		1.998	.465
I positively assess the impact of developing training programs on strengthening customer trust.	Mean		2.3019	.13282
	95% Confidence Interval for Mean	Lower Bound	2.0385	
		Upper Bound	2.5652	
	5% Trimmed Mean		2.2243	
	Median		2.0000	
	Variance		1.870	
	Std. Deviation		1.36744	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	

	Interquartile Range		2.00	
	Skewness		.665	.235
	Kurtosis		-.717	.465
I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.	Mean		2.0377	.11984
	95% Confidence Interval for Mean	Lower Bound	1.8001	
		Upper Bound	2.2754	
	5% Trimmed Mean		1.9308	
	Median		2.0000	
	Variance		1.522	
	Std. Deviation		1.23384	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		1.229	.235
	Kurtosis		.475	.465
I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.	Mean		2.0755	.12264
	95% Confidence Interval for Mean	Lower Bound	1.8323	
		Upper Bound	2.3186	
	5% Trimmed Mean		1.9727	
	Median		2.0000	
	Variance		1.594	
	Std. Deviation		1.26264	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		1.00	
	Skewness		1.187	.235
	Kurtosis		.309	.465
I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter.	Mean		2.2453	.11360
	95% Confidence Interval for Mean	Lower Bound	2.0200	
		Upper Bound	2.4705	
	5% Trimmed Mean		2.1614	
	Median		2.0000	
	Variance		1.368	
	Std. Deviation		1.16954	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		1.036	.235
	Kurtosis		.288	.465
I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.	Mean		2.0189	.12357
	95% Confidence Interval for Mean	Lower Bound	1.7738	
		Upper Bound	2.2639	
	5% Trimmed Mean		1.9099	
	Median		2.0000	
	Variance		1.619	

	Std. Deviation		1.27228	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		1.180	.235
	Kurtosis		.310	.465
I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss.	Mean		2.4245	.14372
	95% Confidence Interval for Mean	Lower Bound	2.1396	
		Upper Bound	2.7095	
	5% Trimmed Mean		2.3606	
	Median		2.0000	
	Variance		2.189	
	Std. Deviation		1.47969	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		3.00	
	Skewness		.743	.235
	Kurtosis		-.901	.465
I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income.	Mean		2.1698	.11412
	95% Confidence Interval for Mean	Lower Bound	1.9435	
		Upper Bound	2.3961	
	5% Trimmed Mean		2.0776	
	Median		2.0000	
	Variance		1.380	
	Std. Deviation		1.17491	
	Minimum		1.00	
	Maximum		5.00	
	Range		4.00	
	Interquartile Range		2.00	
	Skewness		1.243	.235
	Kurtosis		1.007	.465

Source: Compiled by the author using SPSS software based on survey responses.

Based on the table above, it can be noted that the average score of respondents' answers for all statements is in the range of 2-2.5. This indicates that their views on the effectiveness of risk management strategies are positive.

Table 3.2.4. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
I positively assess the increase in financial income of banks with the improvement of risk management.	.238	106	.010	.786	106	.011

I positively assess the decrease in credit losses of banks as a result of proactive risk management.	.388	106	.011	.708	106	.008
I positively assess the impact of developing training programs on strengthening customer trust.	.254	106	.009	.819	106	.008
I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.	.305	106	.010	.761	106	.010
I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.	.307	106	.009	.764	106	.011
I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter.	.319	106	.003	.812	106	.007
I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.	.260	106	.005	.766	106	.004
I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss.	.273	106	.009	.802	106	.007
I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income.	.293	106	.010	.785	106	.011

a. Lilliefors Significance Correction

Source: Compiled by the author using SPSS software based on survey responses.

In Table 3.2.4, the Kolmogorov-Smirnov and Shapiro-Wilk tests test whether the variables are normally distributed. The accepted norm for both tests is a p-value greater than 0.05. In our example (Table 3.2.4), the data follow a normal distribution because the p-value is greater than 0.05.

3.3. Hypothesis testing and regression analysis

The study analyzed the main factors affecting risk management and identified areas for improving the efficiency of bank risk regulation.

Let's write the equation of the model using simple linear regression analysis. The equation of a simple linear regression model is as follows:

$$y = \beta_0 + \beta_{1x} + \varepsilon$$

• y is the predicted value of the dependent variable (y) for any given value of the independent variable (x).

• β_0 is the intercept, the predicted value of y when x = 0.

• β_1 is the regression coefficient – it shows how much y will change as x increases.

• x is the independent variable.

• ε - shows how much variability there is in our estimate of the error of the estimate or the regression coefficient.

H_1: The application of modern risk management strategies in banks has a direct and positive effect on the improvement of financial indicators.

Table 3.3.1. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.386[a]	.149	.124	1.40831	.149	5.962	3	102	.001

a. Predictors: (Constant), I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter., I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income., I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.

Source: Compiled by the author using SPSS software based on survey responses.

Multiple R. A correlation coefficient that measures the strength of a linear relationship between two variables. The correlation coefficient can be any value between -1 and 1, and its absolute value indicates the strength of the relationship. The larger the absolute value, the stronger the relationship:

- 1 means a strong positive relationship;
- -1 means a strong negative relationship;
- 0 means no relationship at all.

In the example we are considering (Table 3.3.1), the value of Multiple R is approximately 0.386, which is far from 1. This indicates that the relationship is relatively weak.

R Square. A coefficient of determination used as an indicator of the goodness of fit. It shows how many points fall on the regression line. The R^2 value is calculated from the total sum of squares.

In our example (Table 3.3.1), R^2 is 0.149. This means that approximately 14.9% of our values fit the regression analysis model. In other words, 14.9% of the dependent variables (y-values) are explained by the independent variables (x-values).

Table 3.3.2 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.474	3	11.825	5.962	.001[b]
	Residual	202.300	102	1.983		
	Total	237.774	105			

a. Dependent Variable: I positively assess the increase in financial income of banks with the improvement of risk management.
b. Predictors: (Constant), I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter., I positively assess the impact of effective implementation of risk management strategies in banks on increasing credit interest income., I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.

Source: Compiled by the author using SPSS software based on survey responses.

In the Anova part (Table 3.3.2), the sig. is equal to 0.001, which is also less than 0.05, so our test is significant.

Thus, hypothesis H_1 is accepted.

Table 3.3.3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.581[a]	.331	.308	1.31659	.331	10.209	3	102	.000

a. Predictors: (Constant), I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks., I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter., I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.

In the example we are considering (Table 3.3.3), the Multiple R value is approximately 0.581, which is close to 1. This indicates that the relationship is strong.

R Square. The Coefficient of Determination is used as an indicator of the goodness of fit. It shows how many points fall on the regression line. The R2 value is calculated from the total sum of squares.

In our example (Table 3.3.3), the R^2 is 0.331. This means that approximately 33.1% of our values fit the regression analysis model. In other words, 33.1% of the dependent variables (y-values) are explained by the independent variables (x-values).

Table 3.3.4. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.088	3	17.696	10.209	.000[b]
	Residual	176.809	102	1.733		
	Total	229.896	105			

a. Dependent Variable: I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss.
b. Predictors: (Constant), I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks., I positively assess the impact of the application of artificial intelligence on banks' ability to quickly adapt to market changes they encounter., I positively assess the impact of artificial intelligence tools on banks' ability to more accurately predict risk forecasts.

Source: Compiled by the author using SPSS software based on survey responses.

In the Anova part (Table 3.3.4), sig. is equal to 0, which is also less than 0.05, so our test is significant.

Thus, the hypothesis H_2 is also accepted.

Table 3.3.5. Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.538[a]	.289	.268	1.08026	.289	13.815	3	102	.000

a. Predictors: (Constant), I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss., I positively assess the impact of developing training programs on strengthening customer trust., I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.

Source: Compiled by the author using SPSS software based on survey responses.

In Table 3.3.5, the Multiple R value is approximately 0.538, which is close to 1. This indicates that the relationship is strong.

R Square. The Coefficient of Determination is used as an indicator of the goodness of fit. It shows how many points fall on the regression line. The R^2 value is calculated from the total sum of squares.

In our example (Table 3.3.5), the R^2 is 0.289. This means that approximately 28.9% of our values fit the regression analysis model. In other words, 28.9% of the dependent variables (y-values) are explained by the independent variables (x-values).

Table 3.3.6. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.366	3	16.122	13.815	.000[b]
	Residual	119.030	102	1.167		
	Total	167.396	105			

a. Dependent Variable: I positively assess the impact of professional training and development programs on increasing the overall operational efficiency of banks.
b. Predictors: (Constant), I positively assess the impact of the application of modern technologies on banks' ability to more effectively reduce their risk of loss., I positively assess the impact of developing training programs on strengthening customer trust., I positively assess the impact of developing the professional skills of specialists on increasing the quality of banks' risk management decisions.

Source: Compiled by the author using SPSS software based on survey responses.

In the Anova part (Table 3.3.6), sig. is equal to 0, which is also less than 0.05, so our test is significant.

Thus, hypothesis H_3 is accepted.

RESULTS AND SUGGESTIONS

The results of the study show that risk management in the banking sector is one of the main challenges of the modern era. Although the Azerbaijani banking sector has developed in recent years under the influence of various economic reforms, it still faces a number of risk factors. The implementation of effective risk management strategies is of great importance in order to increase the financial stability of banks and attract foreign investment. Instability in the global financial system, economic crises and increasing risks of market participants reveal the need for effective risk management mechanisms.

In particular, effective management of credit, liquidity, interest and foreign exchange risks is one of the important elements in maintaining the financial stability of banks. In order for banks to maintain their stability in financial markets, credit risks must be managed, since non-repayment of loans can lead to serious problems in the system. At the same time, if interest and foreign exchange risks are not managed correctly, the profitability and liquidity of banks can be seriously affected.

The implementation of various international regulatory mechanisms, including Basel standards, and their harmonization with local legislation can create conditions for more effective risk management. Improving the regulatory framework for the Azerbaijani banking sector and aligning local legislation with international standards will make financial markets more transparent and sustainable. It is also important to establish a risk management culture in the banking sector, train bank employees in this regard, and take preventive measures to increase the sustainability of the sector.

In the course of the research, a survey was conducted to analyze the main factors affecting risk management in Azerbaijan and to investigate the areas of increasing the efficiency of bank risk regulation. The majority of respondents, men and people aged 26-35, from various fields participated in the survey. The responses of 106 people who participated in the survey were analyzed and the following results were obtained:

1. According to the results of the survey, it is clear that the implementation of modern risk management strategies has a positive impact on improving financial indicators. The majority of respondents agreed with the opinion that effective risk management strategies have a positive impact on the financial indicators of banks.

2. The use of modern technologies such as artificial intelligence and data analytics in the risk management process also has a positive impact on reducing the risk of losses of banks. According to the respondents, the use of artificial intelligence helps to more accurately express the risks of losses and prevent their occurrence.

3. Increasing the professionalism of specialists in the field of risk management and training programs have a positive impact on increasing the efficiency of the risk management process of banks. Increasing the level of awareness of experts in risk management can facilitate the management of risks with the right strategy.

The following recommendations were put forward as a result of the research:

- Implementing more effective strategies based on international experience in risk management in the banking sector;
- Automation of risk management systems and expansion of artificial intelligence-based analytical tools;
- Increasing risk diversification in the banking sector and strengthening liquidity buffers; Supporting the more sustainable development of the economy by increasing the non-oil sector-focused credit portfolios of Azerbaijani banks;
- Developing a risk culture in banks and increasing risk management expertise;
- Improving the state's control mechanisms over the banking sector and further tightening regulatory standards;
- Implementing modern risk assessment methods and stress testing models;
- Optimizing risks using innovative financial instruments in the banking sector.

In addition to ensuring the sustainable development of banks, these recommendations will also help increase their competitiveness in the international financial system.

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