RISK CONTROL AND MANAGEMENT IN BANKING SECTOR: INVESTIGATING THE WORK OF ARTIFICIAL INTELLIGENCE IN MITIGATING RISKS

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Abstract

This study examined risk control and management in the banking sector, investigating the work of artificial intelligence in mitigating risks. The study stated that the banking sector is a cornerstone of the global economy and pivotal in facilitating financial transactions, lending, and investment activities. However, the sector is inherently exposed to numerous risks, including credit risk, market risk, operational risk, and fraud, which can significantly impact its stability and profitability. In the course of carrying out this review, several essential concepts were explored, such as the concept of risk, risk control, management, the banking sector, and artificial intelligence, among others. Furthermore, risk identification and assessment, risk diversification, capital adequacy and liquidity management, and credit risk management, among others, were mentioned as risk control and management techniques in the banking sector. The study further mentioned the roles of AI in mitigating risk in the banking sector to include fraud detection and prevention. The study concluded that the banking sector, which is vital for financial transactions, lending, and investments, faces numerous risks like credit risk, market risk, operational risk, and fraud and that effective risk management is crucial for stability. One of the recommendations was that banks should invest in and integrate advanced AI-driven analytics to proactively detect and mitigate risks.

Keywords: Risk Control and Management, Banking Sector and Artificial Intelligence

Introduction

The banking sector is a cornerstone of the global economy and pivotal in facilitating financial transactions, lending, and investment activities. However, this sector is inherently exposed to numerous risks, including credit risk, market risk, operational risk, and fraud, which can significantly impact its stability and profitability. Effective risk control and management are therefore critical to ensuring the resilience and integrity of financial institutions. In recent years, advancements in artificial intelligence (AI) have offered innovative solutions to enhance risk management practices in banking. This paper investigates the role of AI in mitigating risks within the banking sector, highlighting its potential to transform traditional risk management frameworks.

Artificial intelligence encompasses a range of technologies, including machine learning, natural language processing, and predictive analytics, which can analyse vast amounts of data to identify patterns, anomalies, and emerging risks. AI's capability to process and interpret complex datasets far surpases human capabilities, enabling banks to detect and respond to potential threats more efficiently (Davenport & Ronanki, 2018). For instance, machine learning algorithms can continuously learn from new data, improving their accuracy in predicting credit defaults or detecting fraudulent activities over time. This adaptive nature of AI makes it a powerful tool for proactive risk management in banking.

One of the significant advantages of AI in risk management is its ability to enhance the accuracy

and speed of decision-making processes. Traditional risk assessment methods often rely on historical data and human judgement, which can be time-consuming and prone to errors. AI-driven systems, on the other hand, can analyse real-time data from various sources, providing timely insights that enable banks to make informed decisions swiftly (Berg et al., 2020). This real-time analysis is crucial in a dynamic financial environment where delays in identifying and addressing risks can lead to substantial financial losses.

Furthermore, AI can significantly improve the efficiency of compliance and regulatory processes in the banking sector. Compliance with regulatory requirements is a major aspect of risk management, and failure to adhere to these standards can result in severe penalties and reputational damage. AI technologies can automate compliance monitoring, ensuring that banks consistently meet regulatory standards (Financial Stability Board, 2017). By reducing the manual effort involved in compliance checks, AI not only minimises the risk of non-compliance but also allows banks to allocate resources more effectively.

Another critical area where AI contributes to risk mitigation is the detection and prevention of fraud. Fraudulent activities, including identity theft, money laundering, and cyber-attacks, pose significant risks to financial institutions. AI-powered systems can detect unusual patterns and behaviours indicative of fraud, enabling banks to take preventive measures promptly. For example, AI algorithms can analyse transaction data to identify suspicious activities that deviate from typical customer behaviour, thereby enhancing the bank's ability to combat fraud (Gartner, 2021). This proactive approach to fraud detection is essential to safeguarding the assets and data of both the bank and its customers.

Concept of Risk

Risk is the likelihood that a situation may negatively impact people, things, or resources. Usually, risk is represented as a function of the cumulative impacts of hazards, the resources or individuals exposed to risks, and the susceptibility of those exposed components. The likelihood that actual outcomes may differ from predicted results is known as risk in the finance industry. The volatility of returns is the definition of risk. Risk is the potential for negative outcomes. Risk is the uncertainty around the consequences or repercussions of an action with regard to something that people value, with a tendency to concentrate on unfavourable outcomes.

In the language of finance, risk is the possibility that the actual returns on an investment or outcome will be different from the projected returns. Risk entails the potential to lose all of your initial investment. According to Knapp and Langill (2015), risk is an uncertain event or condition that, if it occurs, will have a negative or positive effect on one or more project objectives. Hazards encompass dangers, weaknesses, and outcomes for the resources inside an industrial network. Risks are problems that decrease the value of a company (Damayaanti, 2023).

Concept of Risk Control

Hazard control, another name for risk control, is the process of minimising or lowering the hazards connected to a certain action or circumstance. Implementing strategies to lessen the likelihood or effect of possible dangers is known as risk control. This might involve tactics like putting safety protocols in place, setting up backup plans, or taking proactive steps to lessen the possibility of negative results. According to Kenton (2023), risk control is the set of methods by which firms evaluate potential losses and take action to reduce or eliminate such threats. This method makes use of the results of risk assessments, which entail locating possible risk factors in an organization's activities, including financial policies, non-technical and technical business features, and other matters that might have an impact on the company's success.

Proactive adjustments are also implemented as part of risk control to lower risk in certain areas. So, risk management aids businesses in minimising losses. An organization's enterprise risk management (ERM) policy must include risk control. Implementing strategies for mitigating or eliminating hazards that have been recognised is known as risk control, and it is a component of risk management. Eliminating the danger is the most effective strategy to control a risk, but it's not always a realistic option. The methodical and proactive steps and plans that businesses use to reduce, mitigate, or manage the different risks they encounter are known as risk control. Reducing the possibility of unfavourable events happening and lessening their impact in the event that they do happen are the main objectives of risk control. In order to efficiently respond to unanticipated occurrences, it entails recognising possible risks, putting preventative

measures into place, and creating contingency plans.

The process of assessing possible losses through risk identification, analysis, and mitigation, as well as the implementation of control mechanisms to reduce these risks, is known as risk control. Reducing the likelihood or effect of possible hazards is the aim. A business technique known as "risk control" is used to evaluate and oversee an organization's activities in a way that identifies and averts unneeded disasters that could impede the organization's operations and future goals. By using risk control techniques, potential risks, needless losses, etc., are avoided. It is associated with unknown and unexpected events (called uncertainty) and can be extremely difficult to predict, quantify, and control (Peddada, 2013).

Concept of Management

Planning, arranging, staffing, directing, managing, and coordinating all activities—from small-scale to large-scale—is the integrated process of management. A desired, goal-oriented pool of activities that is followed by regular effort from year to year and decade to decade, decade to decade, and so on, is also a success. The goal of management is to achieve a desired outcome through the skillful, well-planned, and methodical execution of different levels of activities using the 3Ms and 5Ms, which stand for "men" (human resources management; HRP), "money" (financial management), "materials" (supply chain management), "machines" (production management), "motivation" (HRD), "methods" (operational or quality assurance management), "monitoring" (operational or quality control management), and "markets" (marketing management). This is a fantastic assignment that meets needs both personally and organizationally at different degrees of pleasure.

Some very great individuals have defined management as a unique process that involves science and art in addition to planning, organising, regulating, and actuating in order to achieve predetermined goals." Management, according to George R. Terry (1877–1955), is the art of completing tasks with the help of others and in officially structured organisations. "Management is a multifunctional organ that oversees employees and their work as well as supervisors and businesses. The practice of getting things done with the intention of accomplishing goals successfully and economically is known as management. The process of organising, guiding, inspiring, and regulating an organization's information, financial, human, and physical resources in order to achieve its objectives effectively and efficiently is known as management. Coordination of people, processes, and resources to effectively and efficiently accomplish organisational goals is the art of management.

The art and science of managing involves using people to accomplish tasks. It is the process of directing and managing people's diverse activities in order to meet organisational goals. The skill of managing involves delegating tasks to others in an organised and integrated way in order to accomplish certain goals while making efficient use of available resources. Management may benefit from mobilising the material, human, and financial resources and strategically allocating them to company activities in order to achieve the established objectives. Organisation and direction of workflow, operations, and workforce in order to achieve corporate objectives is known as management. Creating an atmosphere that enables staff to perform effectively and productively is management's main objective.

Concept of Banking Sector

The banking sector is a cornerstone of any modern economy, playing a pivotal role in financial intermediation, economic growth, and stability. Banks facilitate the mobilisation of savings, providing a secure place for individuals and businesses to deposit their money. They channel these savings into productive investments through loans and other financial services, thereby fostering economic development. By offering a wide array of services such as savings accounts, loans, credit facilities, and financial advice, banks help in the efficient allocation of resources (Mishkin, 2015).

Historically, the banking can be traced back to ancient civilisations, where temples and palaces provided financial services, including loans and currency exchange. The modern banking system began to take shape during the Renaissance in Italy with the establishment of prominent banks like Medici Bank. These early institutions laid the groundwork for contemporary banking practices, emphasising the importance of credit and trust in financial transactions (Kindleberger & Aliber, 2011). Over time, banking evolved, integrating more complex financial instruments and expanding its reach globally.

The primary functions of banks can be categorised into accepting deposits, providing loans, and offering ancillary services. Accepting deposits is fundamental, allowing banks to accumulate funds from individuals and entities. These deposits are then used to extend credit to borrowers, which can range from personal loans to large-scale corporate financing. Banks also offer a variety of services, such as wealth management, foreign exchange, and payment processing, enhancing their role as financial intermediaries (Hull, 2012).

Regulation and supervision are critical aspects of the banking sector, ensuring its stability and integrity. Regulatory bodies, such as central banks and financial supervisory authorities, oversee banking operations to prevent malpractices and systemic risks. These regulations include capital requirements, liquidity standards, and compliance with anti-money laundering laws. Effective regulation helps maintain public confidence in the banking system and protects the broader economy from financial crises (Freixas & Rochet, 2008).

Technological advancements have significantly transformed the banking sector, introducing innovations like online banking, mobile payments, and digital currencies. These technological shifts have enhanced the accessibility and convenience of banking services, allowing customers to conduct financial transactions from anywhere at any time. However, they also pose new challenges, including cybersecurity threats and the need for continuous technological upgrades. The integration of technology in banking necessitates a balance between innovation and security to ensure customer trust and data protection (Gomber et al., 2017).

Concept of Artificial Intelligence

The term artificial intelligence (AI) describes computer programmes that are able to carry out sophisticated operations that were previously limited to human performance, such as problem-solving, thinking, and decision-making. According to Udo-Okon and Akpan (2024), artificial intelligence refers to the research and programming of computers to carry out intelligence tasks that require human intervention. Bassey and Owushi (2023) defined artificial intelligence as "the development of computer systems that can perform tasks that typically require human intelligence."

The capacity of a digital computer or computer-controlled robot to carry out actions often associated with intelligent individuals is known as artificial intelligence (AI). Kanade (2022) mentioned that artificial intelligence (AI) is the intelligence of a machine or computer that enables it to imitate or mimic human capabilities. AI is the application of many technologies to give robots human-like intelligence in terms of perception, comprehension, planning, action, and learning. Computers and other devices may mimic human intellect and problem-solving abilities thanks to artificial intelligence (AI) technology. The perfect feature of artificial intelligence would be its capacity for reasoning and action towards a certain objective.

Machines with artificial intelligence are able to match or even surpass human mental skills. Bassey and Owushi (2023) explained that artificial intelligence can be understood as the collection of technologies that enable machines to sense, comprehend, act, and perform several functions matching those of humans. Artificial intelligence, also known as AI, is'man-made thinking power', in which artificial means' man-made' and intelligence means 'thinking power' (Choudhury, 2022, cited in Ebirim, Amah, Iwuji, and Obi, 2023).

Types of Risk in Banking Sector

The banking sector is inherently exposed to a variety of risks due to its integral role in the financial system. Understanding these risks is essential for effective risk management and ensuring the stability and reliability of financial institutions. The following are the types of risks in the banking sector:

- **Credit Risk**

Credit risk arises from the potential that a borrower or counterparty will fail to meet their obligations in accordance with agreed-upon terms. It is one of the most significant risks faced by banks, as lending is a core banking activity. Credit risk can lead to financial losses when borrowers default on loans or other credit products. The 2008 financial crisis highlighted the devastating impact of poor credit risk management, as defaults on subprime mortgages led to widespread financial instability (Acharya & Richardson, 2009). Banks mitigate credit risk through thorough credit assessments, diversifying loan portfolios, and setting

aside capital reserves as a buffer against potential losses (BIS, 2010).

- **Market Risk**

Market risk, also known as systematic risk, refers to the potential for financial loss due to adverse movements in market prices, such as interest rates, foreign exchange rates, and equity prices. Banks are exposed to market risk through their trading activities, investment portfolios, and interest rate-sensitive assets and liabilities. For instance, a significant increase in interest rates can reduce the value of fixed-income securities held by a bank, leading to financial losses. To manage market risk, banks employ various strategies, including hedging, diversification, and using financial derivatives (Hull, 2018).

- **Operational Risk**

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people, systems, or external events. This type of risk encompasses a wide range of issues, including fraud, system failures, human errors, and natural disasters. Operational risk is particularly challenging to manage because it is often unpredictable and can have far-reaching consequences. Banks address operational risk by implementing robust internal controls, conducting regular audits, and investing in technology to enhance operational resilience (Basel Committee on Banking Supervision, 2011).

- **Liquidity Risk**

Liquidity risk is the risk that a bank will not be able to meet its financial obligations as they come due without incurring unacceptable losses. This can occur if a bank cannot liquidate assets quickly enough or if there is a sudden withdrawal of deposits. The collapse of Lehman Brothers in 2008 exemplified the severe consequences of liquidity risk, as the investment bank was unable to secure the necessary funding to meet its obligations, leading to its bankruptcy and triggering a global financial crisis (Brunnermeier, 2009). Banks manage liquidity risk by maintaining sufficient high-quality liquid assets, diversifying funding sources, and conducting regular stress tests to assess their liquidity positions (BIS, 2013).

- **Compliance Risk**

Compliance risk, also known as regulatory risk, arises from the potential for legal or regulatory sanctions, financial losses, or reputational damage due to non-compliance with laws, regulations, and industry standards. The banking sector is heavily regulated to ensure stability and protect consumers. Non-compliance can result in hefty fines, legal penalties, and damage to a bank's reputation. For example, in 2012, HSBC faced a $1.9 billion fine for failing to implement adequate anti-money laundering controls (Department of Justice, 2012). Banks mitigate compliance risk by establishing comprehensive compliance programmes, conducting regular training for employees, and staying updated on regulatory changes (Arner et al., 2017).

Risk Control and Management Technique in Banking Sector

The following are the risk control and management techniques in the banking sector:

- **Risk identification and assessment**

Risk identification and assessment are foundational in the risk management process. Banks use advanced analytics, artificial intelligence (AI), and machine learning to identify and assess potential risks more accurately. Techniques such as stress testing and scenario analysis help banks understand the potential impact of different risk factors (Kashyap, Rajan, & Stein, 2020).

- **Risk Diversification**

Diversification remains a crucial strategy to mitigate risk. By spreading investments across various asset classes, sectors, and geographic regions, banks can minimise the potential impact of adverse events on their portfolios. This approach helps manage market risk, credit risk, and operational risk (Amenc, Martellini, & Sender, 2019).

- **Capital Adequacy and Liquidity Management**

Maintaining adequate capital reserves and liquidity is vital for banks to absorb potential losses and meet their financial obligations. Regulatory frameworks such as Basel III have introduced stringent capital and

liquidity requirements to ensure banks' resilience during financial stress (BCBS, 2017). These measures help maintain financial stability and prevent bank failures.

- **Credit risk management**

Credit risk management involves assessing borrowers' creditworthiness and setting appropriate credit limits and terms. Modern techniques include using AI-driven credit scoring models, credit default swaps (CDS), and collateral requirements. Regular reviews and stress tests of loan portfolios help identify and mitigate potential credit issues (Altman, Resti, & Sironi, 2019).

- **Operational risk management**

Operational risk arises from failures in internal processes, systems, or external events. Banks implement robust internal controls, conduct risk assessments, and establish business continuity plans to manage operational risk. The use of technology, such as blockchain and cybersecurity measures, enhances operational risk management (BCBS, 2020).

- **Market risk management**

Market risk management involves mitigating the risk of losses due to market fluctuations, such as changes in interest rates, currency exchange rates, and commodity prices. Banks use financial instruments like futures, options, and swaps to hedge against market risks. Advanced risk measurement models, such as value-at-risk (VaR), help quantify and manage market risk exposure (Hull, 2018).

- **Regulatory Compliance and Governance**

Compliance with regulatory requirements and strong governance practices are critical for effective risk management. Banks must adhere to regulations related to anti-money laundering (AML), know-your-customer (KYC), and other financial laws. Implementing a robust governance framework with clear roles and responsibilities ensures accountability and transparency (OECD, 2019).

- **Use of Technology and Data Analytics**

The use of advanced technologies and data analytics has transformed risk management in banking. Banks leverage big data, AI, and machine learning to detect patterns, predict risks, and make informed decisions. These technologies enhance the accuracy and efficiency of risk assessment and management processes, allowing for proactive risk mitigation (Arner, Barberis, & Buckley, 2019).

Roles of AI in Mitigating Risk in Banking Sector

The banking sector has always been at the forefront of adopting technological advancements to enhance efficiency, security, and customer satisfaction. Among the most transformative technologies in recent years is artificial intelligence (AI). AI has emerged as a crucial tool in mitigating various risks in the banking sector.

- **Fraud detection and prevention**

One of the primary applications of AI in banking is fraud detection and prevention. Traditional methods of detecting fraudulent activities often involve manual processes and rule-based systems that can be slow and ineffective against sophisticated fraud schemes. AI, particularly machine learning (ML) algorithms, can analyse vast amounts of transaction data in real-time to identify patterns and anomalies indicative of fraudulent behavior. These systems learn from historical data, continuously improving their accuracy and reducing false positives (Ngai et al., 2011). For example, AI-powered systems can flag unusual transactions for further investigation, helping banks swiftly respond to potential threats and minimise financial losses.

- **Credit Risk Assessment**

Credit risk assessment is another area where AI plays a pivotal role. Banks need to evaluate the creditworthiness of loan applicants accurately to mitigate the risk of default. Traditional credit scoring models often rely on limited data points and can fail to capture the complete financial picture of an individual or a business. AI algorithms can process a broader range of data, including social media activity, payment histories, and economic indicators, to assess credit risk more comprehensively (Kou et al., 2014). By leveraging AI, banks can make more informed lending decisions, leading to lower default rates and

improved financial stability.

- **Regulatory Compliance**

Compliance with regulatory requirements is a significant challenge for banks, given the complexity and constant evolution of financial regulations. AI can assist banks in automating compliance processes and ensuring adherence to regulations. Natural language processing (NLP) algorithms can analyse legal documents and regulatory texts to extract relevant information and monitor compliance (Arner et al., 2017). Additionally, AI systems can track changes in regulations and update compliance protocols accordingly, reducing the risk of non-compliance and associated penalties. The benefits of applications of AI in the banking sector are apparent (Thisarani and Fernando, 2021).

- **Operational risk management**

Operational risks, including system failures, human errors, and cybersecurity threats, pose substantial risks to banks. AI can enhance operational risk management by predicting potential issues and enabling proactive measures. Predictive analytics can identify patterns that may lead to system failures, allowing banks to address vulnerabilities before they escalate into significant problems (Gomber et al., 2018). Moreover, AI-driven cybersecurity solutions can detect and respond to cyber threats in real-time, safeguarding sensitive financial data and maintaining customer trust.

Conclusion

The banking sector, vital for financial transactions, lending, and investments, faces numerous risks like credit risk, market risk, operational risk, and fraud. Effective risk management is crucial for stability. Artificial intelligence (AI) offers advanced solutions for mitigating these risks, transforming traditional frameworks. AI technologies such as machine learning and predictive analytics process vast data efficiently, enhancing risk detection and decision-making. AI also improves compliance and fraud detection, ensuring regulatory adherence and safeguarding assets.

Recommendations

1. Banks should invest in and integrate advanced AI-driven analytics to proactively detect and mitigate risks. Machine learning algorithms and predictive analytics can analyze vast amounts of data in real-time, identifying patterns and anomalies indicative of potential threats.
2. To ensure adherence to regulatory standards and reduce the risk of non-compliance, banks should implement AI-based compliance monitoring systems. These systems can automate the continuous review of transactions and processes, ensuring they meet regulatory requirements.
3. Banks should deploy AI-powered fraud detection systems to safeguard against fraudulent activities such as identity theft, money laundering, and cyber-attacks. AI algorithms can analyze transaction data and customer behaviors to identify suspicious activities that deviate from normal patterns.

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