Multidisciplinary Reviews

CONFERENCE PAPER
Published Online: December 29, 2025
https://doi.org/10.31893/multirev.2025ss0323

Sustainable Management Practices: Balancing Profitability and Responsibility

Risk management strategies in financial institutions

S. Yavana Rani[a] ✉ | **Indu Singh**[b] | **Chintan Prajapati**[c] | **K. Ravindran**[d] | **Saumya Goyal**[e] | **Kukatla Tejesh**[f]

[a]CMS Business School, JAIN Deemed-to-be University, Bangalore, Karnataka, India.
[b]School of Education, Noida International University, Greater Noida, Uttar Pradesh, India.
[c]Parul University, Vadodara, Gujarat, India.
[d]Presidency College, Bangalore, Karnataka, India.
[e]Quantum University Research Center, Quantum University, Roorkee, Uttarakhand, India.
[f]Centre for Multidisciplinary Research, Anurag University, Hyderabad, Telangana, India.

Abstract To improve stability and protect operations, the majority of financial institutions have created risk management plans, and minimize losses. This study assesses a wide spectrum of risk management procedures that financing institution employ in handling systemic, operational, market, credit, and liquidity risks with moral hazards in current focus. Thus, the research analyses the use of stress testing, modeling techniques, and hedging strategies for effective identification, assessment, and minimization of these risks. Therefore, the regulatory frameworks namely, Basel II and Basel III are crucial in setting international standards for the management of not only credit and operational risks but also market risks while imposing minimum capital requirements. This research emphasizes the need for building a strong risk culture and governance system within financial institutions; it presents a strong case for adopting a proactive risk management approach, balancing innovation and growth with adherence to regulations. The results show that organizations with thorough risk management plans are more resilient to monetary fluctuations and regulatory demands. The findings emphasize how crucial it is to put in place thorough, flexible risk management plans to preserve resilience, guarantee legal compliance, and reduce risks all of which support long-term financial success and stability.

Keywords: risk modeling, regulatory compliance, financial stability, global finance landscape, monetary fluctuations

1. Introduction

Financial institutions have always prioritized spreadsheet-based models, well-established statistical techniques, and qualitative expert judgment when it comes to risk management. The risk environment in which financial institutions operate is complicated and marked by instability and uncertainty. Effective risk management is essential to banks, insurance companies, managers of assets, and other financial sector organizations (Xiaoli & Nong, 2021). One of the areas of finance that has grown the most over the last few decades is banking risk management, yet this field needs to keep evolving. Risk executives have high expectations for the potential advancement of banking risk management (Milojević & Redzepagic, 2021). Since the loan issue process requires a thorough analysis of the chance of receiving the money back, In the realm of finance and banking, credit risk is among the most crucial subjects. To avoid unnecessary losses, care and attention must be used (Mhlanga, 2021). The primary obstacle to medium-sized enterprises' ability to grow sustainably has consistently been cost control, which is the driving force behind economic progress. Therefore, the issue of company cost management and control must be resolved in the development of contemporary businesses (Zhao & Zhao, 2021). The global economy continues to developed, and an increasing number of businesses are participating in the financial sector, which supports the long-term growth of the domestic sector. Due to their inability to withstand risks, small businesses are in danger of going bankrupt. This is mostly are focusing on businesses virtual financial markets rather than investing in real economies (Song & Wu, 2022).

Historically, a variety of models and approaches in financial institutions, from basic credit scoring procedures to evaluating credit risk. Even though conventional approaches have shown some degree of efficacy, they commonly observe the intricacies of contemporary economical markets and the abundance of available data. Presumptions and past data may restrict their ability to forecast outcomes and adjust to shifting market conditions (Bello, 2023). Financial firms use risk mitigation techniques to recognize, evaluate, and reduce risks. To ensure that their activities are stable and secure. Financial institutions use a range of risk management strategies in organizations, such as stress testing, money-invested diversity, and strong internal control systems. Using stress testing standards is one common for evaluating how resilient banks and other financial institutions are to possible events (Mwangi, 2024). The global economy depends heavily on the financial sector, which facilitates cash flows, oversees investments, and offers vital services to both consumers and companies.

Nonetheless, the sector is naturally vulnerable to several risks, such as systemic, operational, liquidity, credit, and market hazards. For financial organizations to remain stable and successful, effective risk management is essential because it makes it easier to recognize, evaluate, and reduce possible losses while also guaranteeing compliance with regulations (Rahman, 2024).

An essential part of international business strategies is risk management. The productivity and efficacy of an organization's workforce in accomplishing its goals is referred to as workforce efficiency. To increase customer satisfaction and loyalty, customer engagement entails establishing and preserving interactions with clients. The efficient and coordinated use of assets to reduce, track, and manage the probabilities and consequences of unfavorable events takes its place (Egieya et al., 2024). Nowadays, managing financial risks without the use of artificial intelligence (AI) solutions is nearly impossible.

The fact that conventional economic risk control methods and tactics have grown complicated, time-consuming, and inadequate is unquestionably one of the primary causes of this. In particular, a successful commercial application can be built on an appropriate combination of AI approaches and traditional financial risk management. In the current unpredictable business environment, it improves each participant's management and growth possibility, efficiency, and optimism, despite their financial sectors (Sari & Indrabudiman, 2024). It also highlights how crucial a proactive, dynamic approach is to preserving stability and resolving financial unpredictability in a complex global environment.

According to the strategies, through the use of insurance, people or organizations can shift the financial weight of their losses to an insurer. The insured entities are shielded from severe financial harm in the case of a covered incident by submitting recurring payments. Hedging is the financial strategy used to lower or eliminate the risk of unfavorable changes in asset prices through the use of financial tools or techniques. In essence, it is insurance against market price fluctuation. Diversification is the process of spreading investments or business operations among several assets, sectors, or geographical areas in order to reduce vulnerabilities to any one risk.

This research's objective is to investigate the different risk management techniques used by financial companies to reduce operational, market, credit, liquidity, systemic, and moral hazards, with an emphasis on regulatory structures such as Basel II and III. This research makes a contribution by demonstrating how risk culture, governance frameworks, and regulatory compliance shape successful risk management plans. The research is arranged in the following order of organization: Phrase 2 discusses the methodology; Phrase 3 covers the risk management strategies of the research, Phrase 4 outlines the discussion and lastly, Phrase 5 ends with the conclusion.

2. Materials and Methods

In the dynamic world of financial institutions, risk organization was crucial to preserving constancy and productivity. Financial management risk such as moral hazard, market risk, liquidity risk, operational risk, credit risk. Decision-making can be influenced by moral hazard, especially in insurance markets. It is essential to understand and successfully manage these risks to preserve financial stability and adhere to legal requirements. Various risk management strategies are explained below.

2.1. Survey analysis

Behavioral finance and risk management have been reviewed in this literature. Studies for this review were gathered from the “Google Scholar” database, namely MDPI, Elsevier, Research Gate, and Springer. The search started by first entering the keywords “Behavioral finance”, “Risk assessment”, Financial risk”, “Investor psychology”, “Financial decision-making”, in exploring the vast applications of behavioral finance in the area of risk management. Initially, there were 150 records found across these platforms. After removing duplicates, 150 unique records remained. The search was further focused by refining only the studies on applications of behavioral finance, risk management, published between 2020 and 2024. Following title and abstract screening, 119 records were rejected for lack of relevance.

Research articles published in various were included in the literature search. However, research papers from peer-reviewed journals; book chapters, lecture notes, and conference proceedings were not included. Nearly, 31 full-text articles remained to be evaluated for inclusion. These studies served as the foundation for the analysis. Because they include review articles, these provide a thorough understanding of how psychological finance is applied in managing risks. The following Table 1 lists the inclusion-exclusion procedures that were used in the 150 papers used for analysis.

2.1.1. Quality assessment

The research incorporated journals of top quality. Ensures wrong insights are not involved in the application of Artificial Intelligent (AI) and Machine Learning (ML) for risk management in financial institutions. Abstracts and conclusions have been scrutinized to filter the articles more thoroughly. References of these papers were checked, followed by reviewing those articles whose references cited the papers. Duplicate records were removed, irrelevant studies were filtered out, to improve the validity reliability of the final analysis.

2.1.2. Eligibility and inclusion

The research proceeded to analyze articles dated from 2020-2024, primarily in the area of AI and ML applications in risk management across financial sectors. Only English-language research articles were considered. Articles were included if they contained subjects that could possibly relate to risk management, namely, financial decision-making, credit ratings, and fraud detection in the context of AI and ML. The criterion for inclusion was either empirical or theoretical work, excluding articles

that were merely opinion-based or offered no substantial methodological description. Books chapters, conference papers, and grey literature were also excluded to guarantee that only high-quality, reliable sources were included in this analysis. The assessment for acceptance for the final analysis of each article was undertaken with the utmost scrutiny, out of this set of accepted are shown in Figure 1.

Thus, the extracted data were organized and analyzed, through comparative analysis of approaches relevant to the area of study.

Table 1 Inclusion - exclusion criteria.

Criteria	Inclusion	Exclusion
Time-period	2020 to 2024 (post-crisis period)	Pre-crisis time period
Publication Stage	Only finally published papers	Pending
Language	English	Non-English
Subject-area	• Financial institution • Risk management • Banking • Economic risk analysis	All others
Type of Papers	Review and research articles	Lecture notes, conference presentations, book chapters, proceedings.
Scope of Study	Behavioral finance, risk management, financial decision making, investment decisions, financial institutions	Consumer behavior, human resources

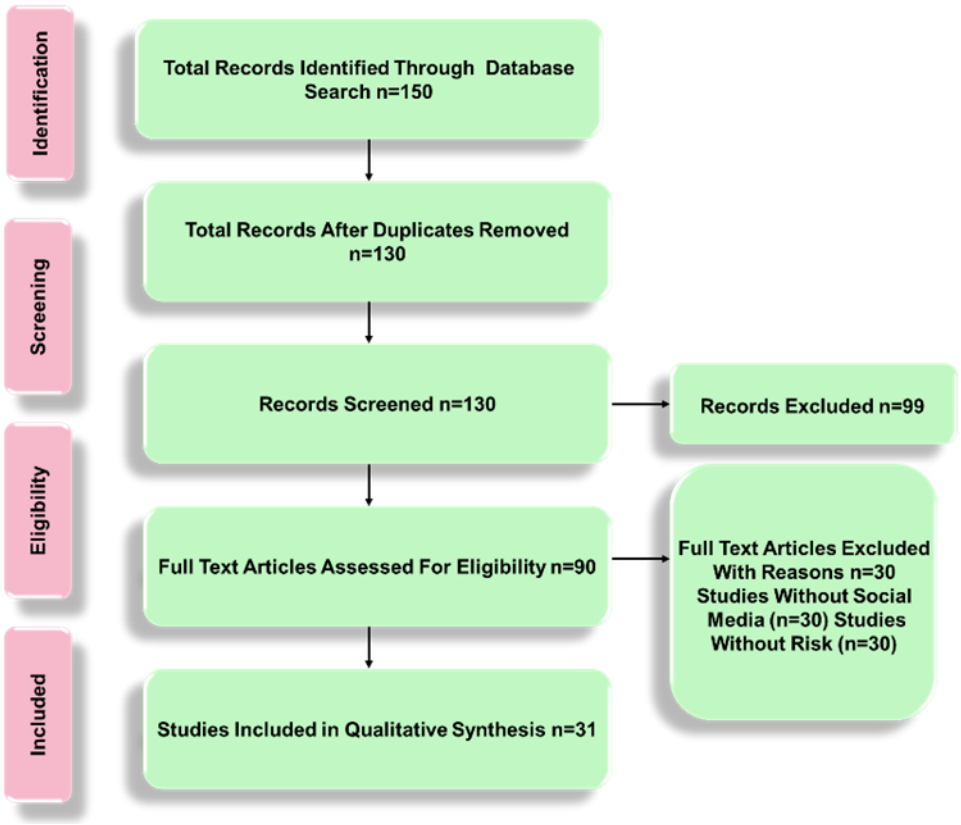

Figure 1 Types of risks in financial institution.

3. Types of Risk in Financial Institutions

The procedure of determining, evaluating, and controlling the risks connected to lending money to people or companies is known as credit risk control. It entails evaluating the creditworthiness of debtors, estimating the likelihood of default, and putting plans in place to lessen any losses. Several crucial tasks are included in credit risk management, including risk assessment, risk mitigation, credit analysis, and credit rating. For financial institutions to minimize losses and preserve ideal loan investments, efficient handling of credit risk is crucial. It calls for a blend of sound judgment, risk management knowledge,

and analytical abilities. This research created several methods for evaluating credit risk in recent years. It has been shown that by using the right analytical techniques, transactional data can provide insights for evaluating credit risk (Mitra et al., 2024).

Market risk: The external financial hazards include trade risk related to credit and market risk. Market risk is the term used to describe changes in the value of an investment. Unexpected shifts in the economy might affect the market value of the assets of an organization and obligations through instruments of finance. It includes rate risk, which results from their inherent volatility, plus exchange rate risk, which arises from changes in the prices of other currencies caused by supply and demand on the global market and governmental choices. Conversely, when the other party fails to fulfill legal payments obligations, trade risk of credit arises (Settembre-Blundo et al., 2021).

Liquidity risk: The insurance sector will not be able to swiftly convert resources into cash without suffering large losses. Or that it won't have sufficient liquidity to satisfy its immediate debts. The cash defensive period's liquidity risk is quantified by the operational cycle and revenue realization period, which gauges short-term liquidity using the working capital turnover rate of the business. Thus, it is necessary to control liquidity risks since a bad management strategy could result in an increase in supplier obligations, which could generate losses and subpar market outcomes. Since the products in the consumer goods sector are meant for direct consumption and are needed by all stakeholder groups, the liquidity and survival of these businesses are extremely important (Bouslimi et al., 2024).

Operational risk: To perform an extensive evaluation of the literature on financial institutions' management of operational risks, which shows evidence of sophisticated methods for evaluating risk in the financial sector based on operational loss distributions. Since financial risks are essential to the operation of any financial institution, it is also vulnerable to a variety of non-financial hazards that are sometimes difficult to assess and reduce management's transparency. Using commercial concerns such as enhanced competitiveness to improve risk-based decision-making, and value to investors, as well as regulatory initiatives like Basel II (Basel committee of banking supervision), operational risk management has been developing in the financial sector for decades. In order to improve the global economic technique's financial security and reliability, Basel II intends to fortify processes for risk management and create noticeably more market-sensitive capital standards (Lopez-Sanchez, 2021).

Moral hazard: In which insured people take fewer preventive actions because they do not reduce their premiums as long as the insurer is unable to monitor them, can result from this asymmetry. Moral hazard in insurance markets has been the subject of numerous empirical investigations, which have found that it varies between markets and depends on several criteria, including the type of insurance product. In this sense, understanding the moral hazard effect under various probabilities is made possible by examining the impact of insurance coverage on self-insurance apart from other variables. An experimental strategy has been used by some scholars to research moral hazard. Moral hazard produces predictable losses with no chance of reimbursement (Park & Kim, 2020).

4. Risk Management Strategies

To reduce the effect of risks on a company, financial institution measures entail recognizing, evaluating, and prioritizing risks. These strategies consist of acceptance, transfer, mitigation, and risk avoidance. In the face of uncertainty, an organization may preserve its financial stability, safeguard its resources, and accomplish its goals with the help of efficient risk control. Table 2 shows the types of risk and its applications in many financial institutions.

Table 2 Effective risk mitigation approach in financial institution.

References	Type of risk	Objective	Result
Qatawneh (2021)	Information technology (IT) infrastructure's mediation function in credit risk management.	To create a favorable atmosphere for credit risk management by using information technology, the effects of computerized accounting information systems (CAIS) on.	Suggested that financial institutions become more knowledgeable with CAIS because of its capacity to comprehend and analyze a client's situation and determine whether they qualify for credit.
Syadali et al. (2023)	The risks of credit, liquidity, market risk, operational threat, legal risk, compliance risk, reputation risk, and strategic danger.	When Islamic banks serve as financial traders for Indonesian businesses, there was always a danger. It means that the individual can measure and reduce risks and solve issues with the aid of risk management.	For entities with the appropriate Islamic legal system, Sharia compliance must be considered before transactions were completed, and procedures must be closely watched.
Luo (2021)	Multinational corporations have new potential because of digital global connectedness, but there were also special concerns. Concentrate on three risk	Digital global connection presented new potential for multinational corporations; it also carries special risks, a topic that has not yet	The framework provided a distinctive perspective on the crucial steps that multinational business (MNEs) must take both individually and collectively to avoid digital risks, highlighting the significance

	categories: information security, regulatory complexity, and digital interdependence.	received enough attention in the field of international business.	and procedure of developing, implementing, and utilizing digital intelligence in the concurrent the achievement of local adaptation, transnational adaptability, of the hazards associated with digitization and international coordination for cross-border operations that were increasingly supported by digital technology.
El Hajj and Hammoud (2023)	Trading algorithms, managing risks, fraud detection, rating of credit, and in financial organizations, customer service was their most prevalent use of AI and ML technologies.	Using a multimodal method that combines a quantifiable survey and qualitative research, the approach looked at the implementation and effects of AI and ML in the banking sector.	A mixed-methods approach was used, combining the qualitative interpretation of relevant research with quantitative survey data. The research clarifies the possible opportunities while also enhancing their understanding of the current situation and prospects of Finance-related AI and ML technology.
Liu and Huang (2022)	Financial risk in the banking sector.	The research examined how Chinese financial institutions' There was a connection between ethical finance and handling financial risks.	Consistent as frequently the empirical results of the national joint stock bank account sample and the complete sample are compared. Assuming a significant portion of the collection originates from a national bank handles joint stocks, the approach reduces the risk of a biased outcome.
Rybalchenko et al. (2022)	The research examined contemporary crisis management techniques for financial institutions and how they might be improved from the financial risk in the banking sectors.	The essay's primary focus was crisis management as an organizational method to guarantee financial organizations' stability. By using scientific research methods and an analysis technique, the primary advantages and disadvantages of the existing state of anti-crisis management in financial organizations' activities were determined.	The findings could act as a stimulant for enhancing banking institutions' anti-crisis management and management systems, which would guarantee Ukraine's financial stability.
Brahmaiah (2022)	To examine the strategies and processes Indian regulated business banks both public and private sector banks use to control liquidity and market risk.	It reveals that public sector banks (PSBs) are outperforming, when it involved providing and disclosing their risk control methods in their financial statements, banks in the private sector (PVSBs) were involved in identifying risks, evaluation, and analytics.	Regarding their policies and methods for assessing, analyzing, monitoring, controlling, and responding to risks associated with market and liquidity risk, the results indicate that PVSBs and PSBs do not significantly differ from one another.
Kedarya et al. (2023)	Among the most crucial factors affecting how profitable a bank was, soundness and business performance are strategic risk.	An important undertaking that needs to be completed in accordance with the guidelines established by the Basel II framework is strategic risk management. Strategic risk analysis was a relatively recent field of analysis. The necessity to control the risk was discussed in the literature today, and it is connected to the idea of economic capital.	The research proposed a trustworthy calculation of the strategic risk in connection with the risk assets of a bank. Market volatility and unpredictability could be taken into consideration with a strategic risk measure based on regulatory capital, which also establishes the amount of capital needed to mitigate strategic risk.

Torban (2020)	The stability and ongoing profitability of an insurance company depend heavily on credit risk management.	The unbanked segments of the population receive financial assistance from microfinance. Microfinance can encourage business and lessen poverty. since it is a system that gives modest loans to low-income individuals so they can generate money and launch their own small enterprises.	Both qualitative and quantitative analysis of data techniques were used in the research. The research examined how the Client assessment, credit monitoring for risk, and collection techniques all had an influence on the management of credit-related risks in Adama County institutions and financial institutions.
Gambetta et al. (2021)	Financial institutions were essential to fostering liquidity and supportable financial development, and they frequently integrate social and environmental reflections into their risk management outlines.	It evaluates the effects on the environment and society and computes the risk profile of financial companies that integrate environmentally friendly practices into their operations.	Based on their sustainability reports, financial organizations with more market risk, weaker managerial effectiveness, and reduced capital exposure often make a greater contribution to the Sustainable Development Goals (SDG).
Bardas et al. (2022)	Reputational hazards have been considered in the analysis and supplementation of financial firms.	The research examined the characteristics of risk and financial institution management in uncertain times. The current stage of the financial industry's evolution is marked by the availability of a large range of methodologies and methods for managing risks, including risk identification, assessment, and mitigation.	The findings indicated that a risk committee, whose major role was to track, recognize, and regulate risks that develop in the operation of the financial organization, ought to be in possession of the formulation, usage, evaluation, and assessment of the data acquired during risk assessment.
Nurnaningsih et al. (2024)	Conventional, static auditing techniques frequently fall short in proactively identifying and addressing weaknesses.	This research proposed to assess the degree to which financial institutions' use of risk-based auditing enhances the caliber of internal oversight and risk reduction.	The internal auditing and financial organizations' capacity to recognize and control possible risks are enhanced by risk-based audits. Therefore, financial institutions' oversight and risk management can be enhanced through the application of risk-based audits.

3. Discussion

The research (Vasquez & Xiao, 2024) lacked to use the time-series and longitudinal data since these data types do not cover the effects of exogenous shocks in the price of a security or the economic conditions surrounding the system to which it belongs. The research is concerned only with delta-hedged stock options, thus limiting its applicability to other investment types. The conclusions might be also affected by differences in credit rating methods; moreover, the assumptions of the model may not cover all factors accounting for the relationship between default risk and investment returns. Cheng and Qu (2020) depends only on web crawler technologies and word occurrence analysis, which might miss subtle aspects of the data or provide erroneous interpretations of contextual meanings. Moreover, emphasis on particular classifications of banks may restrict the applicability of findings within the context of all financial institutions. The fast pace of technological progress may also suggest that findings would be outdated once new innovations are considered.

Zhang et al. (2023) has one caveat-that is, it is China-specific. Hence, the findings may not be much generalized to other countries having a different economic condition or regulatory environmental standard. Also, the suggested modeling may not capture all functions of the market fully, and the historical time-series analysis may fail to consider abrupt changes that might affect asset price bubbles because the sudden market behavior instabilities may not change due to sudden policy changes. Interviews and surveys used in data sources could suffer from the generalizability of the research (Syadali et al., 2023). Special attention on particular case studies may not necessarily offer a full view of Islamic banking risks across Indonesia. Sharia compliance could probably create more varied interpretations or analysis of the study findings.

Bello (2023) research is mostly concerned with using ML to assess credit risk, which was economic and financial analysis. It excludes, nevertheless, other risk categories that are equally important to financial risk management, such as market, liquidity, and operational risks. Furthermore, Bello's method lacks the regulatory ramifications of using ML for risk estimation,

which is of utmost significance in the highly regulated financial environment of the present. Lastly, the analysis greatly neglects the intricacies of incorporating ML with traditional risk administration strategies.

Mwangi (2024) demonstrates how methods for risk mitigation might be enhanced by AI, but the research merely describes certain applications of machine learning without describing how such technologies are used in various categories of financial risks. It was lacking in how machine learning can be a supplementary or collaborator with conventional risk management methods like hedging and stress testing. Moreover, it fails to consider the likely barriers to adoption that financial institutions may experience from using such technologies, including problems with scaling, comprehension of the model, and data integrity. Lastly, the research was also deficient in providing a detailed explanation of how the regulatory regimes contribute to impacting the use of ML in risk mitigation.

Rahman (2024) presents the potential for machine learning algorithms to enhance risk management frameworks but leans more towards risk assessment and identification. The research does not cover the actual implementation of how they are used in practice or how they fit into other risk management processes. It also does not consider the fact that financial institutions need to cope with regulatory environments, especially those demanding Basel III frameworks. The research does not present threats such as skilled expertise, data infrastructure, and ethical effects of automated decision-making.

Vesna (2021) discusses the challenges of financial institutions in adopting AI applications for risk management. The study, however, mainly discusses the limitations of AI, including data quality issues, model accuracy, and resistance to organizational change. Although these are important concerns, the study does not offer adequate solutions or best practices to overcome these concerns. Secondly, the report does not mention how AI is to be embedded into existing risk management systems and how it is to be implemented to meet regulatory requirements. The fact that the report does not discuss the governance structures and risk culture in depth creates a knowledge deficit concerning how financial institutions can best implement AI for managing risk.

The research addresses these limitations of time-series and survey data used to capture both external factors and overall economic conditions, extending its consideration to other investment classes besides delta-hedged options, and merging two data sources with multiple data frames to enhance contextual precision. It was applicable worldwide in addressing diverse geographies and regulatory environments, rather than being limited to Chinese or Islamic-banking contexts. The architecture integrates machine learning for credit, market, liquidity, and operational risks with traditional methods like stress assessment and risk management, was Basel II/III compliant, and fosters a strong governance and risk culture to tackle issues related to data quality, model interpretability, scalability, and ethical concerns associated with AI adoption.

4. Conclusion

According to this research, financial institutions must implement efficient risk organization techniques help lower a range of risks, including liquidity, market, credit, and functional and moral hazard. Financial institutions could support their operations and lower their chances of possible losses by implementing strong risk management techniques like credit analysis, risk simulation, stress testing, and hedging. Institutions can proactively detect and reduce possible risks by using techniques like scenario analysis, stress testing, and risk modeling. Regulatory structures like Basel II and Basel III are crucial for affecting risk administration practices because they establish minimum capital standards and promote security in the banking industry. Furthermore, maintaining ongoing monitoring and risk adaption requires a robust risk culture and governance architecture. Financial institutions must implement dynamic and thorough risk management strategies that not only guarantee regulatory compliance but also improve overall risk management as the global financial environment grows more complicated.

Ethical Considerations

Not applicable.

Conflict of Interest

The authors declare no conflicts of interest.

Funding

This research did not receive any financial support.

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