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INVESTIGATING THE IMPACT OF ARTIFICIAL INTELLIGENCE TOOLS IN FINANCE

MASTER THESIS

YEAR 2023

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF COMPUTER INFORMATION SYSTEMS

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M.Sc. THESIS

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Approval

We certify that we have read the thesis submitted by Adaeze Evelyn Ubah titled **"The Impact of Artificial Intelligence Tools in Finance: Systematic Literature Review"** and that in our combined opinion, it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Educational Sciences.

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of the Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.

Adaeze Evelyn Ubah

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Acknowledgements

I would like to express my sincerest appreciation to everyone who has helped me complete this thesis. Their help, advice, and inspiration were essential to my success.

Firstly, to my wonderful supervisor. Prof. Dr. Nadire Cavus I would like to express my gratitude for her direction, assistance, and inspiration during my research. This thesis would not have been possible without his/her perceptive comments and suggestions.

The Professors and my fellow students in Computer Information Systems Faculty at Near East University for their dedication to teaching and for providing me with a stimulating environment in which to develop my skills.

I also want to express my gratitude to my family, and close companions, who have supported and inspired me emotionally throughout my academic career. Their unwavering support has been a source of motivation and inspiration for me.

Finally, my deepest gratitude goes out to everyone who has helped me with this thesis, whether it was personally or indirectly. All of this study would not have been possible without your help.

Adaeze Evelyn UBAH

Abstract

Investigating The Impact of Artificial Intelligence Tools in Finance

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MSc, Department of Computer Information Systems

June 2023, 78 pages

The integration of artificial intelligence (AI) solutions in financial institutions has yielded substantial improvements in diverse domains, including decision-making, risk assessment, fraud detection, and customer service, among others. The implementation of AI has the capacity to considerably augment financial analysis, prognostication, and overall efficacy. However, extant literature lacks sufficient investigation to explicate the other pertinent studies. The objective of this investigation is to examine the utilization of artificial intelligence techniques within the financial services industry. The study was conducted by means of a systematic literature review in accordance with the PRISMA diagram guidelines. This study employed a systematic literature review approach, utilizing various academic databases including Science Direct, IEEE, EBSCO, SCOPUS, and Web of Science. The search was conducted using selected keywords within the timeframe of 2019 to 2023. The study's primary findings offer a synopsis of the increasing attention towards the implementation of AI technologies in the financial sector. The systematic literature review showed that AI tools have received noteworthy attention for their capacity to revolutionize diverse facets of the industry, encompassing but not limited to decision-making, risk evaluation, fraud identification, customer service, investment guidance, and customized banking. In addition, the amalgamation of deep learning techniques and artificial intelligence has exhibited the capability to mitigate cognitive and affective errors, leading to enhanced financial gains for banking organizations and increased satisfaction among their customers. This study aims to provide guidance to stakeholders in the finance sector regarding the integration of artificial intelligence tools into their operations.

Keywords: Artificial Intelligence, tools, finance, machine learning, fintech

ÖZ

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Finansal kurumlar, karar verme, risk değerlendirmesi, sahtekârlık tespiti ve müşteri hizmetleri gibi çok çeşitli alanlarda yapay zeka (YZ) uygulamalarını kullanıyor. Finansal analiz, kestirimcilik ve genel etkinlik, YZ ile önemli ölçüde artırılabilir. Bununla birlikte, mevcut literatür, diğer ilgili çalışmaları tartışmak için yeterli araştırmayı içermiyor. Bu çalışmanın amacı, finansal hizmetler sektöründe yapay zeka uygulamalarının nasıl kullanıldığını araştırmak. PRISMA diyagramı yönergelerine uygun olarak çalışma, kapsamlı bir literatür taraması yoluyla yürütüldü. Bu çalışma, Science Direct, IEEE, EBSCO, SCOPUS ve Web of Science dahil olmak üzere çeşitli akademik veritabanlarını kullanarak literatür taraması için sistemli bir yaklaşım kullanmıştır. 2019 ile 2023 arasında seçilen anahtar kelimeler için araştırma yapılmıştır. Çalışmanın ana sonuçları, finans sektöründe YZ teknolojilerinin kullanılmasına yönelik artan ilgiyi göstermektedir. YZ araçlarının endüstrinin çeşitli yönlerini değiştirme yeteneği nedeniyle, kapsamlı bir literatür taraması, YZ araçlarının önemli bir ilgi gördüğünü göstermiştir. Karar verme, risk değerlendirmesi, sahtekârlık tespiti, müşteri hizmetleri, yatırım rehberliği ve özelleştirilmiş bankacılık bunlarla sınırlı değildir. Ayrıca derin öğrenme ve yapay zekanın kombinasyonu, bankacılık kuruluşlarına duygusal ve bilişsel hataları azaltarak daha fazla finansal kazanç ve müşteri memnuniyeti sağlayabilir. Bu çalışmanın amacı, finans sektöründeki paydaşlara yapay zeka araçlarını işletmelerine nasıl entegre etmeleri konusunda yol göstermektir.

Anahtar Kelimeler: Yapay Zeka, araçlar, finans, makine öğrenimi, fintech

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List of Abbreviations

AI:	Artificial Intelligence
ML:	Machine Learning
NLP:	Natural Language Processing
FINTECH:	Financial Technology
NLP:	Natural Language Processing
GANS:	Generative Adversarial Networks.
ANN:	Artificial Neural Network
RPA:	Robotic Process Automation
KYC:	Know Your Customer
CDD;	Customer Due Diligence
DLT:	Distributed Ledger Technology
SLR:	Systematic Literature Revie
PRISMA:	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RQ:	Research Question
ANI:	Artificial Narrow Intelligence

CHAPTER I

INTRODUCTION

This chapter summarizes the background of artificial intelligence in the financial sector, emphasizing its growing importance and outlining the study's goals, problem statement, the significance of the study, limitations of the study, definition of terms and the overview of the study.

1.1 Background

This new era of AI has brought about significant transformations in various domains, including the financial sector, as evidenced by scholarly works such as those by Chen et al. (2022) and Abad-Segura et al. (2020). The implementation of artificial intelligence solutions. within financial institutions has resulted in significant enhancements across various domains such as decision-making, risk evaluation, fraud detection, and customer service, among other areas. The utilization of AI has the potential to significantly enhance financial analysis, forecasting, and overall efficiency. This phenomenon can be attributed to its capacity to efficiently process vast amounts of data and discern nuanced patterns. Artificial intelligence can be utilized to identify subtle patterns (Chen et al. 2022). The progression of AI represents a rational extension of scientific and technological progress, with the ultimate objective of enhancing the efficacy of society in its entirety. The financial services industry has undergone significant transformation as a result of the integration of novel technologies and the digitization of formerly analogue procedures (Abad-Segura et al. (2020). The traditional hierarchical arrangement of banking institutions has been disrupted by the advent of technological advancements such as automated teller machines and internet-based banking services. Consequently, it has been determined that a thorough investigation into the ramifications of AI on decision-making and operational processes is necessary (Sadok et al. 2022). The extant macroeconomic circumstances, stemming from the crisis of 2020, have exerted significant strain on the financial institution’s profitability. In recent times, there has been a heightened urgency to undertake research on the potential ramifications of artificial intelligence on the financial services sector Sadok et al. (2022). The financial services sector, among other industries, has experienced distinctive opportunities and challenges due to the proliferation of advanced technologies such as big data, cloud computing,

mobile applications, artificial intelligence, and blockchain. In the realm of financial management, the strategies of minimizing expenses, optimizing automation, and adopting novel digital innovations are gaining greater significance. The statement mentioned above requires a thorough examination and application of AI technology to achieve the objectives of augmenting productivity, improving the calibre of financial data, and amplifying financial risk mitigation measures, as proposed by Agarwal et al. (2022). The utilization of AI in the financial sector holds great importance, especially in terms of safeguarding confidential data. The application of AI has the potential to yield significant advantages in financial operations and data administration, as it enables the extraction of valuable insights from existing data, identification of recurring patterns, and assessment of potential risk factors (Mandala et al. 2022). Researching the potential applications of artificial intelligence in financial management is of utmost importance. The implementation of this measure would facilitate the enhancement of the velocity and precision of financial data processing, the uniformity of commercial practices and protocols, and the realization of financial digitization.

1.2 Purpose of the Study

The main objective of this systematic review of literature is to examine the application of artificial intelligence tools within the finance industry. The present review attempts to furnish readers with significant insights into the latest developments, emerging trends, and obstacles encountered in the deployment of AI in the finance sector. The attainment of this objective will be realized by conducting a thorough examination of scholarly literature, scientific studies, and professional publications. Following this methodology, the subsequent focus of inquiry in this study pertains to the formulation of research questions. (RQs) are presented as follows:

1. What are the most commonly used AI tools in finance institutions?
2. How are AI tools being utilized in financial institutions?
3. What is the impact of AI tools on financial decision-making, the effectiveness of AI tools in predicting financial market trends and identifying investment opportunities, and the use of AI tools in risk management and fraud detection in the finance industry?

4. How does the adoption of AI tools in finance vary across different regions of the world, and what factors contribute to these differences?
5. How effective are AI tools in predicting financial market trends and identifying investment opportunities?
6. What are the benefits of using AI tools in finance?
7. What are the drawbacks or limitations of using AI tools in finance?
8. What is the current state of research on AI tools in finance?
9. What are the critical success factors for implementing AI tools in finance?
10. What are the future trends and potential applications of AI tools in finance?
11. What are the ethical and legal considerations surrounding the use of AI tools in finance?

1.3 Problem Statement

Despite the increasing amount of scholarly literature on the influence of AI tools in finance, a significant knowledge gap persists regarding the precise consequences and ramifications of these tools on diverse facets of the financial sector. The existing research (Choithani et al. 2022; Mhlanga, 2021; Jawid, 2021) has predominantly concentrated on the broad implementation of AI in the financial sector, including predictive modelling and algorithmic trading, while insufficiently investigating domains such as risk management, customer behavior analysis, and regulatory compliance in a comprehensive manner. The purpose of this systematic literature review is to fill the existing gap in knowledge by conducting a critical analysis of the available research on the effects of AI tools in finance. The review aims to identify key research gaps and provide recommendations for future studies that can explore the nuanced effects of AI tools in finance across various domains. Additionally, the review will examine the implications of these effects for financial institutions, stakeholders, and regulatory frameworks.

1.4 Significance of the Study

This research endeavours to investigate the impact of artificial intelligence tools in the financial domain, encompassing areas such as risk evaluation, fraud identification, algorithmic trading, client servicing, and financial strategizing. The text underscores the positive outcomes resulting from the integration of artificial intelligence, including enhanced precision, productivity, and customized offerings.

The examination of challenges and limitations pertaining to the adoption of AI tools is also being conducted. The identification of future research directions serves as a guide for the advancement and expansion of AI applications within the world of finance.

1.5 Contributions to Computer Information Systems Department

The study on AI tools in finance may improve the department curriculum by giving students relevant skills that meet the financial industry's needs, improving their employability. Graduates with AI abilities will be more employable in industries like data analysis, risk management, and automation. Research on AI tools in finance can boost the computer information systems department's reputation, industry linkages, and AI-driven finance innovation, leading to industry alliances, research possibilities, and alumni success.

1.6 Limitations of the Study

Each research paper is always poised with certain limitations however this research has the following limitations;

- The study's parameters are limited to the particular timeframe of September 2022 to June 2023 when this study was conducted.
- This research is focused on a specific set of artificial intelligence tools and their impact on the financial industry
- It only presents journals that can be accessed via the Near East University Library

1.7 Definition of Terms

Artificial Intelligence: The term artificial intelligence is used to describe machines that are capable of performing tasks that normally require human intelligence, such as speech recognition, decision making problem-solving, and learning. The field comprises a range of methodologies, such as machine learning, natural language processing, computer vision, and robotics.

Financial Institution: A financial institution is an entity that offers a range of financial services to various stakeholders such as individuals, businesses, and governments. The financial sector consists of a variety of institutions such as banks,

credit unions, investment firms, insurance companies, and others that manage and facilitate various financial transactions, investments, loans, and other related activities.

Machine Learning: Machine learning (ML) is a subdivision of AI that concentrates on the creation of models and algorithms that empower computers to learn from data and make predictions or decisions without the need for explicit programming. Machine learning algorithms are designed to examine data patterns, detect correlations, and enhance their efficacy by gaining experience over time.

Automation: Automation is a process that involves the utilization of technology and machinery to execute tasks and procedures with minimal human involvement. The field of finance incorporates the utilization of software, algorithms, and robotics to enhance the efficiency and effectiveness of financial activities, including but not limited to data entry, transaction processing, reporting, and customer service.

Data Analytics: Data analytics is a process involving the investigation and analysis of vast amounts of data with the intent of revealing meaningful insights, structures, and insights. Finance utilizes statistical methodologies, mathematical models, and software applications to extract meaningful insights from financial data, improve the quality of decision-making, and identify opportunities for optimization.

Bankruptcy: This is a lawful procedure whereby an individual or entity acknowledges their incapacity to settle their outstanding debts. The process commonly entails a judicially overseen reorganization or dissolution of holdings in order to satisfy outstanding obligations to debtors. Bankruptcy offers a structured approach to either facilitate the financial recuperation or the systematic liquidation of an entity that is experiencing financial distress.

Cryptocurrency: Cryptocurrency refers to a form of currency that is wholly digital or virtual and whose security relies on cryptographic techniques. It operates independently and does not require the participation of a central bank. Utilizing blockchain, the technology ensures the security of transactions, controls the genesis of new units, and authenticates the transfer of assets.

Blockchain: This technology is a decentralized and distributed ledger system that enables the secure recording, verification, and storage of transactions across multiple nodes or computers. The aforementioned technology provides transparency,

immutability, and tamper resistance, making it suitable for various applications beyond the scope of digital currencies. The aforementioned applications encompass, yet are not restricted to, the management of the supply chain, implementation of intelligent contracts, and verification of digital identities.

Modelling: This method involves developing abstract models that can be used to simulate complex systems or occurrences in the real world. Mathematical models and algorithms are developed and used in finance to analyze data, make predictions, weigh risks, and streamline the decision-making process. be put to use in predicting the direction of the economy and weighing the consequences of probable finance.

1.8 Overview of the Study

The chapter one of this study is the introductory section that presents a thorough summary of the influence of artificial intelligence on the financial sector, underscoring its increasing importance and delineating the objectives of the investigation to scrutinize AI deployments, benefits, challenges, and overall ramifications.

The second chapter is the literature review part which provides an overview and critical analysis of the prior research, defining the context, assessing methodology and highlighting gaps in the field of artificial intelligence tools in finance.

The third chapter which is the methodology section describes the research approach, including the databases and keywords used to find relevant studies, the criteria for selecting those studies, and the steps taken to extract and synthesize the data from those studies.

In the fourth chapter presents the results and detailed analysis of the selected studies, summarizing their salient points and highlighting how AI has been put to use in the finance industry. Risk assessment, fraud detection, algorithmic trading, customer service, and fiscal management are just some of the domains where AI has found useful uses. The benefits, challenges, and restrictions of using AI, as well as the repercussions on areas like risk management, decision-making, and customer satisfaction, are discussed in depth.

The fifth chapter is the discussion section which provides a summary of the findings, focuses on the most salient trends and themes, and digs into the implications

these findings have for the financial sector. The utilization of AI has been recognized for its capacity to enhance decision-making processes, mitigate risks, and improve customer satisfaction. The preceding assertion endeavours to address lacunae in extant scholarship and proposes novel avenues for inquiry in the world of artificial intelligence with regard to the financial domain.

The sixth chapter presents the conclusion where the study concludes with a synopsis of the key findings from the systematic literature review, elucidating the importance of AI in the financial sector and its potential to bring about positive changes in the way financial operations are carried out.

CHAPTER II

LITERATURE REVIEW

This review's chapter delves into AI, financial tech innovations, and the application of AI-based software in the industry.

2.1 Theoretical Framework

2.1.1 Artificial Intelligence

The advent of AI has had far-reaching and far-reaching effects on many facets of modern life. The phenomenon of automation is being witnessed across various levels and sectors at an accelerated pace. The expeditious advancement of artificial intelligence has had extensive implications on various facets of society, the economy, and governance. Advances in AI have been made in many fields, from medicine and business to education and transportation (including self-driving cars and the travel sector) to agriculture and social media. As the utilization of artificial intelligence expands, specific domains of application, including healthcare, the military, and civic society, are increasingly perceived as attractive targets for potential attacks. As per the findings of Shinde et al. (2021), the remarkable decision-making capabilities of AI can be attributed to its adaptable nature, which enables it to perform effectively even in situations where data is limited. These instruments possess the ability to aptly react to situations by taking into account their context and the associated emotions. The utilization of artificial intelligence has facilitated the implementation of robust encryption techniques and streamlined monitoring of potentially dubious actions. Due to this, customers have been able to choose loan amounts at attractive interest rates. Furthermore, it acquires knowledge from previous engagements and constructs a more intricate understanding of customers and their patterns. The lack of transparency inherent in most AI-based systems has slowed down its practical application, despite the extensive research conducted on the subject by Martin (2017), Rai et al. (2019), Cao (2020, 2022), Zheng et al. (2019) Goodell et al. (2021), Ubah et al. (2021), and Abdel-Karim et al. (2021), as evidenced in a current study by Choithani et al. (2022). The aforementioned circumstance has hindered the full actualization of the potential of artificial intelligence. The term "black box" refers to the lack of transparency and interpretability in AI systems, primarily due to the opacity of many modern AI devices.

Thus, while the inputs and outputs of these systems may be perceptible and understandable, the intermediate processing stages that occur therein are indeterminate, evocative of an enigmatic entity. Consequently, those who employ or create such systems cannot determine the precise influence of individual variables on the decision-making process or the techniques employed to derive decisions from the input variables.

2.1.2 Innovations in Financial Technology

There has been a major change in the financial services sector in recent years. due to technological advancements, resulting in a revolution of various financial services and operations. Numerous pivotal technological innovations have played a substantial role in this metamorphosis. Initially, there has been a growing acceptance of AI and machine learning technologies within the financial sector. The aforementioned technologies have been implemented in various domains, including but not limited to risk evaluation, identification of fraudulent activities, formulation of trading algorithms, and provision of customer support. According to Park et al. (202)1, the implementation of artificial intelligence and machine learning techniques can lead to the optimization of financial processes through the facilitation of automation, improved decision-making, and enhanced efficiency. Blockchain and Distributed Ledger Technology (DLT) represent a significant technological advancement. The utilization of Blockchain and DLT holds the capacity to fundamentally transform financial transactions, enhance security measures, and augment transparency. According to Zheng et al. (2019), the implementation of decentralized and secure record-keeping systems can decrease the reliance on intermediaries and enhance trust and efficiency in financial transactions. Robotic Process Automation (RPA) has emerged as a noteworthy technological advancement in the realm of finance. RPA is a technology that employs software robots to carry out monotonous tasks and optimize operational workflows. According to Goodell et al. (2021), the implementation of automation results in enhanced efficiency and reduced costs across multiple financial tasks, including compliance reporting, data entry, and reconciliation. The implementation of big data analytics has brought about a significant transformation in the field of finance. The utilization of advanced analytics techniques through big data analytics facilitates improved risk assessment, customer segmentation, and personalized financial services. Also, Zheng et al. (2019), stated that the utilization of

data enables financial institutions to enhance their operational efficiency by facilitating informed decision-making. The emergence of financial technology (FINTECH) innovations has resulted in notable progressions in the domains of digital payments, mobile banking, and peer-to-peer lending. The advent of FINTECH has facilitated enhanced convenience and accessibility for users via digital wallets, mobile payment platforms, and online lending platforms. According to Goodell et al. (2021), the aforementioned innovations have fundamentally altered how financial transactions are executed and services are obtained. Finally, due to the heightened dependence on technology, safeguarding financial systems and customer data through cybersecurity and risk management measures has become of utmost importance. The field of cybersecurity has witnessed significant advancements in encryption, biometrics, and advanced threat detection systems. These measures have been implemented to protect against cyber threats and uphold the confidentiality and integrity of financial data Park et al. (2021). In general, these technological advancements represent the continuous evolution of the finance sector. The advancements in efficiency, security, and customer experiences have been instrumental in shaping the future of financial services and operations.

2.1.3 Artificial Intelligence Tools

The financial sector is the only one that has benefited greatly from the increased interest in and use of AI techniques. The use of AI technologies in many areas of finance has been the subject of numerous scholarly investigations. Among the most important AI resources, natural language processing (NLP) techniques have been applied to the study of financial texts like social media posts, news articles, and financial reports. Investor mood may be measured and market movements in stocks and currencies can be predicted with the help of sentiment analysis, a subfield of natural language processing (Bollen et al. 2019; Zhao et al. 2021). Credit risk analysis, fraud identification, and trading techniques are just some of the many financial applications of deep learning algorithms. Accuracy and prediction power can be enhanced by allowing deep learning models to learn complex patterns and relationships from financial data (Liu et al. (2021); Zheng et al. 2020). Portfolio optimization, algorithmic trading, and risk management are just a few of the areas where reinforcement learning algorithms have been investigated in the financial sector. By interacting with financial settings and receiving feedback on their activities,

these algorithms acquire optimal decision-making rules (Rahman et al. 2019; Papoudakis et al. 2020). Financial applications of generative adversarial networks (GANS) include the group of synthetic financial data, the identification of abnormalities, and the simulation of market scenarios. Financial models can be tested and trained with GAN-generated data that is realistic in all material respects (Takahashi et al. 2019; Wei et al. 2020). Especially in high-stakes financial decision-making, explainable AI attempts to develop interpretable and transparent models. The clarity of AI models in finance has been improved through the use of rule-based systems, decision trees, and model-agnostic techniques (Sai et al. 2021; Dumitrescu et al. 2022).

2.1.4 Artificial Intelligence in Finance

As stated by Mandala et al. (2022), artificial intelligence is a critical component in the finance industry, as it is utilized for statistical measurement management, trend analysis, and daily record and transaction handling. The utilization of this technology spans various domains, including but not limited to risk management, fraud detection, credit decisions, and financial advisory, as noted by Mandala et al. (2022). According to Mandala et al. (2022), AI possesses the capacity to analyze spending patterns and forecast loan borrowing behaviour The distinction between strong AI, which demonstrates self-awareness and perception, and weak AI, which lacks autonomy, serves as a means of delineating the present state of AI research. Agarwal et al. (2022), emphasized the importance of subfields within AI, such as Machine Learning, Machine Reasoning, and Robotics, in accomplishing the field's larger goals. This claim emphasizes the significance of these areas for the future of AI research and development. The study also posits that the domains of financial markets and services are particularly pertinent to the fields of Machine Learning and Machine Reasoning, as evidenced by their research findings. According to Choithani et al. (2022), AI's multifunctionality, capacity for decision-making, encryption proficiencies, and comprehension of customer behaviour it an indispensable and dependable tool. The prudent utilization of AI can enable banks to attain efficacy, expedited procedures, and substantial reductions in expenses.

2.2 Related Research

Van et al. (2019) conducted three studies that developed the probability of default models utilizing artificial intelligence, revealing the enhanced efficacy of artificial intelligence models in comparison to traditional models. The study determined that the integration of AI into automated credit risk solutions that can be scaled has the potential to enhance risk assessment. The authors have suggested that additional research be conducted on alternative data sources for risk scoring, in order to improve the management of financial risks.

Lee (2020) conducted a study that analyzed the legal and regulatory framework surrounding the use of artificial intelligence in financial services markets. The study aimed to promote financial inclusion. The study underscored the importance of improving the protective measures for individuals who use robo-advisory services and addressing concerns pertaining to privacy and data ownership. The author has suggested the development of more precise regulations as a means of enhancing the efficacy of Know Your Customer (KYC) procedures.

The study conducted by Sharma et al. (2020) involved a systematic and thorough analysis of the application of AI for forecasting stock market patterns. The study emphasized the potential benefits of incorporating artificial intelligence and neural networks into the field of stock market forecasting, particularly in relation to fluctuations influenced by sentiment, as evidenced during the COVID-19 pandemic. The authors proposed an additional inquiry by utilizing supplementary databases and machine learning models to obtain fresh insights and improve predictive abilities.

Milana and Ashta,, (2021) emphasized the co-evolution of scholarly and mainstream literature in the domains of banking and financial markets, which has been facilitated by the progress in artificial intelligence and computational capabilities. The analysed literature in the research instilled optimism for augmented efficiency, enhanced data accessibility, advisory and managerial provisions, and risk mitigation. However, it also brought to light unsettled concerns pertaining to the durability of the system and financial prosperity.

Empirical research was conducted by Mercier (2021) to investigate diverse definitions of machine learning and to comprehend the particular benefits and drawbacks of each approach. The research underscored the necessity of recognizing the impractical anticipations engendered by the exaggerated promotion of artificial intelligence. The author proposed the adoption of collaborative strategies to capitalize

on emerging technological advancements and enhance customer service delivery in financial institutions.

Bogojevic (2021) carried out a study that sought to examine the current status and potential future directions of artificial intelligence methods in the field of financial risk management. The study highlights the significant advancements that have been made by incorporating artificial intelligence in diverse fields such as market risk management, credit risk management, data quality assurance, text mining, and fraud detection. The author has suggested the incorporation of AI into the financial risk management framework as a means of addressing the constantly evolving nature of the financial industry.

The study carried out by Sadok et al. (2022) investigated the potential ramifications of incorporating AI into credit assessment processes utilized by financial organisations such as banks and lenders. The research underscored the potential for the incorporation of novel data sources in credit evaluation to engender partiality, along with ethical, legal, and regulatory apprehensions. The authors have proposed the implementation of novel financial regulations to tackle the aforementioned concerns. These regulations would encompass the authentication of bank data and AI algorithms.

The study by Choithani et al. (2022) is a qualitative research endeavour that examines the impact of AI on society. The study specifically delves into the attractiveness, challenges, opportunities, and effects of AI on professions and vocations. The investigation also examined the utilization of an innovative cointegration methodology to predict the future of Bitcoin by leveraging comparable cryptocurrency information. The authors espoused the incorporation of digital technology into the financial industry at a profound level, and the establishment of innovative regulations to promote fair competition among market participants.

The research done by Hisham et al. (2022) involved an empirical investigation that compared supervised and unsupervised machine learning approaches in the identification of fraudulent and valid transactions within blockchain networks. According to the research, the predominant method for investigating anomaly detection was supervised learning. The authors proposed that additional investigation is necessary to enhance performance optimization through the utilization of machine learning methodologies, including ant colony and metaheuristic algorithms.

Cao (2023) delivered a comprehensive exposition on AI research in the field of finance. The discourse encompassed a thorough examination of the challenges,

solutions, and potential of AI in this domain. The review underscored the necessity of resolving outstanding issues, investigating potential opportunities, and examining the synergies of next-generation artificial intelligence within the banking industry. The research extensively relied on analogous studies that centred on particular artificial intelligence methodologies and their implementation in financial contexts.

2.2.1 Research Gaps in the Literature

Related studies show multiple research gaps. study gaps in the financial sector highlight the need for more study into alternate data sources for risk assessment, privacy, and data ownership. Additional databases and machine learning techniques may help artificial intelligence predict stock market tendencies. AI system durability and financial stability are also being studied. New financial rules are needed to address ethical and legal issues raised by credit evaluation using artificial intelligence. Fair competition and seamless digital technology integration are promoted by novel regulatory measures and machine learning. Unresolved challenges and advanced artificial intelligence in banking need further study.

CHAPTER III

METHODOLOGY

This chapter will expound upon the methodology, which delineates the methodical approach that will be utilized to examine the research question and accomplish the research objectives.

3.1 Research Method

To fulfil the research objectives of the investigation, the author opted to carry out a systematic literature review, which is a meticulous and comprehensive approach to examining and synthesizing prior research studies and publications pertaining to a specific subject or research. The process involves employing a systematic and comprehensive search methodology to reveal relevant research studies, succeeded by a methodical examination and amalgamation of their discoveries concerning artificial intelligence tools in the financial sector. The systematic literature review (SLR) is a research methodology that adheres to a predetermined protocol to identify, assess, and analyze all relevant information pertaining to a specific inquiry. The aforementioned determination was executed in adherence to the established conventions that are widely acknowledged as the norm in the fields of information systems and software engineering, as delineated by Kitchenham and Charters (2007). This measure was implemented with the aim of enhancing the verifiability of the results and minimizing the potential for researcher bias. The systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guideline, as outlined by Moher et al. (2021). This process began with the initial selection of the database and concluded with the final review process, including the criteria for inclusion and exclusion. The PRISMA criteria were developed to aid in the identification of top-tier research articles from a plethora of databases, particularly in instances where a substantial number of outcomes required a reduction to a minimum based on predetermined criteria.

3.2 Search Strategy

In order to ensure that this systematic literature evaluation is of the highest possible quality, a few different approaches were taken. Employing a comprehensive range of terms or keywords with the aim of achieving a more inclusive search., such as “Artificial Intelligence” OR “AI” AND “Tools” AND “Finance” OR “Finance Application”. The terms “Artificial Intelligence" or “AI” and "Tools” and “Finance” or “Finance Application” were specifically selected because of their high semantic similarity to the topic at hand, which is the use of AI technologies in the financial sector. The aforementioned terminology pertains to the amalgamation of cutting-edge technologies and computational methodologies within financial systems and procedures. Furthermore, the incorporation of the term “Tools” denotes a concentration on artificial intelligence tools that are specifically utilized within the financial domain, thereby limiting the research's scope. The term "Finance Application" was incorporated as an alternative to underscore the pragmatic utilization of artificial intelligence tools within the financial industry. Through the utilization of logical operators such as "OR" and “AND”, an exhaustive examination of the literature can be performed by amalgamating these keywords. The "OR" operator facilitates the incorporation of several associated terms or equivalents, whereas the “AND” operator guarantees that all specified keywords must be present in the retrieved search outcomes.

Keywords query: ((“Artificial Intelligence” OR “AI”) AND ("tools") AND (“Finance” OR “Financial market”))

The abovementioned approach facilitates a concentrated inquiry into the precise instruments, methodologies, and techniques utilized within the financial sector to exploit artificial intelligence technology. A systematic review was performed on peer-reviewed journal articles published from 2019 to April 2023. The selection of publications commencing from the year 2019 was based on the significant progress made in the field of Artificial Intelligence within the past half-decade. This measure was implemented to facilitate the inclusion of top-notch research that has been carried out within the past half-decade. The study utilized multiple databases such as IEEE, Science Direct, EBSCO, Web of Science, and Scopus. The search excluded publications authored in languages other than English, articles that were not accessible

through open access, articles that were published over five years ago, and articles that were not classified as research articles.

Table 1:

The query for keyword search

	Keywords	**Similar terms**
Major	Artificial Intelligence	AI
AND	Tools	Application
AND	Finance	Financial Applications

3.3 Inclusion and Exclusion Criteria

All of the selection criteria utilized in this study were adequately considered, despite the fact that the entire selection procedure will probably certainly be different based on the databases that are considered. This action was taken to guarantee reliable outcomes. It is also important to establish inclusion and exclusion criteria before commencing the selection process, as doing so will have a bearing on the overall quality of the literature review. The standard of the literature review will suffer as a result. The selection criteria used to determine which studies would be included and which would be excluded based on the search results are listed in Table 2 (below). According to these results, we choose which studies to include and which to exclude. The search's results provided the data used as the foundation for these standards. These criteria were used as a foundation for decision-making to eliminate any potential roadblocks that might arise during the course of the procedure.

Table 2:

Inclusion and exclusion criteria

Inclusion	Exclusion
Accessible within the 5 databases	Duplicates between the databases
Only Articles published in English	Articles that were originally published in languages other than English
Full text available online (Open access)	The full text is not available for viewing (not open access).
Journal papers that have been peer-reviewed	Journal publications that have not been peer-reviewed
Articles published in the last 5 years (2019-2023)	Articles published previously in the last 5 years (2019-2023)
Studies that focus on the application of AI in the financial sector.	Studies that lack clear relevance to the topic of AI in finance

3.4 Selection Processes

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guideline (Moher et al. 2021) was adhered to during the execution of the systematic literature review. The PRISMA guidelines, also known as "Preferred Reporting Items for Systematic Reviews and Meta-Analysis," were utilized to depict the complete selection procedure, commencing with the primary exploration of the database and culminating in the final review process, along with the criteria for inclusion and exclusion. The PRISMA criteria were devised to facilitate the selection of high-quality research journal articles from a multitude of databases, particularly in cases where a large number of results necessitated a reduction to the minimum based on specific criteria. This action was undertaken to streamline the process of selecting.

After performing a comprehensive search spanning the last five years and applying a language filter to include only English publications, a total of 20,914 articles were retrieved from three distinct databases, namely Science Direct, IEEE, EBSCO, Web of Science, and Scopus. The researcher was able to derive the following numerical values from their data based on the provided criteria. The databases Science

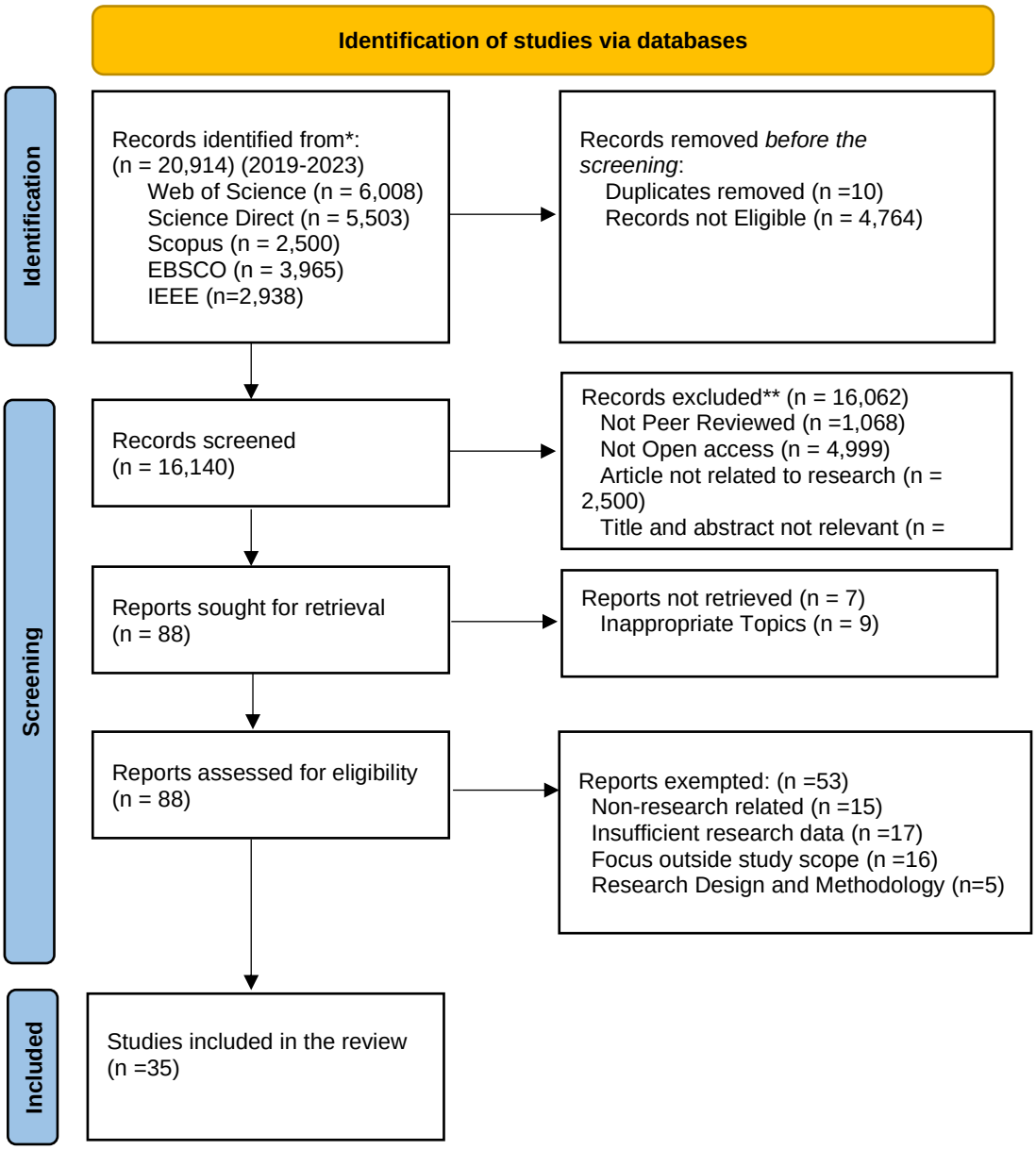
Direct, IEEE, EBSCO, SCOPUS, and Web of Science were utilized in this study, with sample sizes of 5,503, 2,938, 3,956, 2,500, and 6,008, respectively.

Following a rigorous screening process that involved scrutinizing the titles and abstracts of various papers, the researcher eliminated those that did not meet the stipulated criteria of being peer-reviewed journal articles, open-access articles, or research articles, articles not related to the research and irrelevant abstracts and titles. Consequently, the researcher was left with a total of eighty-eight (n= 88) publications. Perusing the articles facilitates the determination of the information that will be utilized for the results section of our report. A total of 53 papers (n=53) were eliminated from the study due to their lack of relevance or substance with respect to the research questions, insufficient search data, study focus outside the scope, and the research design and methodology.

The objective of the literature review was to ascertain articles that satisfied the predetermined criteria for inclusion. Only 35 articles were deemed appropriate for examination, as illustrated in Figure 1.

Figure 1:

PRISMA flow diagram of the study



3.5 Quality Assessment

In order to ensure that the papers that were analysed were of a sufficient standard, the researcher of this comprehensive literature review oversaw the intended review methods. This measure was taken to ensure that the scrutinized articles met the requisite standard of quality. The systematic review was conducted by the researcher who established the study's design based on rigorous management of time and resources. The selection criteria and methodology employed were determined with

consideration of the study's goals and objectives. During the conclusive phase of this comprehensive literature review, the amassed articles were systematized and automated instruments, such as Zotero, were employed to guarantee accuracy in eliminating duplications, performing comprehensive assessments of complete texts, classifying citations, and supervising the quality of the arranged articles.

3.6 Data Extraction

The process of data extraction was a critical component of this systematic literature review and warrants attention from the study's subject. Prior to commencing the extraction methodology, the researcher diligently scrutinized each downloaded article and subjected it to a meticulous process known as a full-text review, which was time-intensive. This measure was taken to ensure that the article met the standards required for quality assessment. To expedite the procedure, the methodology employed for data extraction in this investigation is delineated in the subsequent table, which is located underneath. A comprehensive Excel spreadsheet was generated to encompass all the data accessible through Google Drive, supplemented by additional data obtained for assessment purposes during the course of conducting this research. The data was meticulously scrutinized, rephrased, amalgamated, and condensed from each of the primary sources to ensure a successful outcome. The present study was conducted with the aim of addressing the following inquiry:

Table 3:
Data extraction

Data Item	Description
S/No	Serial Number
Reference	The cited study's reference has been placed here.
No Of Citation	Number of cited papers
Year Of Publication	Publication Year
Aim Of Study	The purpose of the study
Country	The country of publication
AI Tools in Finance	AI tools used in finance
AI tools usage	How AI tools are used in finance
AI Tools Impact	The impact of AI tools in the finance industry
AI Tools Adoption	How organizations are adopting AI tools in finance
AI Tools Effectiveness	How effective are AI tools in predicting financial market trends and identifying investment opportunities?
Drawbacks	The drawbacks or limitations of using AI tools in finance.
State Of Research	The current state of research on AI tools in finance
Implementation Factors	The critical success factors for implementing AI tools in finance
Future trends	The future trends and potential applications of AI tools in finance
Ethics/ Legal	The ethical and legal considerations surrounding the use of AI tools in finance
Recommendation	Recommendations made by the author(s) of the study that was included in the review.

CHAPTER IV

RESULTS AND FINDINGS

The findings section presents a thorough examination of the chosen studies, elucidating the ways in which artificial intelligence has been utilized within the finance sector.

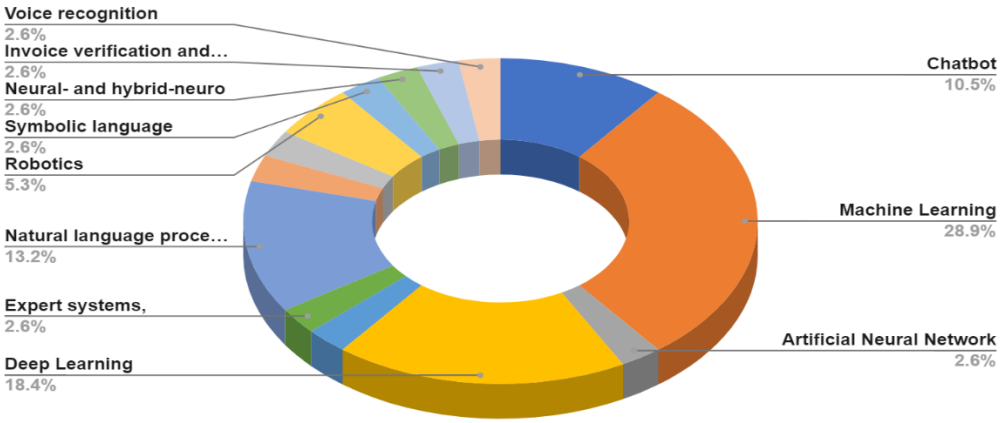
4.1 The Most Commonly Used AI Tools in Finance Institutions

A wide variety of applications of artificial intelligence have been put to use in the financial sector. For the purpose of making accurate predictions, a number of different machine learning methods, including partial least squares, least absolute shrinkage, principal component analysis, least absolute shrinkage and selection operator, least angle regression, support vector machines, ridge, decision trees, artificial neural networks, and deep learning, have been widely utilized (Bogojevic, 2021; Milana and Ashta, 2021; Van et al. 2019; Cao, 2023; Lee, 2020; Sharma et al. 2020; Hisham et al. 2022; Alzaidi, 2019; Vijai et al. 2019; Han et al. 2023; Černevičienė and Kabašinskas, 2022). The application of robotics in the field of finance has been documented by Van et al. (2019). Chatbots have been employed for diverse functions, such as account administration, financial reconciliation management, and credit financing, as evidenced by studies carried out by Choithani et al. (2022) and Wang et al. (2022). The utilization of artificial neural networks has been observed in the domain of credit scoring, as evidenced by the works of Rodgers et al. (2023) and Milojevic and Redzepagic (2021). Various AI tools are utilized in the field of finance, such as logistic regression, discriminant analysis, Bayes classifier, closest neighbour, classification trees, Lasso logistic regression, and deep learning (Milojevic and Redzepagic, 2021). Additionally, expert systems, natural language processing, audio processing, knowledge representation, and symbolic language are also employed (Mhlanga, 2020). Voice recognition (Chen et al. 2022) and NLP (Gupta et al. 2020; Choithani et al. 2022; Rizinski et al. 2022) are other examples of AI tools used in finance. The monitoring of the stock market, control of market capitalization, and management of market risk have all been seen as applications of AI technology as reported by Bogojevic (2021) and Mandala et al. (2022). The advent of AI-based technologies such as data mining, accurate portrait, machine learning, and neural

networks has brought about a new era in financial goods, service channels, service methods, risk management, credit financing, and investment decisions, as noted by Hou et al. (2021). Artificial intelligence has the potential to serve as a valuable tool for monitoring the Defense Forces Information System (DFIS) and addressing the challenge of information imbalance, as noted by Rawat et al. (2023). In addition, the implementation of AI tools such as neural networks and hybrid-neuro networks has been devised and employed for the purpose of predicting stock market trends (Chopra and Sharma, 2021).

Figure 2:

Artificial intelligence tools in finance



Based on the data presented in Figure 2, it is evident that the most widely utilized artificial intelligence tool in the finance industry is Machine Learning (ML), accounting for 28.9% of the total usage. Following ML, Deep Learning (DL) is the second most prevalent tool, with a usage percentage of 18.4%. Natural Language Processing (NLP) and Chatbots are also commonly employed, with usage percentages of 13.2% and 10.5%, respectively. Robotics, Artificial Neural Networks (ANN), Invoice Verification, Voice Recognition, Neural and Hybrid Neuro, and Expert Systems are comparatively less utilized, each accounting for 2.6% of the total usage.

4.2 Artificial Intelligence Tools Usage in Finance

In the field of finance, the use of artificial intelligence has recently become widespread. In research by Van et al. (2019), the financial sector has adopted a number of AI techniques, including the use of robotics. As evidenced by the research carried out by Choithani et al. (2022) and Wang et al. (2022), the employment of chatbots has been noticed in a variety of sectors, including account administration, financial reconciliation management, and credit financing. Studies carried out by Rodgers et al. (2023) and Milojevi and Redzepagic (2021) revealed that artificial neural networks have been put to use in the field of credit scoring. This was discovered as a result of the application of artificial neural networks. According to Milojevi and Redzepagic (2021), the field of finance makes use of a wide variety of AI technologies, some of which include logistic regression, discriminant analysis, Bayes classifier, nearest neighbour, classification trees, Lasso logistic regression, and deep learning. Additionally, the sector employed Lasso logistic regression. In addition, Mhlanga (2020) stressed the utilization of knowledge representation, expert systems, natural language processing, audio processing, and symbolic language in this context. Voice recognition (Chen et al. 2022) and natural language processing techniques have been found to be utilized as part of the application of AI tools in the financial industry (Gupta et al. 2020; Choithani et al. 2022; Rizinski et al. 2022). This has been noticed as part of the application of AI tools in the financial industry. Both Bogojevic (2021) and Mandala et al. (2022) have published articles that discuss the use of AI technology to the monitoring of the stock market, the control of market capitalization, and the management of market risk. A new era in financial offerings, service delivery channels, service approaches, risk mitigation, credit provision, and investment decision-making has begun as a direct result of the proliferation of AI-driven technologies, such as data mining, precise profiling, machine learning, and neural networks (Hou et al. 2021). According to Rawat et al. (2023), the application of AI could show to be a useful asset in the monitoring of the Defense Forces Information System and in the process of addressing the problem of information asymmetry. In addition, implementation of AI approaches, including neural networks and hybrid-neuro networks, have been developed with the goal of forecasting patterns in the stock market (Chopra & Sharma, 2021).

4.3 The Impact of Artificial Intelligence in Finance

Mercier's (2021) study suggested that artificial intelligence holds significant promise in aiding the financial industry, encompassing regulatory bodies, as well as enterprises of varying sizes. Bogojevic (2021) and Van et al. (2019) have reported that the utilization of AI has resulted in enhanced efficacy of financial risk management determinations. According to Milana and Ashta (2021), the utilization of AI and data analytics may prove advantageous for investors as it has the potential to enhance predictive capabilities and facilitate more accurate bankruptcy forecasts. The study carried out by Sadok et al. (2022) revealed that the utilization of AI-based scoring models results in sustained behavioural changes that enhance the accuracy of prediction outcomes. Lee (2020) stated that the utilization of AI has the potential to automate Know Your Customer (KYC) and Customer Due Diligence (CDD) procedures, resulting in reduced compliance expenses for financial intermediaries. According to Sharma et al. (2020), AI has the potential to provide more widely applicable insights for predicting stock market trends. Specifically, they suggested that artificial neural networks (ANNs) may be useful in analyzing complex, nonlinear problems. According to Choithani et al. (2022), AI is transforming the dynamics of human financial transactions by enabling machines to perform tasks that were previously executed by humans. According to Alzaidi (2019) and Vijai et al. (2019), artificial intelligence is presently employed for the purpose of detecting transactional discrepancies, providing customized recommendations, and devising remedies to eliminate human errors. The study conducted by Wang et al. (2022) revealed that the utilization of AI in chatbots resulted in effective consumer engagements. According to Han et al. (2023), the implementation of blockchain technology in AI decision-making procedures can attain the necessary level of transparency to instill full confidence in the judgments and outcomes derived from AI. Milojevic and Redzepagic's (2021) proposed that the implementation of AI technology has the potential to alleviate prevailing economic and financial challenges on a global scale. According to Mhlanga's (2020) research, AI has a noteworthy influence on the advancement of digital financial inclusion. This includes its ability to identify and manage risks, address the problem of information asymmetry, and detect and prevent fraud and cybersecurity threats. According to Chopra and Sharma (2021), proficient AI-driven models have the potential to assist stock traders, brokers, and investors in attaining returns that were previously deemed unattainable. According to the study

conducted by Rizinski et al. (2022), the implementation of machine learning algorithms in personal finance, consumer finance, and corporate finance can potentially yield significant cost savings for financial institutions. Specifically, the researchers found that by utilizing ML algorithms to prevent fraud, assess loan risks, improve loan underwriting, and prevent money laundering, financial institutions can potentially save an aggregate of $447 billion in operational expenses by the year 2023.

4.4 The Adoption of Artificial Intelligence Tools in the Finance Industry

The research conducted by Choithani et al. (2022) and Alzaidi (2019), stated that the banking sector has widely utilized AI for a variety of objectives. This was done in order to streamline operations and improve customer service. According to the findings of Milojevic and Redzepagic (2021), the utilization of artificial intelligence machine learning and deep learning has become increasingly prevalent in the field of banking risk management, with projections indicating further expansion in the coming years. The deployment of chatbots in the banking business, as stated by Wang et al. (2022), is intended to improve customer service, as stated in the previous sentence. According to the conclusions presented by Mhlanga (2020), the year 2011 represented the apex of the general usage of technologies related to artificial intelligence. As a direct response, well-known technology companies like Google, Microsoft, IBM, and Facebook have made large investments in artificial intelligence and machine learning with the intention of capitalizing on the commercial potential of these fields. According to Mandala et al. (2022), the use of technology that is powered by AI is absolutely necessary in order to effectively supervise and monitor the financial industry in the United Kingdom. In addition, Rizinski et al. (2022) state that financial organizations have implemented machine-learning technologies in their operations. In the study by Cao (2023), the use of AI to speed up the procedures of system identification and computation is highlighted. This application of AI technology is beneficial for accounting and finance since it improves both efficiency and transparency while also making it possible to automate formerly manual processes.

4.5 The Effectiveness of Artificial Intelligence Tools in Finance

Bogojevic (2021) posited that the integration of artificial intelligence in market risk management has the capacity to substantially enhance performance. The primary technique employed to augment market risk management is machine learning.

According to Choithani et al. (2022), AI has the capacity to not only automate the tasks of knowledge workers, but also imbue the automation process with intelligent capabilities that enable it to effectively navigate competitive environments and cyber threats. According to Van et al. (2019), artificial intelligence models demonstrate enhanced predictive precision and present the opportunity to broaden risk models across various product categories and geographic regions. In the research carried out by Milana and Ashta (2021), AI has the potential to track variations in a firm's brand perception by analyzing information from online sources and social media. This approach can facilitate a feedback mechanism that allows the machine to acquire knowledge and make more efficient decisions. Sharma et al. (2020), highlighted that AI has introduced a novel outlook to the field of finance by enabling the forecast of financial market values and providing more universally applicable insights for the purpose of stock market forecasting. Alzaidi (2019), in his study, stated that the implementation of AI in the banking industry has the potential to reduce the need for manual labor and back-office operations. According to Wang et al. (2022), the utilization of chatbots by organizations has been on the rise due to the progress made in artificial intelligence. This trend is expected to enhance business agility by facilitating job assistance to individuals. In the opinion of Han et al. (2023), the integration of blockchain and AI presents a novel technological approach to regulating and monitoring accounting information, which has the potential to mitigate information asymmetry and agency issues. According to the findings of Milojevic and Redzepagic (2021), the implementation of AI and machine learning in credit scoring and internal rating processes may have adverse effects on the credit procedure and the disbursement of receivables. Specifically, the study suggests that positive outcomes associated with such implementation may lead to unintended consequences. In accordance with Mhlanga (2020), the utilization of AI in digital financial inclusion can potentially address the issue of information asymmetry that exists between financial institutions and individuals, ultimately leading to a rise in financial inclusion. According to Chopra and Sharma (2021), the enhancement of AI models leading to increased market predictability may prompt a rise in savings among individuals, thereby enabling businesses to secure additional funds from equity markets to finance leverage, new product launches, industry expansion, and marketing expenditures. As stated by Mandala et al. (2022), AI has the potential to mitigate the tedium associated with recurring tasks that are commonly encountered in the financial sector. Rizinski et

al. (2022), posited that machine learning algorithms possess the potential to enhance the worth of financial services and their clients by leveraging the economies of scale that are inherent in automated procedures. In the research by Li's (2023) it was stated that internet finance institutions have the potential to enhance the quality, consistency, and security of their services through the implementation of AI technology. Additionally, Chen et al. (2022) suggested that the utilization of AI may facilitate improved customer navigation and real-time interaction with the system. Based on Mhlanga's (2021) research, credit lenders and institutions are enhancing their credit assessment capabilities by leveraging AI and machine learning techniques, as well as alternative data sources such as company registers, social media messages, satellite images, and public data. This is primarily aimed at assessing consumer behaviour and verifying their loan repayment capacity. Gupta et al. (2020) assert that the application of machine learning and deep learning techniques has enabled data scientists to contribute to the analysis and forecasting of the financial sector.

4.6 The Benefits of Using Artificial Intelligence Tools in Finance

Milana and Ashta (2021) carried out research that revealed the potential benefits of utilizing AI-powered technology in accounting, specifically in the areas of data collection and the assessment of externalities. Similarly, Choithani et al. (2022) have suggested that AI has the capacity to enhance the operational efficiency of banks and offer customized services. According to Alzaidi (2019), artificial intelligence has the potential to optimize procedures within the banking sector. Additionally, Vijai et al. (2019) asserted that AI is utilized for purposes such as identifying fraudulent activity, ensuring adherence to regulatory requirements, and evaluating creditworthiness. According to Han et al. (2023), the integration of blockchain technology and artificial intelligence has the potential to improve existing accounting methodologies. Mhlanga (2020) posited that FINTECH companies are utilizing AI to facilitate financial inclusion, while Mandala et al. (2022) underscored the significance of safeguarding data in the financial industry. According to Choithani et al. (2022), AI techniques have proven to be effective in mitigating investment risk, forecasting prices and trends, designing portfolios, and detecting fraudulent activities.

4.7 The Drawbacks of Implementing Artificial Intelligence Tools in Finance

Mercier's (2021) found out that machine learning is not well-suited for tasks that lack repetition and is not anticipated to achieve human-level performance. Nevertheless, it can serve as a valuable instrument for enhancing productivity. According to Bogojevic (2021), the utilization of AI in commercial banks is hindered by inadequate data management practices and the absence of structured data. Milana and Ashta (2021) have observed that the advent of AI technology presents a formidable obstacle to the preservation of current employment opportunities, especially in sectors that rely heavily on human resources. Sadok et al. (2022) have highlighted that the utilization of big data presents concerns regarding data protection and the potential for discriminatory practices against certain populations. According to Lee's (2020) argument, AI is perceived as a potential hazard to employment, particularly within the financial industry. Sharma et al. (2020) have drawn attention to the possibility of input attacks that can manipulate the output of an AI system. In the study carried out by Choithani et al. (2022), the unpredictability of outcomes for cryptocurrencies is a challenging issue due to the scarcity of information and the substantial price fluctuations. Alzaidi (2019) posited that the incorporation of AI in banking operations has the potential to cause significant disruptions, thereby necessitating the adoption of additional security measures to establish a safe and reliable automated system. According to Milojevic and Redzepagic's (2021) research, the utilization of innovative AI procedures raises several concerns, including model risk, data availability, transparency, ethics, and personnel competence. Mhlanga (2020) emphasized the necessity of high-quality data to enhance the predictive capacity of artificial intelligence, while Rizinski et al. (2022) highlighted that the absence of transparency in machine learning-driven solutions may result in challenges with government regulations and financial losses.

4.8 The Current State of Research on Artificial Intelligence Tools in Finance

Mercier (2021) asserted that the ML industry has witnessed substantial expansion during the past 8-10 years. According to the findings of Bogojevic (2021), the expansion of FINTECH has sped up the development of AI techniques, thereby revolutionizing the financial sector using blockchain technology, artificial intelligence, and big data analytics. In the study carried out by Cao (2023), there has been a significant amount of interest in the application of AI in the financial sector,

and FINTECH enables the creation of intelligent accounting, lending, payment, asset and wealth management, risk and regulation management, digital currencies and auditing. In the fields of financial economics and econometrics, Mandala et al. (2020) created a distinction between parametric models and nonparametric models. W. Lan (2021) emphasized the significance of strengthening financial management and control through the deployment of network information technology, Ma (2021) recommended that businesses select the processes and technologies that are the most appropriate for implementing intelligent financial apps. Ma's advice was in contrast to W. Lan's. According to Choithani et al. (2022), artificial intelligence research is a high priority in a variety of different businesses.

Figure 3:

Publication trend of AI tools in finance (n=35)

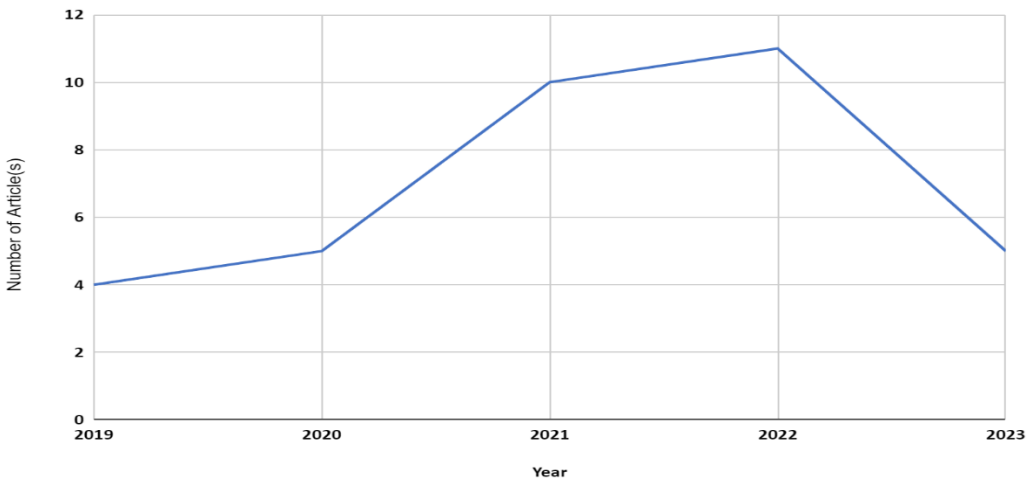
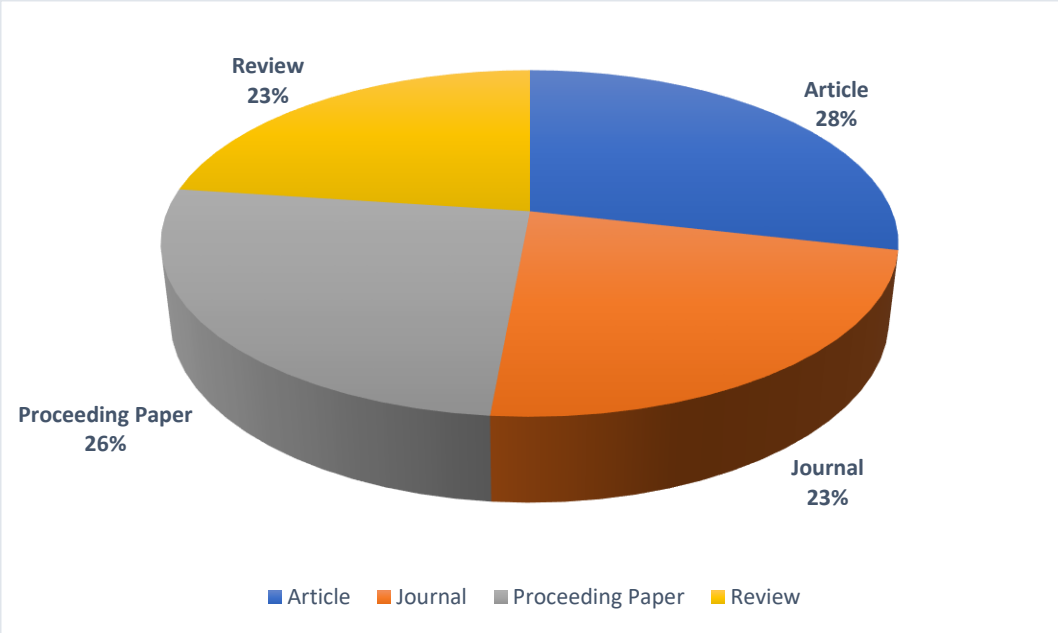


Figure 3 illustrates the trend of artificial intelligence research publications in the field of Finance, as presented by the author. The presented graph displays the quantity of articles that were published in each corresponding year. According to Figure 3, it can be observed that research on artificial intelligence in the field of finance has been significant over the past five years. The year 2022 exhibits the highest number of articles, with a sample size of 11, followed by the year 2021, which has the second-highest number of articles with a sample size of 10. The data reveals that a significant proportion of the articles retrieved were published in the last two years, amounting to more than two-thirds of the total. This suggests a notable expansion in the field of study and ongoing research efforts in this area of stud

Figure 4:

The type of document analyzed



The research documents utilized in this study comprise four distinct file formats, namely articles, proceeding papers, review papers, and journals. The specifics of each category are depicted in Figure 4. The database of articles under consideration exhibits two prominent categories, with scientific articles in journals and articles constituting 61% of the material, followed by review papers at 23%, and proceeding papers at 26%

Figure 5:

Publication trend in terms of geographical location

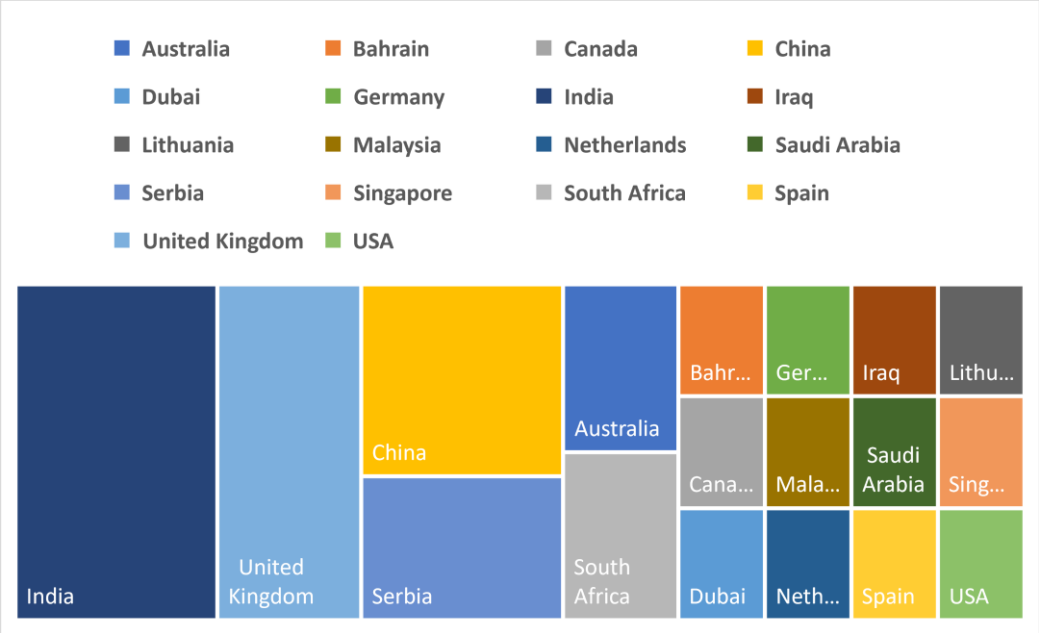
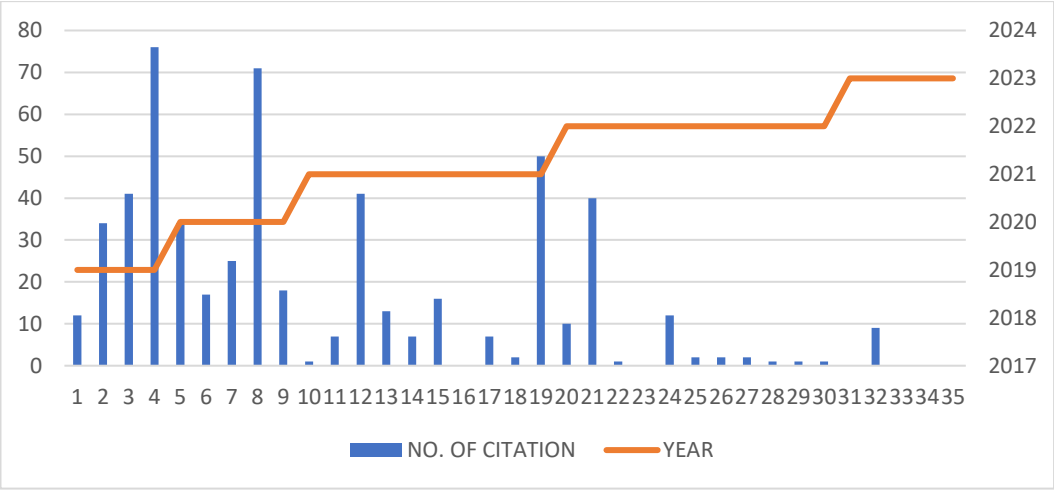


Figure 5 presents the publication trend for geographical location this depicts the distribution of papers reviewed by the country where the paper was published. Also, Figure 6 gives an overview of the progression of publications and citations for each study from the year 2019 to 2023.

Figure 6:

The progression of publications and citations over discrete annual intervals



4.9 The Critical Success Factors for Implementing AI Tools in Finance

Sadok et al. (2022) evaluated the acceptability of using AI analysis of extramarital dating sites to assess creditworthiness. The study focused on the receptiveness of clients to the idea of using such an approach. According to the observations made by Alzaidi (2019), the application of AI algorithms has the potential to improve risk and asset management in the banking business. According to Rodgers et al. (2023), the limited processing capability of banks can result in a limited ability to analyze information, which in turn raises the possibility of danger. The incorporation of AI into financial risk management frameworks is anticipated to occur as a consequence of the growth of the FINTECH industry, as stated in the proposition that Bogojevic (2021) presented. Sharma et al. (2020) emphasized how important it is for marketers to adopt flexible points of view if they want to be successful in the years to come.

4.10 The Future Trends and Potential Applications of AI Tools in Finance

According to Van et al. (2019), there is a forecast that risk robots will exhibit a high level of efficacy in risk management within the next decade. Similarly, Choithani et al. (2022) observed an upward trajectory of artificial intelligence in the banking and financial industries, with projections that AI will exert the most significant impact by 2020. Vijai et al. (2019), highlighted that banks are adopting advanced technologies such as blockchain and analytics to establish a preemptive security mechanism against cybercrimes. In the study carried out by Rizinski et al. (2022), it is anticipated that machine learning will become the fundamental infrastructure of the industry in the foreseeable future. Li (2023) highlighted the necessity of conducting legislative research and establishing a financial law and regulation system that is appropriate for the AI era in order to effectively tackle the risk challenges posed by AI. According to Jawid (2021), AI is poised to have a substantial impact on the banking and financial sector's forthcoming wave of revolutionary developments. Additionally, Abad-Segura et al. (2020) observed a growing interest in the field of financial technology among the academic and scientific community.

4.11 The Ethical and Legal Considerations Surrounding the Use of AI Tools in Finance

Sadok et al. (2022) highlighted ongoing concerns regarding potential biases and ethical issues in AI-based credit analysis, which may have an impact on people's lives, especially in granting credit, and may signal a shift from human to automated system liability. Lee (2020) emphasized the need for companies to identify ownership, testing procedures, and environmental characteristics of algorithms and AI technologies in financial services, while regulations should focus on market safety, investor protection, and market integrity. Ma (2021) suggested that analyzing the benefits of AI technology to investigate its possibilities for financial growth in businesses. W. Lan (2021) recommended that investigating the potential of AI in financial management to suggest appropriate strategies for building a framework for AI management and control. Bogojevic (2021) asserted that integrating AI methods with traditional statistical methods can provide precise real-time information for effective financial risk management. Rawat et al. (2023) suggested giving artificial narrow intelligence (ANI) serious thought as a potential focal point for future progress, while Cao (2023) recommended analyzing research literature to pinpoint areas for improvement in using cutting-edge technologies in businesses. Li (2023) highlighted that the growth of AI in the field of Internet finance can be promoted by strengthening technology research and development, financial supervision, and updating relevant laws, regulations, and technical specifications. Choithani et al. (2022) discussed the documented track record of contemporary events in the banking sector, such as bankruptcy or bankruptcy legislation.

CHAPTER V

DISCUSSION

The chapter of the study presents a concise overview of the results, highlights the most significant patterns and motifs, and delves into the ramifications of these findings for the financial industry.

5.1 Discussion

The findings of this systematic review of literature underscore the widespread incorporation of artificial intelligence technologies in the financial industry. The utilization of various machine learning techniques, such as partial least squares, principal component analysis, decision trees, support vector machines, artificial neural networks, and deep learning, has been extensively demonstrated in numerous predictive studies (Bogojevic, 2021; Van et al. 2019; Milana and Ashta, 2021; Cao, 2023; Lee, 2020; Sharma et al. 2020; Hisham et al. 2022; Alzaidi, 2019; Vijai et al. 2019; Han et al. 2023; Černevičienė and Kabašinskas, 2022). The efficacy of these methodologies has been demonstrated in various endeavors, including credit evaluation, mitigation of market risk, and forecasting of stock market trends. The utilization of robotics in the financial sector has been extensively documented in academic literature. Chatbots have been implemented for a range of purposes, such as account management and financial reconciliation management, as evidenced by studies conducted by Van et al. (2019), Choithani et al. (2022), and Wang et al. (2022). It is recommended that financial institutions integrate established AI techniques, such as machine learning algorithms, natural language processing tools, robotic process automation (RPA), and predictive analytics, into their operations and decision-making protocols to improve their efficiency and effectiveness.

The integration of AI technologies within the financial realm has experienced a notable increase, particularly within the banking industry. According to the research conducted by Milojevic and Redzepagic (2021), the field of banking risk management has experienced significant utilization of AI, machine learning, and deep learning techniques, with a projected increase in their implementation in the future. The incorporation of chatbots has been deployed with the objective of augmenting customer service, while the integration of AI technology has led to the mechanization of KYC/CDD protocols, consequently curtailing compliance costs (Lee, 2020; Wang

et al. 2022). The study conducted by Hou et al. (2021) has identified that the integration of AI technologies, such as data mining, machine learning, and neural networks, has led to significant changes in financial products, service channels, risk management, credit financing, and investment decision-making. Additionally, Bogojevic (2021) and Mandala et al. (2022) have posited that artificial intelligence has been utilized for the purpose of monitoring stock market activity, managing market capitalization, and mitigating market risk. The utilization of AI tools by financial institutions are suggested by the author as a means to improve customer service, risk management, fraud detection, automation of routine tasks, and evidence-based investment and trading decisions.

The ramifications of AI within the financial sector are substantial and encompass a wide range of implications. The utilization of AI has resulted in enhanced effectiveness in decision-making pertaining to financial risk management, as evidenced by the studies conducted by Bogojevic (2021) and Van et al. (2019). According to Milana and Ashta (2021), the integration of artificial intelligence and data analytics has the potential to improve predictive capabilities and enable more precise forecasts of bankruptcy. According to Sadok et al. (2022), the utilization of scoring models that rely on artificial intelligence has led to consistent modifications in behavior, ultimately improving the precision of predictive results. The application of AI tools, particularly artificial neural networks, has the potential to offer significant insights in the domain of forecasting stock market patterns (Sharma et al. 2020). The utilization of AI tools is suggested for financial institutions to improve their risk management and fraud detection capabilities, as well as to predict market trends and recognize investment opportunities. This is done with the objective of augmenting operational efficiency and profitability.

The incorporation of AI technology into the banking industry has made it easier to detect inconsistencies in transactions, make specific recommendations, and put in place corrective measures to reduce the negative effects of human error (Alzaidi, 2018; Vijai et al. 2019). These improvements have been made possible by the ability of the technology to learn from its own data. According to the findings of a study that was carried out by Wang et al. (2022), chatbots that are driven by artificial intelligence have proven to be effective in increasing the level of interaction that customers have with a brand. According to the finding of the study by Han et al. (2023), the use of blockchain technology in the decision-making processes of AI has the potential to

increase the level of trust that individuals have in the outcomes produced by AI. According to Milojevic et al. (2021), the incorporation of AI technology has a significant amount of promise in terms of addressing current concerns pertaining to the global economy and the world's financial system. According to Mhlanga (2020), the implementation of AI technology plays an essential part in the development of digital financial inclusion because of its capacity to reduce risks, address information asymmetry, detect and prevent fraudulent activities and cybersecurity concerns, and address information imbalance. the findings of (Chopra and Sharma 2021), the deployment of advanced AI models has the potential to permit improved earnings for those involved in stock trading, brokerage, and investment. This idea is presented in the context of the argument. The practice of applying computational procedures within the context of machine learning. When evaluating the application of artificial intelligence technologies, the author suggests that financial institutions should take into account geographical factors such as technological infrastructure, legal framework, cultural attitudes, and industry maturity.

The use of machine learning techniques to include AI into market risk management has been identified as a promising strategy for improving efficiency (Bogojevic, 2021). The key method used to improve market risk management is machine learning. To effectively navigate competitive settings and cyber dangers, AI not only automates the jobs of knowledge workers, but also infuses the automation process with intelligence, as emphasized by Choithani et al. (2022). It has been proven that using AI models can improve forecast accuracy and broaden risk models across a variety of product categories and geographical regions (Van et al. 2019). Artificial intelligence has the ability to monitor shifts in how consumers view a company's brand, providing a feedback system that improves decision-making (Milana and Ashta, 2021). More generally applicable insights for stock market forecasting have been made possible by the advent of AI in the financial sector (Sharma et al. 2020). The use of AI has the ability to lessen the need for human labor and speed up back-office processes in the banking sector (Alzaidi, 2019). Chatbots powered by artificial intelligence are increasingly being used to improve efficiency and productivity in the workplace (Wang et al. 2022). Information asymmetry and agency problems may be alleviated by the use of blockchain and AI together to regulate and monitor accounting data (Han et al.2023). Although there are potential benefits to using AI and machine learning for credit scoring and internal rating systems, there are also potential

drawbacks to keep in mind (Milojevi and Redzepagic, 2021). Mhlanga (2020) argues that reducing the knowledge gap between consumers and banks can be achieved through the use of AI in digital financial inclusion. Artificial intelligence models that improve market forecasting can help companies find new avenues for cost savings and revenue growth (Chopra and Sharma, 2021). AI has the potential to improve the value of financial services by reducing the monotony of routine operations (Mandala et al. 2022) and capitalizing on the economies of scale inherent in automated processes. The use of AI can improve the reliability, uniformity, and safety of online banking (Li, 2023) in a number of ways. Additionally, it can aid in consumer navigation and allow for instant communication (Chen et al. 2022). A more thorough assessment of consumer behaviour and loan repayment potential is possible with the help of AI, machine learning techniques, and alternative data sources integrated into credit assessment processes (Mhlanga, 2021; Gupta et al. 2020). All these results show how the financial sector could profit greatly from incorporating AI into previously unexplored areas. However, the prudent and efficient application of AI technologies requires careful consideration of risks and unforeseen outcomes. In order to foresee market movements and locate promising investment opportunities, the author suggests that banks and other financial organizations adopt the use of AI software. In spite of the usefulness of these automated systems, it is crucial that organizations realize their limitations and supplement automated predictions with human expertise and judgment.

The implementation of artificial intelligence-powered technology has the potential to be advantageous in the domains of data collection and the assessment of "externalities" within the field of accounting, as suggested by Milana and Ashta (2021). This exemplifies the potential utility of artificial intelligence in augmenting financial processes. According to Choithani et al. (2022), AI possesses the capability to enhance banking procedures by enhancing operational efficiency and providing personalized services. Additionally, Alzaidi (2019) underscores the capacity of AI to optimize operational processes within the banking sector. The assertions made by Vijai et al. (2019) provide additional evidence that AI is utilized for the purpose of identifying fraudulent activities, ensuring adherence to regulatory requirements, and evaluating creditworthiness. The aforementioned findings underscore the diverse applications of artificial intelligence within the financial industry. The utilization of blockchain technology and AI may serve to improve contemporary accounting

practices, as posited by Han et al. (2023). This merger has the potential to enhance the transparency and efficacy of the financial reporting process. According to Mhlanga (2020), financial technology companies have been leveraging artificial intelligence to expand the reach of financial services to their clientele, as part of their overarching objective to advance financial inclusivity. This suggests the potential utilization of artificial intelligence to expand the reach of financial services. The authors Mandala et al. (2022) highlights the imperative of safeguarding data in the context of artificial intelligence implementation, emphasizing the criticality of data protection in the financial sector. According to Choithani et al. (2022), AI techniques have been found to be beneficial in various domains such as investment risk assessment, price and trend prediction, portfolio construction, and detection of fraudulent activities. The findings of this study illustrate the potential of artificial intelligence in enhancing financial decision-making and mitigating risks across diverse settings. The scholarly discourse tends to concur that the integration of AI in financial domains, including accounting, banking, financial inclusion, and risk management, may yield favorable results. It is imperative to acknowledge the issues pertaining to data security and privacy, alongside the ethical and regulatory implications of integrating AI technology.

According to the findings that Mercier (2021) came up with, the application of machine learning might not be the most effective strategy for undertaking jobs that do not involve repetition. Nevertheless, it has the potential to increase overall productivity. The implementation of AI presents a variety of difficulties that require careful consideration. Because A technologies in finance have the potential to improve productivity, assist better decision-making, enable more effective risk management, and provide more tailored consumer experiences, organizations that deal in finance are being urged to embrace AI tools in finance. Managing the unpredictability of cryptocurrency outcomes, addressing disruptions in banking operations, ensuring data protection, preventing discriminatory practices, mitigating potential employment hazards, guarding against input attacks, ensuring data protection, preventing discriminatory practices, mitigating potential employment hazards, ensuring data protection, ensuring data protection, preventing discriminatory practices, mitigating potential employment hazards, ensuring data protection, ensuring data protection, preventing discriminatory practices, mitigating potential employment hazards, ensuring data protection, The aforementioned difficulties have been the focus of investigation in a number of scholarly works, including those that were written by

Bogojevic (2021), Milana and Ashta (2021), Sadok et al. (2022), Lee (2020), Sharma et al. (2020), Choithani et al. (2022), Alzaidi (2019), and Milojevic (2021). Recent years have seen a period of rapid expansion for the topic of study known as machine learning. This development has been propelled forward by the financial technology sector, which has been a driving force behind the advancement of techniques including artificial intelligence.

Mercier (2021) argues that machine learning may be restricted to repetitive tasks and unlikely to match human performance. It can boost productivity in different settings. This emphasizes the importance of acknowledging machine learning's limits in different circumstances. Commercial banks face data management and structured data issues while implementing AI, according to Bogojevic (2021). Resolving data discrepancies is crucial to using artificial intelligence in banking. Milana and Ashta (2021) noted that AI may threaten current employment possibilities, particularly in areas that rely largely on human labor. In reaction to artificial intelligence's potential effects, strategic planning for skill development and job transfers is crucial. Sadok et al. 2022) raised issues about big data privacy and discrimination. To ensure fair data use in AI applications, ethical and privacy problems must be addressed. Lee (2020) examined how AI may affect banking jobs. Managing the shift to AI-powered technology requires workforce adaptation. Input attacks can manipulate AI systems, according to Sharma et al. (2020). To protect AI systems from malicious activity, strict security protocols are needed. Choithani et al. (2022) said the bitcoin market's volatility and lack of transparency make planning difficult. This emphasizes the necessity of understanding bitcoin and risk management. Alzaidi (2019) suggests that integrating AI into banking operations could disrupt operations, requiring additional safety measures to maintain the automated system's reliability. This emphasizes the need to manage dangers and susceptibilities associated with widespread AI use in politically or personally sensitive fields. Milojevic and Redzepagic (2021) stressed model risk, data accessibility, transparency, ethical considerations, and staff proficiency while using cutting-edge AI methods. These concerns must be addressed to implement AI safely and effectively. Mhlanga (2020) emphasizes the importance of high-quality data in AI prediction. AI-powered solutions require high-quality, easy-to-access data. Rizinski et al. (2022) stated that machine learning-based solutions without transparency can cause compliance issues and financial losses. This emphasizes the need for AI system openness and accountability. The literature

discusses AI and machine learning's limitations, ethics, disruptions, and risks. To safely and efficiently use AI across domains, these challenges must be solved before its widespread application. Financial businesses are being encouraged to use AI tools to improve efficiency, decision-making, risk management, and customer service.

In the study caried out by Bogojevic (2021), it is noted that innovations such as artificial intelligence, blockchain, and big data analytics have radically altered the banking industry, with the help of FINTECH. The preceding statement is an illustration of how artificial intelligence has the potential to transform and enhance various aspects of financial services, such as transaction processing, risk management, and data analysis. According to Mercier (2021), there has been a substantial expansion in machine learning in the previous ten years. This demonstrates how different industries are investing in various machine learning technology. According to Cao (2023), FINTECH has made it possible to construct intelligent digital currencies, lending platforms, payment systems, asset and wealth management tools, risk management solutions, and accounting and auditing software. A vast number of different financial applications could stand to profit from artificial intelligence. The study by Sharma et al. (2020), distinguishes between parametric and nonparametric models of financial economics and econometrics. Understanding modelling approaches is essential to both performing financial analysis and making decisions. According to Ma (2021), businesses should exercise caution while selecting intelligent financial application techniques and technologies. Artificial intelligence solutions, in order to be as effective as possible, need to be linked with the objectives and requirements of a business. The use of network information technology is something that W. Lan (2021) suggests for better financial management and control. Financial operations, decision-making, and oversight can all be improved through the use of network technology and intelligent systems, which hints that AI might be helpful. Research in artificial intelligence is considered valuable across all sectors, according to Choithani et al. (2022). This declaration places an emphasis on the requirement for ongoing research and innovation in order to encourage the use of AI across all industries. AI has been able to influence the financial services sector thanks to the development of ML and FINTECH. This declaration emphasizes the many different applications of artificial intelligence in the financial sector, the significance of selecting suitable models and technology, and the potential for enhancing financial administration and regulation. It is necessary to invest in research and funding for

artificial intelligence in order to make it work effectively in banking and other industries. The limitations of artificial intelligence capabilities should be brought to the attention of financial institutions. These limitations include a lack of transparency, the possibility of overreliance on AI, ethical problems, and data privacy and security risks. These establishments ought to reduce these obstacles as much as possible.

The present research investigates the viability of non-traditional data sources and artificial intelligence methodologies in the evaluation of creditworthiness, underscoring the significance of ethical and privacy considerations in the implementation of these methods. According to Alzaidi's (2019) findings, the utilization of AI algorithms possesses the capability to augment risk and asset management practices in the banking sector. The aforementioned proposition posits that AI has the potential to enhance decision-making procedures concerning risk evaluation and portfolio administration, thereby augmenting the comprehensive efficacy of financial institutions. The research by Rodgers et al. (2023), states that the limited processing capacity of banks may impede their ability to analyze information, which could potentially heighten the risk. The aforementioned underscores the necessity for effective and expandable AI solutions that possess the capability to manage substantial amounts of data and derive significant insights promptly, thereby facilitating risk management endeavors. The study conducted by Sadok et al. (2022) examines the feasibility of utilizing AI analysis of extramarital dating sites as a means of evaluating creditworthiness. The research specifically focused on assessing the level of acceptance among clients towards this approach. The proposal put forth by Bogojevic (2021) posits that the proliferation of FINTECH is anticipated to result in the assimilation of AI within financial risk management frameworks. This suggests a growing acknowledgement of the potential advantages of artificial intelligence in the management and reduction of financial risks, including market instability and credit failure. The authors Sharma et al. (2020) emphasized the importance of marketers adopting flexible perspectives in order to achieve success in the future. Although not directly pertaining to the integration of AI in finance, this highlights the significance of flexibility and receptiveness to modification in relation to the adoption of AI and its influence on marketing tactics. The proposition is that marketers ought to adopt AI technologies and modify their strategies to capitalize on the prospects and obstacles posed by AI in the financial sector. The literature examined in this section delves into diverse facets of AI in the financial domain, encompassing atypical data sources, risk

mitigation, data processing capabilities, and the assimilation of AI into financial frameworks. The results underscore the prospective application of AI within the domains of credit evaluation, hazard mitigation, and promotional tactics. This underscores the importance of ethical deliberations, scalability, and flexibility in the integration and execution of AI systems. It is suggested that financial institutions prioritize ethical and regulatory compliance alongside key factors for the effective utilization of AI technologies, such as data quality and accessibility, cooperation and expertise, scalability and integration, and prioritization.

In order to determine whether or not clients would be open to using artificial intelligence to analyze extramarital dating sites as a means of assessing creditworthiness, as stated by Sadok et al. (2022). This study looks into whether or not extramarital affair-focused websites could be used as a viable alternative data source for credit scoring. The use of private information for monetary evaluations is also highlighted, along with the associated ethical and privacy concerns. According to Alzaidi (2019), the use of AI algorithms has the potential to improve banking institutions' risk and asset management. AI has the ability to improve banks' data analytic capabilities, allowing them to make more educated choices about risk management and the optimization of their asset portfolios. Based on the foregoing, it can be deduced that the banking industry stands to benefit from the incorporation of AI technology into its risk management practices. Banks' low processing power can limit their ability to evaluate information, which may increase the possibility of risk, as identified by Rodgers et al. (2023). All of this highlights the need for AI systems that are both scalable and efficient, able to analyse large datasets and derive meaningful insights quickly. Financial institutions can overcome the limitations of manual analysis and improve their expertise in risk evaluation by employing AI technologies. Bogojevic (2021) suggests that the widespread adoption of FINTECH would eventually lead to the integration of AI into financial risk management systems. More and more FINTECH developments, such as online lending platforms and robo-advisors, are utilizing AI in risk management procedures. Artificial intelligence has the potential to improve operational efficiency, accuracy, and decision-making in the field of financial risk management. The writers Sharma et al. (2020) stresses the significance of marketers developing adaptable viewpoints for future success. Although this has little to do with the use of AI to finance, it does highlight the need for businesses to adapt their strategies and implement AI technologies in order to

remain competitive. Marketers stand to gain a lot from AI, which may help them with things like analytics, automation, and personalization. Marketers can use these benefits to better understand consumer behaviour and adapt their approaches to reaching their target audiences. This article delves into the research of non-traditional data sources for assessing creditworthiness, highlights the benefits of using AI algorithms in managing risk and assets, expresses reservations about the limited processing capabilities of financial institutions, predicts the incorporation of AI into financial risk management frameworks driven by the growth of FINTECH, and stresses the significance of the latter. Together, the aforementioned findings improve our understanding of how AI affects financial sectors like banking, finance, and marketing through factors like credit scoring and risk management. Financial institutions should plan ahead for the development of AI tools within the field of finance and the future applications of these tools in order to maintain a competitive advantage and foster an atmosphere of innovation.

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5.2 Limitations

The systematic review was constrained by several factors, including publication bias, language bias, temporal limitations, the omission of grey literature, and the scope of the research. These limitations have resulted in probable partiality in the ultimate deductions. The conclusions drawn from the review are contingent upon the calibre and diversity of the studies incorporated, the extent to which the findings can be applied to other populations, the absence of studies conducted over a prolonged period of time, the ethical and societal ramifications, the potential for bias in interpretation, and the subjective evaluations made during the selection, data extraction, and synthesis procedures. Various factors could potentially impact the ultimate findings and deductions of the review.

A limitation that has been observed in the studies under review is the restricted scope of attention given to specific AI tools and techniques, without considering their

integration or amalgamation. The current body of literature predominantly centres on assessing the effectiveness and benefits of individual AI tools in the financial sector, with limited attention given to exploring the potential synergies and complementary outcomes that may arise from the integration of multiple instruments. Prospective research endeavours could investigate the potential outcomes and implications of integrating various artificial intelligence techniques and approaches, such as combining machine learning with natural language processing or expert systems, in order to develop more comprehensive and robust AI solutions for the financial industry.

An area of significant importance that warrants further exploration concerns the ethical and regulatory considerations associated with the integration and implementation of AI technologies in the financial industry. The rising adoption of AI within the financial industry has led to a demand for the examination of the ethical implications linked to its implementation in decision-making procedures, risk assessment, and customer interactions. Furthermore, it is crucial to understand the regulatory impediments and frameworks that are essential for supervising artificial intelligence within the financial industry. The study could give precedence to the creation of ethical protocols, frameworks, and regulatory measures that foster conscientious and open utilization of artificial intelligence in the financial industry. This methodology would additionally tackle apprehensions pertaining to partiality, confidentiality, and answerability.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

This chapter of the study summarizes the importance of artificial intelligence in the finance industry and its potential to improve financial operations.

6.1 Conclusion

The present study is a systematic literature review that has investigated the effects of AI tools within the domain of finance. Several key findings have emerged from a comprehensive analysis of relevant studies. The implementation of AI solutions within finance sector has resulted in significant advancements across various domains. The decision-making procedures have been improved, leading to more precise and evidence-based selections. The advancement of risk assessment techniques has led to improved capabilities in recognizing and minimizing potential hazards. The enhancement of fraud detection systems has resulted in heightened security and safeguarding of financial transactions. In addition, the realm of customer service has undergone a transformation, wherein AI-driven chatbots and virtual assistants have been implemented to offer effective and tailored support. The analysis conducted also unveiled that AI possesses the capability to significantly enhance financial analysis and forecasting. In addition, utilizing sophisticated algorithms and machine learning methodologies, AI tools have the capability to analyze extensive financial data, detect patterns, and produce prognostic models, thereby facilitating precise forecasting and well-informed decision-making. These results underscore the capacity of artificial intelligence to bring about significant changes in decision-making, risk evaluation, fraud identification, and customer support, among various other domains. Sustained investigation on the ethical ramifications the AI tools technologies potential use is required to fully realize the capabilities of artificial intelligence and propel additional progressions in the financial sector. The intent of this study is to provide stakeholders in the finance industry with guidance regarding the incorporation of AI tools into their operations because the utilization of AI can potentially augment the operational efficiency of financial institutions, optimize financial analysis, and ultimately enhance the quality of services offered to their clients.

6.2 Recommendations

The recommendations that follow can be made in light of the findings of the study, which are as follows:

6.2.1 Recommendation to Future Researchers

- It is imperative for researchers to explore ethical implications, carry out longitudinal investigations, promote interdisciplinary methodologies, and assess current regulatory and legal structures to guarantee transparency, and accountability, and safeguard the interests of consumers.
- Evaluate how adaptable AI models in finance are to unforeseen circumstances and shifting market conditions by determining how robust and explainable the models are. Develop techniques for evaluating and explaining judgments, maintaining transparency and compliance with regulatory requirements, and developing confidence among users, regulators, and other stakeholders.
- Since AI tools improve both decision-making and operational efficiency, human-AI collaboration is crucial in the financial sector. To better shape AI tool design, lessen cognitive burden, and foster synergies between human expertise and AI capabilities, understanding the dynamics of AI integration is essential. Researchers of the future can help with the ethical creation and rollout of AI financial solutions.

6.2.2 Recommendation to Finance Sector Stakeholders

- It is recommended that financial institutions allocate resources towards the development of AI infrastructure, engage in partnerships with academic and research institutions, adopt ethical AI practices, implement monitoring and evaluation frameworks, and organize educational initiatives aimed at fostering transparency, communication, and trust in financial processes that rely on AI.
- Assure the highest standards of ethics, confidentiality policies, and data governance structures by encouraging collaboration between the financial sector and industry associations to create clear norms and regulations for AI tools.
- Adopt AI models that are interpretable and transparent, and invest in technologies such as explainable AI (XAI) to make AI-driven decisions easier to implement because clarity and user trust should take precedence in the development of AI

technologies in order to successfully build trust with consumers, regulators, and other stakeholders.

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APPENDICES

Appendix A: Ethical Committee Approval Letter

NEAR EAST UNIVERSITY

SCIENTIFIC RESEARCH ETHICS COMMITTEE

19.06.2023

Dear Adaeze Evelyn Ubah

Your project **"The Impact Of Artificial Intelligence Tools In Finance: Systematic Literature Review"** has been evaluated. Since only secondary data will be used the project does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Prof. Dr. Aşkın KİRAZ

The Coordinator of the Scientific Research Ethics Committee

Appendix B: Similarity Report

MASTER THESIS

by Adaeze Ubah

Submission date: 21-Jun-2023 12:11AM (UTC+0300)
Submission ID: 2119894652
File name: FINAL_THESIS_CONTROL.docx (274.87K)
Word count: 15624
Character count: 95036

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF COMPUTER INFORMATION SYSTEMS

THE IMPACT OF ARTIFICIAL INTELLIGENCE TOOL FINANCE: SYSTEMATIC LITERATURE REVIEW

M.Sc. THESIS

Adaeze UBAH

Supervisor

Prof. Dr. Nadire CAVUS

Nicosia

June, 2023

MASTER THESIS

ORIGINALITY REPORT

7%	5%	4%	2%
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2	resmilitaris.net Internet Source	<1%
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4	www.medrxiv.org Internet Source	<1%
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30	paper.ijcsns.org Internet Source	<1%

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Appendix C: Detailed Results Table

S/N	REFERENCE	NO. OF CITATION	YEAR	RESEARCH TYPE	AIM	COUNTRY	AI TOOLS IN FINANCE	AI TOOLS USAGE	AI TOOLS IMPACT	AI TOOLS ADOPTION	AI TOOLS EFFECTIVENESS	BENEFITS	DRAWBACKS	STATE OF RESEARCH	IMPLEMENTATION FACTORS	FUTURE TRENDS	EHTICS /LEGAL	RECOMMENDATION	FINDINGS
1	Mercier, F. (2021).	1	2021	Emperical Research	In order to better understand the specific advantages and disadvantages of each method, we shall examine the many definitions of ML in this essay.	Canada	Machine Learning	In economics and finance, linear regression models are frequently employed to provide highly interpretable data, such as the beta factor for managing stock risk.	AI has the ability to considerably help the financial sector, including regulators and both large and small businesses.				ML is unsuitable for non-repetitive tasks like establishing legislation, choosing a market stance, or solving consumer complaints. AI will not be human-like soon. It may be a great productivity tool for workers. Heuristics cannot effectively judge AI's pros and cons because there are several AI approaches.	Over the previous eight to ten years, the ML sector has experienced enormous growth.				It's crucial to acknowledge that some hopes raised by the hoopla around AI are unreasonable.	Our industry may profit from this new technological tsunami and better serve our consumers by collaborativel y enhancing financial organizations .
2	Bogojevic Arsic, 2021	7	2021	Emperical Research	The purpose of this article is to outline the current status of AI methods' use in financial risk management and to identify potential future directions for use and advancement.	Serbia	Machine learning, uses techniques like partial least squares, principal component analysis, least absolute shrinkage and selection operator, least angle regression, ridge, decision trees, support vector machines, artificial neural networks, and deep learning.	Artificial neural networks aid in credit risk evaluation, asset price forecasting, and operational risk mitigation by prioritizing data preparation, analysis, and performance.	AI improves decision-making for financial risk management. AI improves decision-making for financial risk management. Finally, deep learning outperforms conventional methods in credit risk and default prediction for conventional and alternative lending platforms and credit.		Machine learning assesses financial risk, enhancing market risk management. It can recognize credit events and quantify default costs, making credit risk assessment difficult yet beneficial.		Data management, extensive documentation, and limited benchmark and credit curve data make AI applications difficult for commercial banks. Successful operations require passive strategies, scenario development, and credit risk analytics automation. AI algorithms can construct databases, portfolios, and anomalies.	Over the past five years, Fintech has accelerated artificial intelligence development, improving the banking sector. Blockchain, artificial intelligence, and big data analytics have changed the banking sector, making financial services more accessible.				Data preparation, risk modeling, stress testing, and validation by AI enhance market and credit risk management. It improves data quality, text mining, and fraud detection. AI will help financial risk management adapt to new settings and business models.	This study examines artificial intelligence in market, credit, and operational risk management. Due to financial sector changes, the study identified the main AI methods for financial risk management.
3	Van et. al 2019	12	2019	Emperical Research	Three studies that create artificially intelligent probability of default models are described in the paper. AI models outperformed conventional models in every trial.	Netherlands	Robotics		AI lets lenders track risk evolution using behaviorally ordered and unstructured data. AI's predictive power opens the door to robotized solutions and IFRS-9/CECL risk projections. Data quality is essential. Lenders should collect behavioral data from multiple sources to improve risk prediction.		AI-models improve forecast accuracy and allow risk model expansion across product categories and locales. A large-scale investigation is needed, but it will improve international risk management by cutting costs and increasing efficiency.					It is predicted that in the next decade, risk robots would greatly improve the efficiency of risk management .		Further research into alternate data for risk scoring may increase prediction model capacity and financial risk control.	Therefore, AI may be included into scalable automated credit risk solutions to improve risk rating.

4	Milana and Ashta, 2021	41	2021	Emperical Research	The objective of this study is to identify practical applications of artificial intelligence (AI) that have a significant impact on the daily lives of ordinary consumers. These applications include face and voice recognition systems, machines that interact with humans using natural language processing (NLP), data collection and organization of market information, financial advisory services, fraud and risk assessment, credit management, price setting, and fintech-related applications. Additionally, this study explores the integration of AI with other emerging technologies such as cryptocurrencies and blockchain.	United Kingdom	Deep learning, machine learning	The crucial application areas that we have employed include forecasting, decision-making, bankruptcy prediction, credit scoring, accounting, and fraud challenges.	Better predictions from AI and data analytics might benefit investors. Credit scoring improves growth and efficiency in microfinance businesses, but it costs money to create the instrument and may exclude suitable borrowers. Financial investors want ML-based bankruptcy predictions for more accuracy.	AI can recognize brand image alterations and market share losses. It provides a feedback loop for faster decision-making, but general choices require human judgment.	Accountants utilize technology to value "externalities." These technologies categorize data sets using "cognitive" search engines and AI.	Schumpeterian creative innovation creates new jobs, but AI threatens human capital-intensive industries like education, arts, tourism, and financial services.			The publications under review have aroused aspirations for higher productivity, fresh data, information, advice and management services, risk reduction, and unresolved issues related to negative consequences on long-term sustainability and rising economic welfare.	Academic and popular literature are developing in tandem with the fluctuating advancement of AI and computer power in their use in banking and financial markets.
5	Sadok et al. 2022	10	2022	Emperical Research	This article explores the implications of banks and other lending institutions using artificial intelligence (AI) in the credit analysis process.	Dubai		The improvement of financial inclusion and loan access for historically underprivileged borrowers is made possible by the application of AI in credit analysis.AI application to creditworthiness evaluations.	AI-based scoring models can drive long-term behavioral changes to perform well on selected variables to improve prediction outcomes.	AI's ability to process more data allows FinTechs to reach previously undiscovered terrain.		AI-using banks and regulators worry about big data's accuracy in risk measurement and customer data protection. The GDPR opposes prudential banking ratios, yet AI algorithms may penalize or prevent credit for particular populations. Even if thoroughly verified, AI can construct biased score models based on discriminatory criteria including gender, ethnicity, sexual orientation, and politics. Human model builders would reject such scoring models, posing moral, legal, and reputational hazards.	If a bank utilized AI to grade adulterous dating sites to get better loan conditions, would customers accept it?	AI-based credit analysis presents ethics, biases, and financial regulation concerns. This change may shift bank liability from human errors to AI-powered automated systems, influencing legal rules and decision-making.	These restrictions need the creation of a new wave of financial regulation that includes the certification of bank data and AI algorithms.	Even without banks realizing it, these new sources of data can introduce a variety of biases that raise ethical, legal, and regulatory concerns.

6	Longbing Cao, 2023	40	2022	Emperical Research	This overview provides a thorough and detailed roadmap of the immense difficulties, solutions, and potential of AI research in finance over the years.	Australia	Machine learning	Modern techniques include representation learning, machine learning, optimization, data analytics, and mining, while classical techniques like logic, planning, and NLP are still widely used.		The fields of finance, digital currencies, asset management, and risk management all benefit from AI study.		This evaluation relies on other studies that focus on certain AI approaches or money difficulties. It also enables our methodical assessment of the many financial applications that have benefited from conventional and modern AI research.	The study also sparks conversation on the unresolved problems, potential future prospects, and synergy of new-generation AIDS in banking.
7	Lee, 2020	34	2020		In order to increase financial inclusion (access to finance), this paper analyzes the architecture of the legal and regulatory framework for applying artificial intelligence (AI) in the financial services markets.	United Kingdom	Machine Learning	P2P networks connect companies and investors cheaply, delivering higher interest rates and liquidity than bank savings. Price rigging, disinformation, insider trading, and money laundering can be detected using AI. Regulatory technology can detect fraud, money laundering, and terrorism funding for financial institutions, regulators, and politicians.	AI can automate KYC/CDD procedures to lower financial intermediaries' compliance expenses.	Artificial intelligence (AI) threatens jobs since it eliminates physical work.1 Financial services are also targeted. AI may increase market meltdowns.		Algorithmic trading requires algorithm ownership, testing, and environmental characteristics to ensure market safety, investor protection, and integrity control.	More explicit restrictions are needed to safeguard robo-adviser users ex ante and ex post, as well as to protect privacy and data rights to improve KYC processes.	The study on future AI governance in financial services, public policy innovation, and urban development can all benefit from this paper's conclusions.

8	Sharma et al., 2020	17	2020	Narrative Review	This research fills that gap by combining the existing literature in the form of a systematic review addressing the application of AI in stock market forecasts and interpreting the results in a narrative review.	India	Machine Learning	"ML techniques for forecasting returns, risk modeling, and portfolio construction."ML methods can handle nonlinear data better. Quantitative finance uses MLPs, SVMs, and LSTMs. Deep belief network and extreme learning machine algorithms can better predict stock values. AI provides problem-solving algorithms.	Through its use in the prediction of financial market prices, artificial intelligence has brought a new and refreshing approach to finance by offering more generalizable findings for stock market forecasting. There has been a lot of research on using artificial intelligence and machine learning to anticipate stock market returns and volatility. The intensive research in neural networks produced new techniques for many potential applications, including the ability to forecast future movements of stocks, indices, and currencies. Furthermore, when compared to a traditional model based on multivariate regression analysis, the neural networks produced relevant results. Many papers maintained ANN implementation for a long period after their debut. The integration of neural networks	AI predicts financial market prices and provides more generalized stock market forecasts. Many studies have used AI and machine learning to predict stock market returns and volatility.	Input threats change an AI system's output without tainting it. Perceivable, imperceptible, digital, and physical. Imperceptible attacks target unseen items, while perceptible attacks target substantial animals. Digital attacks target photos, movies, papers, and files.	Financial economics and econometrics study distinguishes parametric and nonparametric models. Parametric option pricing models start with the Black-Scholes model.	This study recognizes AI, neural networks, and stock market prediction. Thus, its use in stock market mood prediction, particularly during COVID-19 pandemics, warrants attention. Thus, using more databases and ML models for COVID-19 predictions may provide new insights. Novel notions will spur application-based research.	According to the existing literature in the subject, AI and neural networks have a bright future together, albeit the extent to which they may be used should not be overlooked.

9	Choithani et al., 2022,	1	2022	Qualitative Research	The primary purpose of this research has been to investigate the effects of artificial intelligence on today's society. It focuses on the attractiveness of artificial intelligence, confrontation, opportunities, and its impact on professions and vocations.	India	Chatbot	It streamlines credit decisions, quantitative analysis, marketing, and risk management for the financial industry. Traditional financial markets are being evaluated using machine learning and AI. Bankers use coherent algorithms to make tactical decisions based on real-time knowledge. These knowledge databases store expert data. Money launderers can now use several tactics to prove the legality of their illegal payments. AI finds these hidden features, saving banks millions. AI is improving customer service, financial efficiency, security, and risk management. AI alerts financial institutions about cyberattacks and their costs. AI detects many fraud and data breach issues.	Finance AI is changing money behavior. Technology may imitate human mind and movement. This will enable human tasks. Technology may imitate human mind and movement. This will enable human tasks.	AI-embracing banking leaders have already realized these benefits. Banks have employed AI for years. Banks use AI for several purposes.	AI enables banks by automating knowledge workers and making automation smart enough to handle competition and cyber threats.	The bank relies on AI. It helps banks use human and mechanical skills to improve operational efficiency and provide personalized services.	Another challenge for Artificial Intelligence techniques with cryptocurrency is that it is relatively new to the market, having been introduced in 2009, as opposed to the traditional stock market, so a lack of information about cryptocurrencies, combined with high price volatility, makes it difficult to predict better results for cryptocurrencies.C ryptocurrencies are relatively new to the market, having been introduced in 2009, so a lack of information and high price volatility make it difficult for Artificial Intelligence techniques to predict better results.	Financial organization s increasingly use AI. Due to e-commerce , fake transactions cost more. ALA offers personal banking, voice banking, signatures, and data-driven AI solutions. By 2020, AI will dramatically impact banking and finance, affecting competition and possibly relying on mechanical power.	Recent events, such as bank failures and legislativ e attempts to address them, have left a paper trail in the banking industry.	This report recommended deep integration of digital technology into the financial industry to improve service quality and accessibility, as well as creative laws to promote healthy market competition.	A novel cointegration technique is also addressed, which outlines how we might use other comparable cryptocurren cy data to forecast the future of Bitcoin.
10	Hisham et al., 2022,	0	2022	Emperical RESEARCH	This study investigates the technological integration of anomaly detection models into BT and compares supervised and unsupervised machine learning strategies for identifying fraudulent and valid transactions.	Malaysia	Machine Learning				In principle, a machine learning technique might aid in distinguishing between transactions exhibiting normal and abnormal behavior across user addresses by learning the features that correspond to either normal or abnormal activity.					ML performance optimization using ant colony, metaheuristic, and other optimization methods may be a future research field.	According to the findings of this study, the most common approach for exploring anomaly detection in blockchain networks is supervised learning.

11	34	2019	qualitative study	This paper investigates how artificial intelligence has been adapted in Middle Eastern finance. The primary purpose of this study is to obtain data on the impact of artificial intelligence application in the banking industry.	Saudi Arabia	Machine Learning	It streamlines banking automation. less human error. It can significantly cut banking fees. It can help analyze consumer behavior and tailor services to their needs. Machine learning may detect security vulnerabilities and respond.	Currently, artificial intelligence is utilized to identify transactional inconsistencies, offer clients personalized advice, and create solutions to do away with human mistakes.	The banking business has adopted artificial intelligence more slowly than other sectors. Several opportunities exist for Middle Eastern banks to use AI.	Artificial intelligence (AI) can make human-like decisions and avoid human-like mistakes, which could change all banking activities. Artificial intelligence in banking reduces manual labor and back office activities.	Artificial intelligence may be used in the banking industry to streamline and improve processes.	AI will interrupt all bank activities. Automated procedures eliminate oversight. It cannot judge unique scenarios. More security is needed for a secure automated system.	Even though AI in banking is still in its early stages, smart algorithms can improve risk and asset management and optimize financial strategies at Middle Eastern banks.		Analysis of the effects of the use of such new technology in the banking industry may be done through further research.	Thus, it can be concluded that the performance of regional banks may be greatly improved with the deployment of artificial intelligence in the banking sector in the middle east.	Alzaidi, 2018, p. 140
12	41	2019	Emperical RESEARCH	The application of artificial intelligence in the Indian banking industry, as well as its advantages and difficulties, will be covered in this essay.	India	Machine Learning		Risk management: Using prior data, risk analysis, and human error removal from hand-crafted models, clients can buy customised goods. Security: Suspicious behavior, logs analysis, and fake emails can help identify security breaches. OCR and machine learning or AI to extract insights from text data can speed up back-office activities through digitalization and automation. Wealth management for the masses: Bot Advisors can manage tailored portfolios for clients based on lifestyle, risk tolerance, predicted returns, etc. ATMs: Deep learning and real-time camera photos can detect and prevent ATM fraud and criminality.	Analysis of the effects of the use of such new technology in the banking industry may be done through further research.		Additionally, it is utilized to comply with regulations, spot fraud, and judge a person's creditworthiness.		Banks are increasingly using blockchain and analytics to construct a proactive cybercrime defense strategy.	Traditional banking models should account for digitalization's major impact and cyber security risks. Digitalization has impacted the financial business, but institutions must also manage these dangers.	The utilization of AI has the capability to enhance business procedures, provide customized services, and aid in achieving broader objectives such as promoting financial inclusivity.	Vijai, et. al 2019,
13	0	2023	Implementation	This research offers a novel way to comprehending bankers' risk-taking behavior.	UNITED KINGDOM	Artificial Neural Networks	AI-based decision support systems are crucial. Intelligence includes decision-making, problem-solving, and learning.						Bankers analyze a little amount of data due to processing limitations. Due to insufficient information, time limits, competence levels, and uncertain environments, risk increases.		Future behavioral finance research should examine decision-making from multiple angles. Due to a literature shortage, such a thorough strategy is needed. The present paper has made a noteworthy contribution and can serve as a basis for additional research in this exponentially developing stream.	The findings reveal that bankers' risk assessments result in differing appraisals of loan financial information.	Rodgers et al., 2023,

14	Wang et al., 2022	12	2022		The purpose of this study was to investigate the effects of chatbot-enabled agility (namely, internal and external chatbot agility) on customer service performance, as well as the antecedents from the standpoint of information technology utilization (both routine and innovative use).	Australia	Chatbot		Chatbots powered by AI are being given more responsibility for providing successful consumer interactions.	Companies are using chatbots to improve customer service. Chatbot integration into business processes is essential to this goal.	Companies are using chatbots to help employees, which is expected to increase company agility.		This study suggests encouraging routine and unique chatbot use to boost agility and organizational sustainability.	Routine and unique chatbot use improved internal and external agility. Chatbot innovation boosts company agility. Internal and external agility also affect customer service.
15	Han et al., 2023	9	2023	Investigation	This study reviews the published research on how blockchain technology will affect accounting in general, and AI-enabled auditing in particular.	United Kingdom	Machine Learning	AI can be used in audit planning, risk assessment, transaction testing, analytics, and audit-work document production. Businesses can save time, improve accuracy, data analysis, customer service, and expertise by doing so. Businesses can improve decision-making by using multi-party verified blockchain data.	Incorporating blockchain into AI decision-making processes might be the missing piece for achieving the transparency required to completely trust AI-derived judgments and results.		Integrating blockchain and AI can give a new technology way of regulating and monitoring accounting information, reducing information asymmetry and agency issues. This occurs because blockchain permits shared, verified, and agreed-upon data, and AI finds abnormalities. Furthermore, smart contracts automate procedures, which can reduce managerial manipulation and opportunistic behavior.	Blockchain technology can improve accounting practice by capturing, updating, verifying, and sharing data, including audits with AI.	To overcome technological, organizational, and regulatory barriers, blockchain must be developed, standardized, and improved.	Agency theory and stakeholder theory help explain how blockchain can reduce information asymmetry and enhance stakeholder collaboration.
16	Čemerytienė and Kabašinskas 2022	2	2022	Emperical	This article provides a review and classification of multi-criteria decision-making approaches that contribute to the objective of future research: "creating artificial intelligence-based methodologies that are explainable, transparent, and interpretable for the majority of investment decision-makers."	Lithuania	Machine Learning, Chatbots						Future research should use machine learning, AI, and MCDM models to solve the toughest problems. We suggest an updated MCDM approach in this article based on the cases and debate.	Interpretability is a person's ability to understand a choice or model's outcome." Thus, while choosing a research model, choose one that yields the best technological solutions and is straightforward to understand.

17	(Milojević and Redzepagic, 2021)	13	2021	Emperical	The research focuses on the potential of artificial intelligence and machine learning to improve banking risk management.	Serbia	Logistic regression, discriminant analysis, Bayes classifier, closest neighbor, classification trees, Lasso logistic regression, and DL (artificial neural networks) are all AI tools used for credit scoring		Artificial intelligence and machine learning have the ability to help mitigate current global economic and financial issues, such as those created by the newest coronavirus outbreak (COVID-19)	AI, ML, and DL are widely used in banking risk management and predicted to rise. Credit risk has used AI for decades.	AI and ML credit scoring can speed up credit procedures and receivables disbursement, lowering costs, improving customer experiences, and boosting long-term economic growth.		Model risk ("black box" issues), data availability, collecting, and protection, transparency, ethics, and the availability of skilled staff to create and execute novel methods (Financial Stability Board, 2017).	The study reveals the critical aspects for proper implementation. The recommendations in the study emphasize a progressive and deliberate approach.	A measured and well-planned application of artificial intelligence, machine learning, deep learning, and big data analytics can improve risk management in credit, market, liquidity, operational risk, and other areas.
18	Mhlanga, 2020,	25	2020	Emperical	The purpose of this study was to look at the influence of AI on digital financial inclusion.	South Africa	deep learning, expert systems, natural language processing, machine learning, audio processing, knowledge representation, robotics and symbolic language	For risk management and detection, risk measurement, fraud detection, and consumer protection." Credit scoring, chatbots, capital optimization, market effect research, trade signaling, and'reg tech' applications are also popular.	AI helps digital financial inclusion in risk assessment, measurement, and management, information asymmetry resolution, chatbot customer service, fraud detection, and cybersecurity.	Machine learning was popularized in 2011 by Google, Microsoft, IBM, and Facebook. Google, Apple, Facebook, and Amazon in the US and Baidu, Alibaba, and Tencent in Asia showed the importance of AI in finance by adopting digital banking and online buying.	AI may use online purchasing platforms and social networks to eliminate knowledge asymmetry and increase financial inclusion.	Fintech firms are using AI to help low-income workers, the underprivileged, women, youths, and small businesses into the mainstream financial market.	Data quality and accountability are needed to scale AI. High-quality data is what makes AI predictive.	Thus, financial institutions, non-financial institutions, and governments worldwide should adopt and scale up the use of AI tools and applications to help vulnerable groups of financially inactive people participate in the formal financial market with the fewest obstacles and the most benefits.	This study found that AI impacts digital financial inclusion in risk detection, measurement, and management, information asymmetry, chatbot customer support, fraud detection, and cybersecurity.
19	Hou et al., 2021,	7	2021	Emperical	The purpose of this essay is to encourage the growth of rural finance and the further digitization of rural banks.	China	Deep, Learning AI technologies such as data mining, accurate portrait, machine learning, and neural networks usher in a new era of financial goods, service channels, service methods, risk management, credit financing, and investment decisions.	When processing large amounts of data, the traditional machine learning model has limited space to improve the effect, whereas the DL model has natural advantages. It can store and handle huge financial sector data using big data technologies, as well as process or mine data maturely.						As a result, in future study, the number of layers may be suitably raised to assure the precision of the mode based on the actual demands of the rural banking company.	The research findings may give a more accurate prediction model for rural banks, as well as ideas for developing rural informatization and improving rural governance.

20 [Chopra and Sharma, 2021	16	2021	Qualitative	This research examines 148 studies that used neural and hybrid-neuro approaches to forecast stock markets, which were grouped based on 43 auto-coded themes acquired with the NVivo 12 program.	India	neural- and hybrid-neuro networks that have been developed and used to anticipate stock markets.		Stock traders, brokers, and investors can reach unimaginable returns with AI-based algorithms. As financial markets grow more predictable, more investors will invest, allowing corporations to use stock markets to repay debt, launch new products, and expand operations.	Better AI models increase market predictability, which benefits businesses, consumers, and the economy as a whole.			Finally, we develop a research agenda for future financial market analysts, artificial intelligence, and soft computing academics.	Our findings show that artificial intelligence approaches may be utilized successfully to observe and evaluate stock market activities.
21 Ma, J 2021	2	2022	Emperical Research	The current study clarified how artificial intelligence technologies are used in the UK's banking sector. The influence of various powered AI technologies on financial operations and activities has also been examined in this study.	UNITED KINGDOM	Invoice verification and verificationn robot	Artificial intelligence technology is needed for account, tax, capital, budget, accounting, I engineering financial, asset value, financial reconciliation, shared platform, and financial risk management. Automating, digitizing, and intelling numerous financial fields can build a smart financial ecosystem.				Scientifically implementing intelligent technology applications requires enterprises to maximize benefits. For repetitious chores, they should use smart financial apps. The finance section should address operational issues, automation, and financial intelligence.	Analyzing the beneficial effects of AI technology's case application is a good way to start investigating its possibilities. For the financial growth of businesses in the future, the study might offer insightful information.	Research on artificial intelligence technology, financial intelligence application scenarios, and their integration advances the scenario and artificial intelligence technology financial intelligence system planning idea.
22 W. Lan 2021	0	2021	Emperical Research	The study begins with the history of artificial intelligence, analyzes cutting-edge financial management techniques, and serves as a resource for related work.	CHINA					AI management technologies focus on data and information control. Controlling data and information is essential for scientific and fair financial management. Thus, financial data management must be improved for design.	Network information technology, which improves financial management's timeliness and functionality, is essential to artificial intelligence's development. Improving financial management and control and accounting management informationization are essential.	I recommend investigating artificial intelligence in financial management's innovation and development potential. The study may provide creative ways to construct an artificial intelligence management and control framework for information applications. These strategies must match the organization's needs to succeed.	AI may increase financial data use, knowledge transfer, and team building through talent development. It describes how intelligent financial management was developed and implemented to enable the company's growth.

23 (Bogojevic Arsic, 2021)	7	2021	Emperical Research	The purpose of this article is to outline the current status of AI methods' use in financial risk management and to identify potential future directions for use and advancement.	Serbia		AI aids market risk management in data preparation, modeling, stress testing, and model validation. By processing raw financial market, institution, and company data, machine learning algorithms helped prepare data.	Financial risk management entails determining the best strategies for businesses and financial institutions to take on risk. In Fintech, AI has changed financial risk management. AI also improves decision-making for financial risk management.					Fintech's rise will change financial risk management. This will require financial risk management revolution. Financial institutions and other market participants may include AI into their financial risk management strategy.	These methods will provide precise real-time information on the different financial risk categories that institutions and organizations face and require sophisticated risk management. Financial risk management should combine classical statistical methods with AI technologies like deep learning, A.N.N., and advanced categorization.	According to the research, there are no obstacles to the use of AI approaches in financial risk management.
24 (Mandala et al., 2022)	2	2022	Emperical Research	The current study clarified how artificial intelligence technologies are used in the UK's banking sector. The research has also looked into the various AI-powered technologies and how they can affect financial activities and operations.	INDIA	platforms for deep learning, robotic and automated processes, decision-making, and robotic processes	AI helps monitor the stock market and regulate market capitalization. When abnormalities and unexpected behavior are found, AI-based technology rapidly alters businesses.	Since automation has reduced human work and the risk of human error, the UK's finance sector has largely benefited from AI technologies in their operations.		The UK financial sector needs AI-powered oversight. AI-powered technologies include machine learning, decision management, robotics, automation, and deep learning platforms. These methods scale short- and long-term initiatives while budgeting. Thus, AI aids financial institutions in the following ways.	AI reduces repetitious financial activities, according to the paper. Machine learning and artificial intelligence speed up time-consuming activities by filling identical blank boxes with the same data.	Since it handles sensitive data like account information, online service user IDs, passwords, and more, the financial sector prioritizes data protection.		The report advises UK financial firms to use AI to improve operations, secure business, and stabilize the industry. AI helps these organizations forecast liquidity needs, improving efficiency and performance. AI technology's seamless integration makes financial business easier and drives growth and profitability.	Without the use of AI technology, financial firms would not be able to operate their business with much ease, and AI plays a significant role in the higher growth and performance of the financial industry.
25 Rizinski et al., 2022	1	2022	Conceptual framework	Since natural language processing (NLP) transformer models can capture the semantic text similarity, this research compares the results achieved by the experts with those acquired by employing NLP.	USA	Machine learning, NLP, chatbot	Machine learning is used in many financial contexts, from predicting fintech crowdfunding campaign success to assessing creditworthiness.	ANI has transformed the financial inclusion model. Customers can receive personalized financial support.	Across a wide range of financial services, financial institutions have begun implementing machine learning (ML) technologies.	Using economies of scale from automated procedures, ML algorithms can boost financial services and consumer value.		Financial institutions are concerned about ML-driven solutions, especially deep learning models, lacking transparency. These models, like black boxes, struggle with accuracy, methodological soundness, and financial risk calculation, causing government regulations and company financial losses.	In the not-too-distant future, ML will serve as the industry's backbone.	We offer a theoretical structure for dealing with ethical problems in the financial technology industry, including sexism, racism, unfair pricing, conflicts of interest, and data breaches.	According to the findings, the most significant connections between ML ethics and the principles of finance are those involving honesty and fairness. Error analysis and ML model visualization using Microsoft's Responsible AI Widgets and SHapley Additive exPlanations (SHAP) are included as use cases in the study.

26	0	2023	Emperical Research	An overview of Artificial Narrow Intelligence Techniques in an Intelligent Digital Financial Inclusion System for the Digital Society is the goal of this article.	India		ANI-based DFIS improves operational efficiency. ANI can help individuals with monotonous tasks, build AGI and ASI, and conduct isolated duties without bias. ANI systems can assist DFIS address information imbalance since they avoid prejudice.	The introduction of ANI into the financial sector has led to a radical shift in the conventional financial inclusion model. This opens the door for customers to receive individualized financial assistance.					Future progress in ANI requires giving ANI serious thought as a potential focal point.	The front, middle, and back offices of the financial sector could all benefit from using ANI to save money.
Rawat et al, 2023						Machine learning									
27	0	2023	Emperical Research	This paper uses a deep learning algorithm to examine the current defects and the application effect of intelligent investment consulting, and then discusses the security risks faced by Internet finance, such as the intelligent evolution of hacker attacks and self-learning that makes illegal intrusion difficult to detect.	China				Internet financial financing is convenient, broad, and low-cost for investors. National policies address financial sector deficiencies and lending, investment, and wealth management needs to enable growth.	Internet finance institutions can use AI to improve the quality, consistency, and security of their service offerings to customers.	Authorized permitted usage limited must improve legislative research, clarify internet financial law changes, create AI-ready financial law and regulation systems, and handle risk issues.	By strengthening technology research and development, financial supervision, and law; regulation, and technical specification updates, artificial intelligence in Internet finance can grow quickly and healthily.	The simulation results presented in this research demonstrate the effectiveness of the suggested method in keeping an eye on potential weak spots.
Li, P. (2023).						Deep Learning, machine learning									
28	0	2023	Emperical Research	This paper's purpose is to demonstrate that the analysis of the current study tackles the areas of financial accounting practices in firms that are deficient as a result of using conventional methods for financial management. The study also examines the technology that companies might utilize to work around the drawbacks of the older methods.	Bahrain			By delivering more precise and thorough financial descriptions, AI and ML have accelerated company growth.	AI accelerates system identification and processing. AI improves accounting and finance efficiency and clarity. AI automates processes and reduces human errors.			By analyzing the research literature, we were able to pinpoint specific areas for improvement in the business's use of cutting-edge technologies.	Businesses can benefit from having clear ideas about the implementation of advanced technologies thanks to an examination of the overall obstacles and benefits of business practices influenced by the deployment of innovative technologies.
Alkhajah, 2023						Machine Learning, NLP									

29	Jawid, 2021	2	2021	Emperical Research	Benefits of Indirect Foreign Investment in Target Countries is an attempt to answer that question. And how much direct foreign investment there has been in Egypt's stock market's recent expansion and revival.	Iraq	Machine learning	Artificial intelligence and digital transactions (block chain) make it easier to collect data and get credit using unconventional methods like phone data, which describes behavior. AI algorithms now gather "loan behavior" data to better assess borrowers' creditworthiness.	Building personal finance, empowering underprivileged cultures, and preventing fraud are all ways in which artificial intelligence (AI) has touched the realm of financial services.		By analyzing and linking huge data, AI is changing the financial industry, providing enhanced, tailored, and secure services. It ensures financial stability.	Because of its growing significance throughout time, the notion of artificial intelligence must be applied by countries to aid in the support of the economy and financial markets through a set of systems and mathematical procedures.	According to the research, Arab and foreign capital flows in the stock market are expected to raise the value of the local currency and not pay economic growth rates unless they subscribe to capital growth and finance project activity and investment rates. The Egyptian stock market is especially susceptible to foreign speculative operations' repercussions on the economy.
30	Chen et al., 2022	1	2022	Application Design	In this paper, we propose a design for a voice-interactive AI-powered self-service financial kiosk.	China	Voice recognition		The spread of AI into new industries and customer demand for high-tech products have driven the "financial electronics" business. This laid the groundwork for intelligent financial services that can adapt to individual users.	Customers may find it easier to navigate the system, and users may be able to make changes and interact with it in real time.		Understanding the latest demands and product concepts in this field is vital for perfectly adapting these changes into society as science and technology grow and innovate in the future.	Voice interaction results: The terminal's voice interaction delay estimation is accurate and within five sample points.
31	Abad-Segura et al., 2020	76	2019	Biblomatic Method	The study's overarching goal is to examine this research topic globally from 1975 through 2019.	Spain			The digitization and networking of equipment have made it possible to complete jobs more rapidly, efficiently, and from more convenient locations.		According to indicators like the number of papers on "current and future research lines," academic and scientific interest in financial technology is rising.	Future research should examine banking, financial services trade, geographical growth, legal, management, research technique, and financial technology longevity. Financial technology research is growing worldwide.	The collected results supplement existing understanding of financial technologies, facilitate the establishment of a connection between science and technology, and provide valuable input into policymaking.

32	Mhlanga, 2021	50	2021	Emperical Review	To examine the role of machine learning and AI in credit risk assessment, we will employ a literature review strategy based on an examination of relevant documents and an examination of relevant concepts.	South Africa	Machine Learning	AI can help economic agents build, link, and evaluate enormous new data sets, reducing adverse selection. AI reduces moral hazard by eliminating the need for economic players to share material information.	AI may have aided with credit assessments, threat identification for financial institutions, regulatory requirements, and financing gaps for developing countries. AI can help overcome information asymmetry in numerous circumstances, including the credit market.	Artificial intelligence and machine learning, along with alternative data sources like company registers, social media data like messages, satellite images, and public data, are helping lenders assess consumer behavior and loan repayment.			This study advises that banks and credit lending institutions spend more in AI and machine learning to provide credit to low-income consumers. The paper recommends government-private investment partnerships to help emerging nations invest in AI and ML.	This study revealed that artificial intelligence and machine learning affect credit risk assessments by addressing information asymmetry, adverse selection, and moral hazard using public data.
33	Gupta et al., 2020,	71	2020	qualitative Review	The text-mining literature on financial forecasting, banking, and corporate finance is the primary emphasis of this research. It also summarizes some recent studies and does an analysis of the current literature on text mining in financial applications.	India	Machine Learning, NLP	NLP is an area of AI that clarifies unclear phrases. It's used to assess a financial institution's current and future performance against industry standards and regulations. Documents can be analyzed to draw conclusions.Natural language processing for text mining addresses two fundamental concerns. They avoid exhaustion by using preprogrammed procedures for big data processing. Two, they can identify important hidden qualities.	AI lets us analyze and predict financial consequences from historical data.Deep learning solves natural language's ambiguity for the finance business.	Data scientists now have a role to play in the analysis and forecasting of the financial sector thanks to ML and DL techniques.			Research in this area can aid in the creation of more reliable and accurate prediction and analytic systems, as there are numerous untapped opportunities in the financial arena.	More and more scientists are taking an interest in text-mining applications and working tirelessly to improve existing models.
34	How et al., 2020	18	2020	Emperical Review	This study proposes a no-code human-centric AI-based strategy to modeling the potential dynamics between the collected financial profiles of 45,211 contact encounters in order to predict the intentions of the prospective consumers with regard to the supplied financial goods.	Singapore		AI could improve people's lives, the economy, and society. AI could have far-reaching effects on society by expanding into credit scoring and finance. AI's ethical and moral issues require multidisciplinary scholars.	As demand for novel financial solutions rises, AI can assist service providers understand consumer needs. AI should prioritize clients over products. AI can help people identify customer preferences by analyzing data patterns.	AI's predictions may inspire them to make client-data-based suggestions. Marketers may better understand clients, trends, and new business prospects by collaborating with AI.	Marketers must let go of idealized success fantasies and adopt more flexible viewpoints to achieve this future.		In addition to describing how AI may be used to improve financial inclusion, this study proposes how AI-Thinking might be employed as a cognitive scaffold for educing (drawing forth) actionable insights.	This paper's probabilistic reasoning technique makes predictive modeling straightforward for inexperienced AI users.

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35 Choithani et al., 2022	1	2022	Comprehensive study	The paper reviews the most recent findings from the field of artificial intelligence techniques for cryptocurrency, focusing mostly on Bitcoin. The paper reviews and discusses the most significant works including AI and ML methods like SVM, ANN, LSTM, and GRU in the context of cryptocurrencies and Bitcoin.	Germany	Chatbot, machine learning, deep learning, NLP	AI helps banks improve decision-making, customer understanding, direct communication, suspicious data pattern detection, and self-regulation of a wide range of data-intensive, costly, and error-prone banking services. It helps customers choose loan amounts at favorable interest rates, cuts costs, and automates the process. AI may threaten money, banking, and client data.	Smart systems powered by AI automatically trade cryptographic resources for a hefty payout.	AI-powered banks are more reliable, trustworthy, covenant-minded, and customer-friendly. It's cutting-edge digital banking efficiency. Artificial intelligence improves customer service, auto procedures, and financial costs. AI lets banks automate knowledge workers and make their automation smart enough to handle competition and cyber threats.	Some AI methods reduce investment risk and anticipate price, trend, portfolio design, and fraud.	Cutting-edge methods reduce bitcoin price volatility for short-term predictions. Without cryptocurrency expertise, it's hard to predict better results. Hackers can also steal or damage digital currency.	Transportation, security, engineering, education, medicine, business, accounting, finance, marketing, economics, the stock market, agriculture, and sports all prioritize AI research today.	AI is improving daily to overcome these problems and increase its dependability across fields. Expertise and correct use can complete encryption. Prudent AI use can boost efficiency and speed up procedures. Self-regulation and emotional awareness are important.	The paper presents a novel cointegration methodology that leverages analogous cryptocurrency data to forecast Bitcoin's future trajectory.

Detailed results table link:

https://docs.google.com/spreadsheets/d/1BypO6Aw0eZekQXUJQJCBRnoBIqBEvsZT/edit?usp=drive_link&ouid=117200235355636618447&rtpof=true&sd=true