A SYSTEMMATIC LITERATURE REVIEW ON ARTIFICIAL INTELLIGENCE TECHNOLOGY IN BANKING

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ABSTRACT

Introduction- *The role of AI in banking is currently increasing as it brings the power of advanced data analytics to combat fraudulent transactions and improve compliance. AI models accomplish anti money laundering in few seconds and also analyse huge volume of data at record speed to derive valuable insights.*

Objective- *The study aims to systematically review the diverse application of AI (Artificial Intelligence) in banking sector and understand its impact on customer service, employee productivity and bank performance.*

Research Methodology *– This systematic literature review has been conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta analyses (PRISMA). We studied articles from 2007 to 2022 from database such as Google scholar, Web of Science, Scopus, Science direct, Elsevier and other reputed journals while using search words like artificial intelligence, banking, emerging technology, machine learning, banking applications, bank performance, customer satisfaction. Authenticated research papers in English with full text available are included in research. Meta-analysis could not be implemented due to wide variability in design. At last, we descriptively summarised the final articles in ten tables.*

Result- *Initially, a total of 108 titles were identified, 31 duplicate entries were found. 87 publications were considered for abstract reading after manually screening of all titles. Finally, 46 studies were included for systematic review study who met the inclusion criteria. The review data supported the findings that AI can play a crucial role in the area of finance specially banking for instance it can be used for identification of fraudulent transaction, managing customer wealth, and in managing credit risk of loan portfolio.*

Conclusion- *Studies revealed that there are numerous artificial intelligence applications in banking boosting customer satisfaction mainly chatbot, wealth management, robo advisors, and also applications which benefited bank employees such as predictive analysis, cyber security and risk management. AI with different frameworks can help bankers to diagnose and manage frauds with greater accuracy. Banks should focus more on implementation of various AI use cases that can enhance customer retention and also add new customers. In future, artificial intelligence banking applications shall play crucial role in the growth of bank's financial and non-financial parameters*

Keywords: Artificial Intelligence, Banking Industry, Robo-advisor, Emerging Technology, Chatbot, AI Applications.

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INTRODUCTION

In modern world, artificial intelligence refers to technology that is able to mimic human cognitive skills like problem solving. Banks play a very important role in the growth and development nation's economy (Alt et al., 2021; Amin, 2022). It is considered as a life blood of present world economy because it handles finance, money related matters and other credit transactions. Banking industry provide financial assistance in the growth of small and larger industries. It helps customer in tracking where expenditure over savings and motivate them to save money and own interest for a better future. To perform all these activities, the bank started using computer in 1970's and they further started using diverse channels using latest technologies such as ATM's, mails, telephone banking, online banking, mobile banking. Today banks have started adopting latest cutting-edge AI technology in their work processes. AI emerging technologies help the banks in integration of various work flows understand previous patterns and reduce processing time of routine assignments. In near future the entire banking industry is expected to use artificial intelligence technology in their operational processes. As per McKinsey Global survey high- performing companies who have employed AI technology, have reported higher revenues and reduction in cost as compared to other companies. Implementing RPA (Robotic Process Automation) standardizes various complicated banking task such as credit card processing and mortgage lending documentation process. Machine learning has the ability to perform like a human mind by thinking for itself. It can perform various activities like learning, speech recognition, perception, planning, reasoning, problem solving, and also the ability to operate and decide on its own. The key purpose of adopting AI technology in the banking sector is to get valuable insights into the customer preferences, to ensure that the customers are satisfied with the bank services and help the customers understand their expectations from the banks Figure 1.

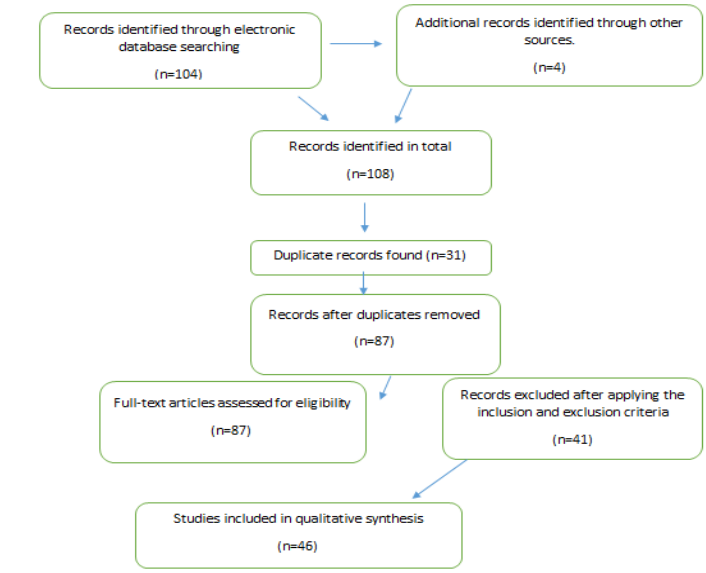

FIGURE 1
PRISMA FLOW

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MATERIAL AND METHODS

This systematic review is aimed to appraise and evaluate the available literature on Use cases of Artificial intelligence technology in banking sector. It is carried after referring the guideline for Preferred reporting items for systematic reviews and meta-analysis (PRISMA). The literature for this paper was identified and selected by performing a thorough search in electronic data bases like Google scholar, web of science, science direct, Scopus, and digital libraries published over last fifteen years from 2007 to June 2022 by using keywords such as artificial intelligence, banking, emerging technologies, machine learning in banking, artificial neural network in banking.

Resource Selection

Full length research articles were extracted from research data bases. Hand searching and electronic searching was performed to go through the journals. In the first stage, 172 citations were identified relevant to the review title of the research paper, however 45 articles were removed due to duplication. The abstract relevance further narrowed down. Hence, authors retrieved 127 articles for second stage. Next the following criterion was applied.

Criteria for Considering Studies for this Review

Inclusion and exclusion criteria

An electronic search was carried out on the selected title Artificial Intelligence technology in Banking sector.

Inclusion criteria:

1. Article must be focused on AI and its application in banking industry
2. There must be some or the application of AI in research paper so that it can be segregated accordingly
3. Articles written in English language only

Exclusion criteria:

1. The research articles that are not related to AI and banking
2. Grey Articles that are unpublished
3. Articles that consist of abstract only without full text availability Figure 2.

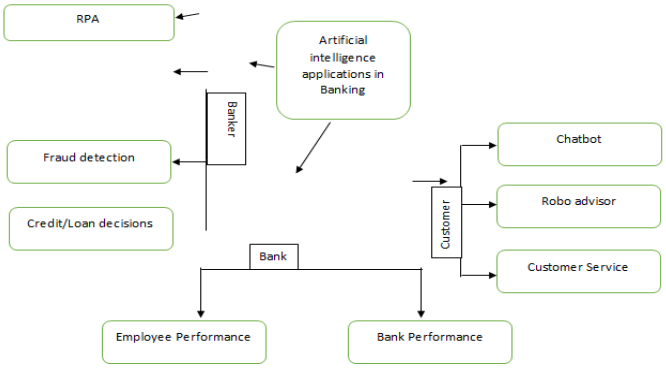

FIGURE 2

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AI APPLICATIONS IN BANKING SEGREGATED AS PER CUSTOMER, BANK AND EMPLOYEE POINT OF VIEW.

After further scrutiny of articles based on inclusion and exclusion criteria, resulted in 54 studies which are considered final for systematic review of Artificial intelligence applications in banking industry. All the articles were completely and thoroughly read. The year of publication of these articles were taken in account to study and understand the progress of Artificial intelligence technology trends that were developed and evolved over the years in banking industry (Vijai, 2020;Valgaeren, 2019). The abstracted data table consists of comprehensive information about the paper including Author name. year of publication, Name of the journal, Research objective, research methodology followed, theories considered and factors analysed and main finding /results of the study Figure 3.

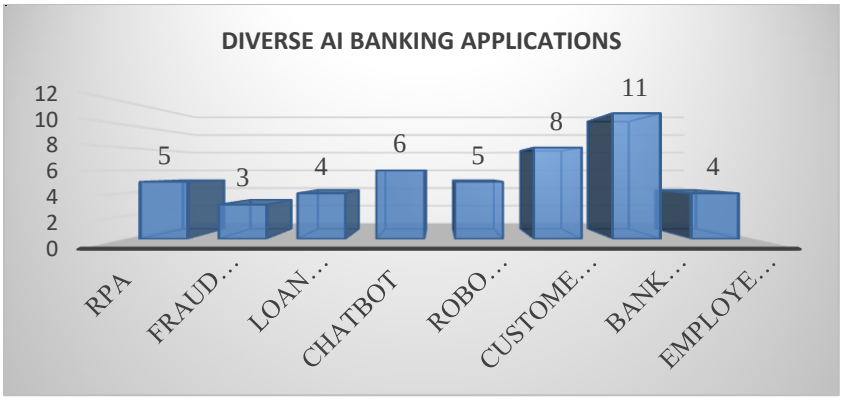

FIGURE 3
NO. OF RESEARCH PAPERS PUBLISHED IN VARIOUS BANKING AI APPLICATIONS.

DISCUSSION AND ANALYSIS

Artificial Intelligence Applications in Banking Sector

Robo advisor: Artificial Intelligence in bank will help the customers to make quick and accurate financial decisions as RoboAdvsior provide them up to date required information about the real time market and also provide suggestions on the stocks in which customer can invest in future. This also helps in answering the various types of queries to the customer. Robo advisor is gaining popularity among the banks (Madakam, 2019; Villar, 2021). The aim of the RoboAdvisor is to provide personalised, high quality customer satisfaction along with efficient and time saving services Table 1.

Table 1
ROBOADVISOR

S No.	Reference	Objective of the study	Research methodology	Author concludes that

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1	Robo-advisors as a form of artificial intelligence in private customers' investment advisory services (Hakala, may 2019)	The objective of this paper is to provide the editor with a comprehensive understanding of the advantages and disadvantages in implementing an artificial intelligence-based investment advisory system along with ethical aspects into account.	Conceptual study - using the funnel method	For the customer, Robo-advisors offer a better access to investment services, more convenient user experience and more affordable advisory service.
2	Exploring the Trust Influencing Mechanism of Robo-advisor Service: A Mixed Method Approach (Cheng, et al., september 2019)	To examine trust transfer theory in the new context of the Robo-advisor and contributes to further development of this increasingly utilized service.	Mixed methods including interviews and surveys-230 investors	The findings of this research concludes the significant influencing role of supervisory control and validates the relationships among trust influencing factors, trust in investors and senior investors are also found in this research.
3	Robo advisory and its potential in addressing the behavioral biases of investors - A qualitative study in Indian context (Bhatia, Chandani, & Chhateja, december 2019)	To explore the present state of Robo-advisory service in the Indian context and investigating how Robo-advisors can help in mitigating behavioural biases of a retail investor.	Qualitative study - structured questionnaire method - sample size- 34 experts	The paper concludes that the current focus is to increase awareness level amongst investors, by educating them and by building the trust. It emphasizes the fact that Robo-advisors still need to mitigate investor's biases while performing risk analysis and profiling the investors.
4	Artificial Intelligence in FinTech: understanding Robo-advisors adoption among customers (Belanche, Casalo, & Flavian, Mar-19)	To propose a framework for research for better understanding Robo-advisor adoption by a wide range of potential customers.	Web survey -765 North American, British and Portuguese potential users of Robo-advisors services. Structural equation modelling and multisampling analyses of the hypotheses.	Consumer attitude towards Robo advisor along with mass media and subjective norms were found to be key determinants in adoption.
5	The rise of machine learning and Robo-advisors in banking (Sabharwal, 2018)	To prove how machine learning is going to be used in financial sector in the future.	Systematic literature review.	Robo advisors can be used to train both employees and managers to work quickly and efficiently. Combination of humans and Robo-advisors form a efficient eco system.

Chatbot: Chat represents "*discussion*" and bot is the short for "*robot*". Hence, Chatbot means discussion with a robot. This tool is very helpful in the banking industry as now a days people are extremely busy in their day to day life, they find it difficult to be physically present in

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the bank. Chatbot provides service 24/7. It also understand the requirement of each customer and provide them the accurate solution (Sadok, 2022; Yarlagadda, 2018; Vijai, 2020) Table 2.

Table 2
CHATBOT

S No.	Reference	Objective of the study	Research methodology	Results
1	Banking With a Chatbot - A study on Technology Acceptance (ALT, Vizeli, & Saplacan, 2021)	To identify the factors that influence customers' intention to use chatbot technology applied in the banking industry.	Survey method, Romanian sample - 287 respondents. Dependent variable - behavioural intention to use and actual usage of the technology	The findings of the research supported the conceptual model by predicting 48.5% of variance in the behavioral intention. The current study was able to make a significant contribution to the field of both academics and practitioners.
2	Chatbots and Virtual Assistant in Indian banks (Singh & Singh, Dec 2019)	To discuss the adoption of Chatbots and Virtual Assistants by different category of banks including private sector banks and public sector banks in India.	Secondary data - website of the banks and technology provider companies, literature available in research journals, blogs by experts on the topic, press releases by banks & news websites, etc.	Indian banks are investing in chatbots but the features are limited and awareness level among customers is low. It is necessary to enhance the existing capabilities of the chatbot system and to aware customers and employees about the usefulness of chatbot
3	Identifying Relevant Segments of Potential Banking Chatbot Users based on Technology Adoption Behaviour (Alt & Ibolya, 2021)	To identify relevant segments of potential banking chatbot users based on technology adoption behaviour.	Online questionnaire method, non-probability sampling method - 287questionnaires. Hierarchical and k-means cluster analysis. Dependent variable - behavioural intention, actual use, and attitude to use I banking.	The analysis concluded three distinct segments: innovators (26%), consisting of highly educated young women employed in the business sector, The late majority (55%), consisting of young women with higher education degrees who work in services related fields, and laggards (19%), consisting of educated middle-aged men employed in the business sector.
4	Analysis of Factors Influencing Millennial's Technology Acceptance of Chatbot In the Banking Industry In Indonesia (Richad, Vivensious, & Kaburuan, April 2019)	To analyse factors that influence millennial's technology acceptance of chatbot in the banking industry in Indonesia.	Primary data- simple random sampling technique- sample of approx. 400 people	The results shows that perceived ease of use and attitude, innovativeness, perceived usefulness towards using the chatbot affected behavioural intention.
5	Chatbots in Banking Industry: A case study	1. Ushering details of progress made by chatbots in Indian	Systematic literature review.	Chatbot designed with AI is one of the most promising bank strategies wherein bank

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	(Sayiwal, Jun-20)	Banking. 2. Conducting a case study of HDFC and Kotak Mahindra Bank regarding the chatbots usage. 3. Making an insight into the views of various banks regarding the use of AI based techniques.		can win the satisfactory vote of their loyal customers.
6	The Impact of Chat-Bots on the Banking Experience (Narula & Narula, Apr-21)	To identify and analyse the customers' perception on the various aspects of Chatbot services	Primary data-structured questionnaire- 80 respondents	This paper concluded that banking customers are not only aware about chat-bots but are also of the opinion that they are somewhat effective and maybe could replace customer service personnel in the coming future.

Customer service: AI in banking can help in automation and improving customer service. With the introduction of AI technologies such as chatbots, voice and facial recognition, AI powered mobile application, natural language processing and alike make banking services convenient and easier to use. These technologies are available 24/7, answers customer queries, help customers transfer money and also assist customer without human intervention. This improved accessibility and helped bank in providing higher customer satisfaction and generate loyalty (Sabharwal, 2018) Table 3.

Table 3
CUSTOMER SERVICE

S No.	Reference	Objective of the study	Research methodology	Author concluded that
1	Implications of Implementation of Artificial Intelligence in the Banking Business with Correlation to the Human Factor (Ris, Stankovic, & Avramovic, november 2020)	To highlight the need and opportunities to improve the efficiency, effectiveness of service delivery and increase the profits of financial institutions and replace human factors with automatic Virtual Assistants and Chatbots. Research has confirmed that people would rather use virtual assistants and Chatbots rather than go to a bank branch	Questionnaire- 220 respondents, survey method. Independent variable - sex and dependent variable - do you prefer using chatbot in banking business.	The findings concluded that Artificial intellegence has a statistically remarkable effect on employment. The gender, academic credentials, and years of experience were the factors to determine their performance.
2	A study on impact of artificial intelligence in financial services of private banks in Bangalore (Ambika, Rafee, & Pasha,	To analyse the methodology of artificial intelligence in private banks and to understand how artificial intelligence helped betterment of	Secondary data - based on literature review. Structured questionnaire - primary data of customers.	The result of the study is that the private banks are using various AI services for the customers benefit so that the customers are satisfied with their services in addition to

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	august 2020)	customer service in private banks.	Statistical tools: Correlation, reliability test, hypothesis, chi-square test software, and Excel.	that financial services as to improve services more effective manner because some of them are dissatisfied with the banking services. It also shows that people towards technology adoption give importance according to government initiative digital India.
3	Customer loyalty assessment in Malaysian Islamic Banking using Artificial Intelligence (Kishada, Wahab, & Mustapha, may 2016)	To develop artificial intelligence model for customers' loyalty assessment in Malaysian Islamic Banking.	Survey method	The results in paper indicates that the third ANN model
4	Increasing customer service efficiency through artificial intelligence chatbot (Andrade & Turnelero, feb 2022)	To interrogate the contribution of AI in the efficiency of customer service. This study contributes to services technological innovation in process management, a field not yet settle in the literature.	Data content analysis structured and supported by Atlas.ti software.	This paper concluded that technological innovation in Artificial Intelligence positively contributed to the efficiency of customer service at the respective selected bank. The results indicated that attendance through the virtual assistant increased by
5	Consumers' Perception of Artificial Intelligence in Banking Sector (Ryzhkova, Soboleva, Sazonova, & Chikov, 2020)	To show that Russian Business and consumers perceive AI in a positive manner.	Secondary data	This study concluded that the majority of employees are aware of the importance of Artificial Intelligence, although it is not clear sometimes. The investigation confirmed the increase in bank employee productivity, caused by AI implementation.
6	Artificial Intelligence in customer-facing financial services: a systematic literature review and agenda for future research (Hentzen, Hoffmann, & Dolan, november 2020)	To provide a systematic literature review on Artificial Intelligence (AI) in customer facing financial services, identifying gaps in the literature, providing an overview of explored contexts and setting a comprehensive agenda for future research.	Systematic literature review- 90 articles published in Australian Business Deans Council journals. TCCM framework.	The results showed a split between data-driven and theory-driven research, with either investigating AI consumer adoption behaviors in a banking context or adopting an experimental research design focused on testing the accuracy and performance of Artificial Intelligence algorithms to assist with credit scoring.
7	Customer experiences in the age of Artificial Intelligence (Ameen, Tarhini, Reppel, & Anand, july 2005)	To analyse how the integration of AI in shopping can lead to an improved AI-enabled customer experience.	Online survey method- 434 responses. Partial least squares-structural equation modelling.	This study concluded the remarkable effect of relationship commitment on AI-enabled customer experience. It contributes to the existing literature by exposing the mediating effects

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				of trust and perceived sacrifice and the direct effect of relationship commitment on AI-enabled customer experience.
8	The role of Artificial Intelligence on Enhancing Customer Experience (Daqar & Smoudy, june 2019)	To examine the role of Artificial Intelligence on enhancing customer experience in Palestine through different industries.	Quantitative study - Questionnaire method -80-90 users	Artificial Intelligence is the independent variable while customer experience is the dependent variable, which consists of two dimensions; the first is the Personalized customer service and other is after sales customer support.

RPA- Robotic Process Automation

With the help of latest AI technologies, the work of bankers has become automatic. There are various bank related processes in which RPA technology can help (De & Tumelero, 2022).

1. Automatic Report Generation: in a bank compliance officers have to go through end number of daily reports manually. This activity consume long man hours with the help of automatic report generation system, suspicious reports and big transaction reports can be automatically derived and also help in analysis is provided.
2. Account Opening: The complete account opening bank process has been facilitated by the latest technologies, by eliminating the manual errors. This process also ensure complete fulfilment of the account opening form. The data is recorded in the huge database.
3. Credit Documents: RPA has automated the critical and complicated process of loan documents. With the help of RPA technology bankers can make the document processing work faster of various loans such as housing loan, vehicle loan, personal loan, business loan, etc.
4. KYC Updating: Customer on boarding is a very tiring and time consuming process which requires verification of multiple documents. RPA can facilitate in obtaining automatic KYC using OCR (optical character recognition) technique Table 4.

Table 4
RPA- ROBOTIC PROCESS AUTOMATION

S No.	Reference	Objective of the study	Research methodology	Author concludes that
1	Robotic Process Automation in Financial and Accounting Processes in the Banking Sector (Valgaeren, 2019)	To provide new insights about the implementation of RPA in financial and accounting processes within the banking sector.	Qualitative research - investigation method, face-to-face interviews	The results indicate that the implementation of RPA improves financial and accounting processes in the banking sector as it enables these processes to be run at a higher level of speed and improved quality.
2	The RPA and AI Automation (Yarlagadda, 2018)	The research explains the effects of AI and RPA on wages, labour and employment. It emphasizes the impact that the automation machines have brought about in the labour	Secondary data	The research concludes that the existence of RPA and AI leads to faster processing of information over a short period. It is advisable to combine RPA and Artificial Intelligence to generate

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		taskforce and the decrease in wages.		refined process models.
3	The Future Digital Work Force: Robotic Process Automation (RPA) (Somayya Madakam; Rajesh M. Holmukhe; Durgesh Kumar Jaisiwal, 2018)	To understand the rising importance of robotic process automation	Secondary data-available on Google, academic and research databases	The study discovered that Robots and Robotic Process Automation technologies are becoming compulsory as a part to do business operations in organizations across the globe.
4	The future of Robotic Process Automation (RPA) in the Banking Sector for Better Customer Experience (Vijai, Suriyalakshmi, & Elayaraja, 2020)	The study discussed the Robotic Process Automation world markets and applications.	Systematic literature review.	The study concluded that RPA is an emerging tool for the banking sector. The paper provides several directions for further studies in this focus area of challenges, adoption, and impact on a potentially beneficial RPA technology.
5	Robotic process automation in banking industry: a case study on Deutsche Bank (Alice Saldanha Villar, Nawaz Khan,2021)	To show how Deutsche Bank successfully Implemented RPA to improve productivity and quality.	Case study approach	Researchers demonstrated how Deutsche Bank successfully automated Adverse Media Screening (AMS), accelerating compliance, increasing adverse media search coverage and drastically reducing false positives.

Fraud detection: Due to increase in bank related frauds, it has become one of the most immediate and fearful concern among the people in the financial sector. With the help of fraud detection techniques quick response from the bank has helped the customers to build their trust. AI techniques has enormous ability to detect and minimise fraud. With the help of powerful machine learning systems, it captures the irregular behaviour pattern and uncommon activity in the account. Hence, we can say these systems helped the bank to detect fraud and protect security breaches (Narula & Narula, 2021; Ravi, 2021;) (Table 5).

Table 5
FRAUD DETECTION

S No.	Reference	Objective of the study	Research methodology	Author concludes that

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1	Analysis on Credit Card Fraud detection Methods (S. Benson Edwin Raj. , A. Annie Portia)	To analyse the fraud detection methods in credit card. It represents a survey of various techniques used in Credit Card fraud detection mechanisms and evaluates each methodology based on certain design criteria.	Survey of various techniques used in credit card fraud detection mechanisms and evaluates each methodology based on certain design criteria.	The results concluded that the hybridized algorithm named BLAH-FDS identifies and detects fraud transactions using sequence alignment tool. The ANN and BNN are used to detect cellular phone fraud.
2	Artificial Intelligence in Banking Industry: A review on Fraud Detection, Credit Management, and Document Processing (Musaab Mohmmad Alhaddad)	To analyse how three most promising AI applications namely fraud detection, credit management and document processing, can make the banking sector robust and efficient.	Systematic literature review	With integration of AI into banking applications the industry has become technologically competent. Large banks are using AI to remain ahead of competition, deliver superior customer service and improved back end activity. It further helps in reducing cost by enhanced productivity.
3	A Novel and Successful Credit Card Fraud Detection System Implemented in a Turkish Bank (Ekrem Duman, Ayse Butukkaya, Ilker Elikucuk)	To study formulation of problem and algorithms implemented. Further to develop a credit card fraud detection solution for bank in Turkey	Case study of data mining in credit card fraud detection	The newly introduced migrating birds optimization algorithm (MBO) turned out to be superior and was implemented. In addition, during the study a cost sensitive decision tree algorithm was developed and introduced to the literature.

Credit: Artificial intelligence techniques aids banks and other lenders in determining the creditworthiness of clients by analysing data from a wide range of sources including real time data. This helps bankers develop algorithms-based applications backed by robust lending method in credit appraisal (Kishada et al., 2016; Richad et al., 2019; Sadok et al., 2019; Ris et al., 2022) Table 6.

Table 6
CREDIT

S No.	Reference	Objective of the study	Research methodology	Results
1	Artificial intelligence and bank credit analysis: A review (Sadok, Sakka, & Maknouzi, Jan 2022)	To talk about use of AI in credit analysis processed by banks and other financial institutions.	Systematic literature review	At macroeconomic level, AI helps in providing positive estimate for economic growth. On a micro scale use of ai in credit analysis improved financial inclusion and access to credit for undeserved borrowers.

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2	Application of Artificial Intelligence Techniques for Credit risk Evaluation. (Ghodselahi & Amirmadhi, August 2011)	To design a hybrid model for credit scoring leading to higher accuracy	Support vector machine, neural network, and decision tree are base classifiers and were compared based on their accuracy.	The paper concluded that a hybrid credit scoring model (including ai technique) can be used for overall improvement in accuracy when compared to other credit models.
3	Artificial Intelligence in Banking Industry: a review on Fraud Detection, Credit Management, and Document Processing (Alhadaad, November 2018)	To analyse how fraud detection, credit management, can make the banking sector robust and efficient.	Systematic literature review	With integration of AI into banking applications the industry has become technologically competent. Large banks are using AI to remain ahead of competition, deliver superior customer service and improved back end activity. It further helps in reducing cost by enhanced productivity.
4	Artificial Intelligence credit risk prediction: an empirical study of analytical artificial intelligence tools for credit risk prediction in a digital era (Thiel, AdviceRobo, & Raaij, 2019)	The research describes three experiments that develop the artificial intelligence probability of default models.	Mortgage and credit card customers of 3 European lenders. Neural nets and random forests. Dependent variable is default status.	In all experiments AI models performed better than the traditional models. Scalable automated credit risk solutions can therefore build on AI in their risk scoring.

Bank performance: The banking industry presently is largely digital in operation but now bank face significant operational cost and risk issues due to potential for human error. Several AI techniques helps banker to eliminate time-intensive and error -prone work and focus on bank significant growth parameters(Alt & Ibolya, 2021) Table 7.

Table 7
BANK PERFORMANCE

S No.	Author	Objective	Research methodology followed	Concludes that
1	Innovation in banking: fusion of artificial intelligence and blockchain (Vedapradha R. and Hariharan Ravi)	First, to analyze the relationship between the adoption of disruptive technologies and the level of service delivery in the investment banks. Second, to predict the impact of service differentiation on the investment banks' employee performance and finally assess the importance of service differentiation enabled workflow in the investment banks.	Cluster sampling method - primary data-250 employees of leading foreign based investment banks. Variables used are employee performance, service delivery, technology, security, operations, strategy and quality through chi-square, linear stepwise multiple regression analysis and correlation.	This study concludes with framed research questions being addressed, fetching statistical shreds of evidence that the proposed conceptual model developed based on service differentiation can predict qualitative service delivery among the investment banks.

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2	Effects of Artificial Intelligence on Business Performance in the Banking Industry (ELEGUNDE, Ayobami Folarin (Ph.D.), SHOTUNDE, Oladimeji Idris, 2020)	To focus on the role that AI had played in enhancing business performance, especially in the areas of achieving business objectives.	Survey research design-simple random sampling-200 employees and customers of Access Bank Plc and United Bank for Africa (UBA). Content valididty and regression analysis. Customer satisfaction, service quality, competitive advantage and employees' efficiency (dependent variable), non-financial business measures aided by AI (independent variable)	In light of the researcher's findings, it has been established that artificial intelligence, to a large and reasonable extent, impact on business performance, using non-financial objectives as a parameter.
3	Influence of Artificial Intelligence (AI) on Firm Performance: The Business Value of AI-based Transformation Projects (Serge-Lopez Wamba-Taguimdje , Samuel Fosso Wamba , Jean Robert Kala Kamdjoug and Chris Emmanuel Tchatchouang Wanko, 2020)	To analyze the influence of Artificial Intelligence (AI) on firm performance, notably by building on the business value of AI-based transformation projects.	The research process (responding to the research question, making discussions, interpretations and comparisons, and formulating recommendations) was based on a review of 500 case studies from IBM, AWS, Cloudera, Nvidia, Conversica, Universal Robots websites, etc. Studying the influence of AI on the performance of organizations, and more specifically of the business value of such organizations' AI-enabled transformation projects, required us to make an archival data analysis following the three steps, namely the conceptual phase, the refinement and development phase, and the assessment phase.	The emergence of AI is thus encouraged by a double movement: the digitization of the economy and the automation of existing processes, on the one hand, and a disruption in the supply of services based on the exploitation of this deposit on the other hand.
4	Impact of Digital Banking and Artificail Intelligence on Retail customer engagement - A case study on HDFC Bank. (Suresh Raghavan, Ramesh Pai, 2021)	To highlight the AI application adopted by the bank and reveal performance of the bank due to integration of ai techniques.	Case study method - HDFC Bank. Secondary data -bank audit report and other published journals.	There has been positive increase in the financial performance, profitability of the bank, growth of the customer and net promoter score of hdfc bank due to integration of digital banking and ai technique.

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5	A study on the Implementation and the Impact of Artificial Intelligence in Banking Processes (Rashmi R., Nirmal Raj VK, 2021)	To analyse and evaluate the impact of Artificial Intelligence on Bank's Performance through survey method.	Survey method-questionnaire. 34 variables which are used in different banking processes. Respondent are customers and employees. Statistical tools such as cronbach's alpha, Kaiser-Meyer-Olkin and Bartlett's test. The dependent variable used is Artificial Intelligence. Independent variable used are customer satisfaction, understand customer behaviour, risk management, personalised products, etc.	As per the survey analysis the reliability coefficient of Cronbach's alpha is 0.972, which indicated high level of internal consistency of the scale and the (KMO) Kaiser-Meyer-Olkin and Barlett's test revealed the measure of sampling adequacy is 0.960, it is found that component analysis is useful and significant.
6	Exploring the Adoption of Artificial Intelligence In the Zimbabwe Banking sector (Leonard Shambira, 2020)	To inspect Zimbabwe banking sector about how far it has progressed in adopting AI technology in their banking processes.	Questionnaire, observation, and interview. Survey method - 120 bank employees across ten banks.	The study concluded that the drivers for adopting AI in the Banking sector are cost reduction, customer satisfaction and the need to better manage the barriers to adoption of AI and risk are lack of AI knowledge and resources including AI talent and establishing governance for ethical AI, data privacy and other ethical issues.
7	Adapting to Artificial Intelligence through Workforce Re-skilling within the Banking Sector in South Africa (Tebogo Lucky Mamela, Nita Sukdeo, Sambil Charles Mukwakungu,2020)	To inspire the banking sector to re-skill the workforces and present the opportunities in re-skilling the banking institutions workforces in South Africa to adapt to the roll out of Artificial Intelligence technologies.	Quantitative technique- non-random convenient sampling method-participants- workforces from various retail banking institutions of Johannesburg, South Africa. Independent variable - Skills, Dependent variable - AI toolset adaptation	The findings of this research shows that the adaption of AI strongly depends on most of the stated skills, therefore banks are required to re-skill their workforces in order to adapt to AI advanced technologies in order to make them relevant in the future.
8	The use of Artificial Intelligence based technological applications by Indian Banks (Dr. Munish Sabharwal, 2014)	To observe whether the selected Indian Banks are using Artificial Intelligence based technological applications or not and if they are, then what different purposes for	Quantitative technique - questionnaire method -16 number of banks	This paper revealed that none of the banks selected by the researcher in this paper except the new private sector banks use artificial intelligence based

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		which they are using them.		technological applications. The new private sector banks are also using the AI based applications for petty purposes.
9	Artificial Intelligence applications as a Modern Trend To Achieve Organizational Innovation in Jordanian Commercial Banks (Majd Mohammed Al-Hawamdeh, Sawsan A. Aishaer, 2022)	To see how Artificial Intelligence Applications affected Organizational innovation in Jordanian Commercial Banks.	Three- dimensional scale to measure the applications of Artificial Intelligence, expert systems, neural network system, and fuzzy logic systems. Questionnaire- 14 items for scale measurement. Independent variable is Artificial Intelligence, Dependent variable is Organisation innovation.	The findings revealed that artificial intelligence applications have a significant impact on organizational innovation in Jordanian commercial banks, with the most important artificial intelligence applications being the fuzzy logical system.
10	A Study on the Implementation and the Impact of Artificial Intelligence in Banking Processes (Rashmi R., Nirmal Raj VK, 2021)	To analysis and evaluate the impact of Artificial Intelligence on Bank's performance through Survey method	Questionnaire survey method- respondents are the employees of banks and the customers of banks.	Artificial Intelligence impacts banking processes as it satisfies customers better when compared to traditional banking services. According to the survey analysis the reliability coefficient of Cronbach's alpha, (KMO) Kaiser-Meyer-Olkin and Bartlett's test is found that component analysis is useful and significant.
11	Implications of Implementation of Artificial Intelligence in the Banking Business with Correlation to the Human Factor (Krunoslav Ris, Zeljko Stankovic, Zoran Avramovic, 2020)	To highlight the need and opportunities to improve the efficiency, effectiveness of service delivery and increase the profits of financial institutions and replace human factors with automatic Virtual Assistants and Chatbots.	Survey method-517 respondents. Independent variable -sex and dependent variable-Prefer using chatbot.	Virtual assistants, Chatbots, holograms, physical robots will upgrade over the years to flood the market due to all the cheap technologies. Research has confirmed that people would rather use virtual assistants and Chatbots rather than go to a bank branch.

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Employee performance: Artificial intelligence helps manage workload by analysing what customers are doing. Understanding their work and decisions and information required to be delivered instantly (Elegunde & Oladimeji, 2020; Ghodselahi & Amirmadhi, 2011; Hentzen et al., 2022). The AI system has the ability to understand speech, identify patterns and necessary signals that are required to achieve desired results and optimise decisions based on several criteria (Table 8).

Table 8
EMPLOYEE PERFORMANCE

S No.	Reference	Objective	Research methodology followed	Concludes that
1	Employee Readiness towards Artificial Intelligence in Sri Lankan Banking Context (B. Mathipriya, I. Minhaj, L.D.C.P. Rodrigo, P. Abiylackshmana, K.A.D.C.P. Kahandawaarachchi, 2019)	To enlight how employees should be ready for Artificial Intelligence Implementations in Banks.	Qualitative and Quantitative method followed- 115 responses -eight commercial banks from Kaduwela and Colombo. The main variables used are AI mind set, Employee skills, and their current job role to depict people readiness to accept AI in banking industry	The findings concluded that the employees are prepared to adopt AI but there are some limitations to that. It can be seen that teamwork, communication skills, innovative culture are already existing in the employees.
2	The effect of implementing artificial intelligence on job performance in commercial banks of Jordan (Abdallah Abusalma, 2021)	To clarify the effect of artificial intelligence with its variables (Experience system, neural network, genetic algorithm (GA), intelligent systems (IS)) on job performance.	Questionnaire - random sample- 319 managers. Descriptive approach- data are analysed on SPSS. Four independent sub-variables are Experience system (ES), neural network(NN), genetic algorithm (GA), intelligent systems(IA), Dependent variable - Job performance (JP)	This study concluded that artificial intelligence directly affects job performance through (GA, and IA) only, and within certain conditions and specific experiences that characterize managers in the bank. Also, the interest in artificial intelligence increases the bank's efficiency and strengthens its ability to perform banking internally and externally.
3	Artificial Intelligence adoption and employee performance in the Nigerian Bankiing Industry (Ayobami F. Elegunde, Reuben O. Osagie, 2020)	To examine the complement ability of AI to work processes and to know if it eases employee operations in banks in Nigeria.	Questionnaire - 98 respondents of six banks in Lagos State, Nigeria, Content validity and Cross-sectional survey method - 5-point Likert scale rating. Independent variable - AI and Dependent variable - Employee performance.	The findings revealed that Artificial Intelligence complements work process in banks in Nigeria and that machine-aided tasks ease operations in banks in Nigeria. The study recommended the adoption of AI by not only banks but all other firms in the service industry; need for education on the importance of

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				embracing AI; upgrading of school curriculum at all levels in developing and third world economies to incorporate AI and its accompanying gadgets.
4	The effect of Artificial Intelligence on Job performance in China's Small and Medium-Sized Enterprises (SMEs) (Ahmed Muayad Younus, Muslim Najeeb Zaidan, Duaa shakir Mahmood, 2022)	To shed light on the effect of artificial intelligence and its association in variables with job performance.	Questionnaire method-sample size-220 managers. descriptive method -analysed the data using SPSS. Independent variable - AI and Dependent variable- Job performance.	The findings concluded that Artificial intelligence has a statistically remarkable effect on employment. The gender, academic credentials, and years of experience were the factors to determine their performance.

FIGURE 4
NUMBER OF RESEARCH PAPERS PUBLISHED WITH PASSAGE OF TIME. THE FIGURE SHOWS THAT THE ARTIFICIAL INTELLIGENCE IS PRESENTLY GAINING WIDE IMPORTANCE IN BANKING INDUSTRY

RESULTS

This systematic literature review included 54 research articles that were analysed for quantitative data. The analysis of the literature showed that most of the studies were conducted in past 15 years. The trend chart showed that there is a gradual increase in research related to Artificial Intelligence technology in banking industry. The studies that were included in the study focused on AI applications in banking industry such as predictive analysis, fraud detection, customer satisfaction, use of chatbots, robo advisors, portfolio management and many others. Most of the studies have mentioned about artificial neural network, expert system, robotic automation and machine learning as part of AI technology (Alhaddad, 2018).

AI is transforming the traditional conventional methods of banking. AI based systems are used for designing automated software programs that streamlines the fraud diagnosis and data management in banking. Mostly counter work such as account opening, amount deposit and

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withdrawal, ATM handling can be handled better with AI systems (Ameenet al., 2021). AI has completely revolutionised finance industry making decisions of financiers more accurate and systematic and their job easier (Belanche et al., 2019; Daqar & Smoudy, 2019). In this systematic review authors analysed numerous studies on the diverse applications of AI technology in Banking and evaluated their role in field of fraud detection, Predicting bank accounts in future.

LIMITATIONS OF THE STUDY

Despite the fact that this is one of the few detailed systematic reviews on Artificial intelligence applications in banking industry, the present review has some potential limitations. The review does not cover the unpublished literature and papers published in language other than English. Also, most of the review belongs to AI technology use in Banking industry of developed nations.

CONCLUSION

To summarise, AI applications described in the research articles of this systematic literature review showed numerous practically useful banking applications at customer end and bank staff end. Few applications such as identification of fraud at an early stage, risk management, enhancing employee performance due to automation and smoother work processes, virtual chatbots, predictive analytics. AI applications are helping bankers in diverse ways leading to technical efficiency and improved financials. Few authors have also tried to establish the point that AI technology has bring revolution in banking industry in last few years. Past article have shown that AI powered technology in banking has shown tremendous results in various situations. Several authors have concluded that AI systems bring superior value to the bank by improving the fraud detection techniques, enhancing customer satisfaction levels, predicting the future trend from past data in systems and also automating the routine bank assignments. AI is showing incalculable gain because it shall help bank professionals in diagnosing cyber risk, by improving the security system with introduction of robo alerts and early fraud detection mechanism. It further helps the bankers in predating the credit default by analysing the financial statements and evaluating the real time data. Studies also revealed that these automated systems are of great value as it enhanced technical efficiency of employees and improves the financial parameters of bank. Though AI is widely used in financial industry in developing nations but still its growth is lacking in Indian banks.

However, given the limitation of the study future research can be concluded with larger sample size of articles to assess the applicability of Artificial intelligence technology in banking sector. Future research can also include data analytics and other emerging applications of AI in banking field. Also, future research can be made on opportunities and threats linked to AI technology use in Banking industry.

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