IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE FOR FINANCIAL PROCESS INNOVATION OF COMMERCIAL BANKS

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ABSTRACT

Purpose: The purpose of this study is to investigate and illuminate the transformative potential of artificial intelligence (AI) in the context of enhancing financial services within Jordanian commercial banks, with a specific focus on credit risk management. By researching into the applications of AI within this sector, the study aims to provide insights into how AI technologies can reshape traditional banking practices and improve the overall efficiency and effectiveness of credit risk management processes.

Theoretical framework: The study is grounded in the theoretical framework of technological innovation and strategic management. It draws from the literature on AI adoption in the financial industry and its implications for operational efficiency, risk assessment, and customer experience. Additionally, the study incorporates concepts related to data analysis, machine learning, and predictive modeling as key components of AI-driven transformation within the banking sector.

Method/design/approach: To achieve the research objectives, a systematic research design is employed, utilizing survey methods as the primary data collection tool. A sample of 143 employees from major banks located in Amman, Jordan, is selected for participation. The survey encompasses questions designed to gather information about the current state of AI integration, challenges faced, and potential benefits within credit risk management and other financial services. This quantitative approach allows for the collection of structured data that can be statistically analyzed to uncover trends and patterns.

Results and conclusion: The findings of the study highlight the substantial potential of AI integration in revolutionizing the operations of Jordanian commercial banks. AI technologies enable more accurate credit assessment, precise analysis of market risks, enhanced financial forecasting capabilities, robust validation of risk models, and advanced evaluation of creditworthiness. Furthermore, the study reveals that AI offers the opportunity for personalized customer service solutions, thereby improving the user experience and guiding customers toward suitable financial services. In conclusion, the study underscores the positive impact of leveraging AI-driven innovation on financial performance and profitability within Jordan’s banking sector.

Research implications: This study has implications for academia and the banking industry, contributing to knowledge about AI’s strategic use in financial innovation and its application in Jordanian commercial banks for credit risk management and customer service enhancement.

Originality/value: This research stands out by focusing on Jordanian banks’ AI adoption, providing distinct insights into challenges and opportunities in a specific context. Its value lies in guiding banks to effectively integrate AI, enhancing credit risk management and financial services for improved performance and innovation.

Keywords: Artificial Intelligence (AI), Financial Innovation, Commercial Banks, Jordan.

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RESUMO

Objetivo: O objetivo deste estudo é investigar e esclarecer o potencial transformador da inteligência artificial (IA) no contexto do aprimoramento dos serviços financeiros em bancos comerciais jordanianos, com foco específico na gestão de risco de crédito. Ao investigar as aplicações da IA neste setor, o estudo visa fornecer informações sobre como as tecnologias da IA podem remodelar as práticas bancárias tradicionais e melhorar a eficiência e eficácia gerais dos processos de gestão do risco de crédito.

Estrutura teórica: O estudo é fundamentado no quadro teórico de inovação tecnológica e gestão estratégica. Baseia-se na literatura sobre a adoção de IA no setor financeiro e suas implicações para a eficiência operacional, a avaliação de riscos e a experiência do cliente. Além disso, o estudo incorpora conceitos relacionados à análise de dados, aprendizagem automática e modelagem preditiva como componentes-chave da transformação orientada pela IA no setor bancário.

Método/design/abordagem: Para atingir os objetivos de pesquisa, um projeto de pesquisa sistemático é empregado, utilizando métodos de pesquisa como a principal ferramenta de coleta de dados. Uma amostra de 143 funcionários de grandes bancos localizados em Amã, Jordânia, é selecionada para participar. O inquérito abrange questões destinadas a recolher informações sobre o estado atual da integração da IA, os desafios enfrentados e os potenciais benefícios no âmbito da gestão do risco de crédito e de outros serviços financeiros. Essa abordagem quantitativa permite a coleta de dados estruturados que podem ser analisados estatisticamente para descobrir tendências e padrões.

Resultados e conclusão: Os resultados do estudo destacam o potencial substancial da integração da IA na revolução das operações dos bancos comerciais jordanianos. As tecnologias de IA permitem uma avaliação de crédito mais precisa, uma análise precisa dos riscos de mercado, melhores capacidades de previsão financeira, uma validação robusta dos modelos de risco e uma avaliação avançada da solvabilidade. Além disso, o estudo revela que a IA oferece a oportunidade de soluções personalizadas de atendimento ao cliente, melhorando assim a experiência do usuário e orientando os clientes para serviços financeiros adequados. Em conclusão, o estudo destaca o impacto positivo de alavancar a inovação impulsionada pela IA no desempenho financeiro e na rentabilidade do setor bancário da Jordânia.

Implicações da pesquisa: Este estudo tem implicações para o meio acadêmico e o setor bancário, contribuindo para o conhecimento sobre o uso estratégico da IA em inovação financeira e sua aplicação em bancos comerciais jordanianos para a gestão de risco de crédito e melhoria do atendimento ao cliente.

Originalidade/valor: Esta pesquisa destaca-se por focar na adoção da IA pelos bancos jordanianos, fornecendo percepções distintas sobre desafios e oportunidades em um contexto específico. O seu valor consiste em orientar os bancos para a integração eficaz da IA, melhorando a gestão do risco de crédito e os serviços financeiros para melhorar o desempenho e a inovação.

Palavras-chave: Inteligência Artificial (IA), Inovação Financeira, Bancos Comerciais, Jordânia.

1 INTRODUCTION

Artificial intelligence (AI) is the intelligence of robots, not humans. Most academic textbooks characterize artificial intelligence as studying "intelligent agents." These agents are aware of their surroundings and act to increase their chances of success (Alawadhi, Zowayed et al. 2022, Foud Ali, Zowayed et al. 2022, Hassan, Aldoseri et al. 2022). AI has been around for a long time, but prominent AI scholars disagree with the idea that it can emulate cognitive
functions like learning and problem-solving (Hagerty and Rubinov 2019). Since 1955, artificial intelligence (AI) has sought to create "intelligent machines" with human-like cognitive capacities. Like the internet, artificial intelligence (AI) is expected to have widespread effects across all industries (Dwivedi, Hughes et al. 2021). Businesses are using AI more because of the COVID-19 epidemic. After the epidemic, artificial intelligence has grown in importance. AI adoption aims to improve operational effectiveness and efficiency. AI is gaining popularity as organisations automate regular processes and analyse COVID-19 databases. It may boost shareholder happiness. AI has great promise in banking and finance. According to Citi's 2018 research, the financial services sector is the largest non-technical spender on AI services and is growing. Even in impoverished nations like Jordan, where bankers are interested in AI, the rewards are too large. Financial organisations may benefit from strategic AI adoption of machine learning, NLP, and computer vision. This may improve worker and customer satisfaction and back-office procedures (Li, Ragu-Nathan et al. 2006). Enterprise-level AI solutions are changing business. Companies are using artificial intelligence (AI) to save costs, improve productivity, get new insights, and grow their market.

AI in corporate software may improve customer service, sales, cybersecurity, supply chain optimisation, work automation, product refinement, and innovation. Artificial intelligence, which mimics human behaviour, is hard to imagine in business (Alawadhi, Zowayed et al. 2022, Hassan, Aldoseri et al. 2022). The financial services business uses AI for algorithmic trading, portfolio optimisation, model validation and back testing, robo-advising and virtual client assistants, market impact analysis, regulatory compliance, and stress testing. Fraud detection and compliance, customised banking experiences (banking chatbots and robo-advisory services), and credit risk management are the focus of this study. Trailblazers struggle to get others to accept new ideas. Innovation adoption apprehensions depend on the original invention's understanding, potential, and influence on society (Thuneibat, Ali et al. 2022). AI might benefit the stock market. Financial technology businesses use information technology (Al-Hussein, Alabdallat et al. 2023, Al-Rawashdeh, Jawabreh et al. 2023, Al Tarawneh, Alqaraleh et al. 2023). It may be used for marketing, operations, and finance now (Shan, Xiao et al. 2022, Shniekat, AL_Abdallat et al. 2022, Alananzeh, Almuhaisen et al. 2023). When stakeholders lack awareness of the systems, prejudice, inattention, and missed opportunities threaten the bank. Industry experts know nothing about AI's effects on banking. This research seeks industry professionals' opinions on how artificial intelligence (AI) may help Jordanian commercial banks innovate in financial services.

The study's findings underscored the transformative potential of AI integration within the financial services landscape of Jordanian commercial banks. The analysis of gathered data revealed that, through the strategic application of AI-driven technologies such as machine learning, natural language processing (NLP), and computer vision, significant advancements can be achieved. These encompass the refinement of borrower credit assessments, meticulous analysis of market risks, heightened accuracy in financial prognostications, rigorous validation of risk models, comprehensive risk reporting, and an advanced approach to evaluating borrower creditworthiness. Furthermore, the study highlighted AI's capacity to reshape customer service paradigms by offering tailor-made financial solutions that augment customer experiences and offer guidance toward optimal financial choices. The significance of this research extends beyond its immediate scope. It contributes to a broader understanding of AI's potential for fostering financial innovation within the Jordanian banking landscape. By showcasing the myriad benefits of AI-driven credit risk management and customer service enhancement, this study advocates for the strategic adoption of AI as a catalyst for comprehensive operational refinement and enduring competitiveness.
2 LITERATURE REVIEW

2.1 Artificial Intelligence: Scope, Challenges and Prospects

AI is a computer's or robot's ability to do human-like activities. The word is used to describe the process of creating machines that can reason, extrapolate, and learn from experience, which are key human cognitive abilities (Alawadhi, Zowayed et al. 2022, Foud Ali, Zowayed et al. 2022, Hassan, Aldoseri et al. 2022). Artificial intelligence and advanced algorithmic technologies have reached a point where they could disrupt banking norms and usher in a new era of digital banking that meets customers' needs. AI can help banks become more intelligent, efficient, and customer-focused (Sheng 2021). This includes everything from saving money to allocating and using it.

Zheng, Siddik et al. (2021) examined the pros and cons of online banking. Fund transfers are fast, but sharing critical information between devices is risky. Internet banking is pioneering a cashless society (Ijeoma, Akujor et al. 2020). Innovative channels are making financial services easier and more cost-effective worldwide. Schuetz and Venkatesh (2020) suggest that pioneering financial services may increase a bank's market share. Cornelli, Frost et al. (2021) found that banks unable to match modern needs are losing market share to rivals. Pakistan, a developing country, struggles to use modern methods and technology to improve its banking infrastructure to meet changing client needs and compete globally (SAMA, 2020, September 11). This showed that creative financing increases bank market share and cost efficiency. Financial institutions must innovate to stay competitive. This requires novel financial services and artificial intelligence in the financial business. This study is the first to demonstrate how artificial intelligence moderates banking innovation. This study shows financial institution commensurability.

According to Pashang and Weber (2023) cognitive technologies with AI might help banks exploit digitalization and compete with FinTech startups. 32% of financial organisations use AI techniques like predictive analytics and voice recognition. Future banking will use more AI. AI's powerful data analytics help fight fraud and enhance compliance. AI technology speeds up money laundering processes. Financial companies may get important insights from AI's fast data processing. AI bots, digital payment advisors, and biometric fraud detection technologies help provide high-quality services to more people. Li, Wang et al. (2022) found that sales, costs, and earnings increased.

Credit risk management increasingly uses AI. Alternative lenders must use a variety of conventional and non-traditional data sources to assess customer creditworthiness using artificial intelligence. Innovative financing alternatives based on a thorough credit assessment system provide hope to people and organisations with little credit history. Machine learning in the banking business has increased credit scoring, a vital application. Financial institutions and creative financial technology startups lend money, a major economic activity (Jawabreh, Shnicketh et al. 2022, Ali, Ali et al. 2023, Saleh, Jawabreh et al. 2023). This requires strong financial discretion for people and businesses (Hasan, Ali et al. 2021, Hasan, Oudat et al. 2021, Oudat, Ali et al. 2021). Analysts have traditionally used interviews and data to make such decisions. Artificial intelligence has made creditworthiness assessments faster and more accurate. Sophisticated categorization algorithms determine loan approval feasibility. These algorithms include demographics, income, savings, credit history, transaction history at the same institution, and more. AI-based grading algorithms don't take subjective aspects like a bank employee's mood into account. This method allows people with poor credit to demonstrate their reliability and financial stability (Dwivedi, Hughes et al. 2021). AIs improve the customer experience. Historical platform interactions teach the AI system about clients and their habits.
Due to this occurrence, financial institutions may modify their services to meet their customers' unique needs, creating meaningful interactions and lasting partnerships. Artificial Intelligence can be classified into several types, with two primary categorizations based on capabilities and functionality.

![Diagram of Artificial Intelligence types]

**Figure 1.** A diagram which explains the types of Artificial Intelligence.  
**Source:** Li, Wang et al. 2022.

### 2.2 Category One

#### 2.2.1 Artificial Narrow Intelligence (ANI)

This category includes all AI, even the most complex and advanced systems. "Artificial Narrow Intelligence" refers to AI systems that can autonomously do one task using human-like skills. These robots can only do their preset functions, limiting their proficiencies (Dwivedi, Hughes et al. 2021).

#### 2.2.2 Artificial General Intelligence (AGI)

AGI is the ability of an artificial intelligence (AI) agent to learn, absorb information, understand complicated ideas, and perform activities like humans. These systems can autonomously learn multiple competencies and create links and generalisations across disciplines, reducing training time. AI systems will match human cognition by mimicking our varied talents.

#### 2.2.3 Artificial Superintelligence (ASI)

Artificial superintelligence is when computers outperform humans. Popular media and speculative literature depict ASI as a situation in which robots are smarter than humans (Okine, Li et al. 2023)

### 2.3 Category Two

#### 2.3.1 Reactive machines

The early AI systems had limited functionality. Artificial neural networks process varied inputs like humans. Dwivedi, Hughes et al. (2021) found that the devices lack memory. Thus,
these robots cannot use prior experiences to impact their present behaviours, making them incapable of "learning."

2.3.2 Limited memory

An artificial intelligence system's ability to remember prior data and predictions may improve its predicting powers. Dwivedi, Hughes et al. (2021) stated that restricted memory increases machine learning architecture complexity. Any machine learning model must be created with limited memory. The model may be used as a responsive machine.

2.4 Theory of Mind

The theory of mind is the capacity to assign mental states like beliefs, wants, and intentions to oneself and others and to grasp that these mental states may vary. Social connection and communication need this cognitive skill, which develops in early life. Psychology, neurology, and philosophy explore the theory of mind. AI, a complex technology, is just theoretical. Such an artificial intelligence must understand how people and things in a certain situation affect emotions and behaviours (Cai, Zhu et al. 2020). The system should understand human emotions, thoughts, and cognition. Despite many advances, artificial intelligence is still incomplete.

2.4.1 Self-awareness


2.4.2 Conceptualization of financial innovation in 21st century

"Financial innovation" refers to new financial products, services, or methods. Fiscal instruments and remittance procedures gradually evolved into such entities (Hasan and Du 2023). Modern artificial intelligence and fourth industrial technologies have spurred financial innovation. Chen, Chen et al. (2023) claims that most people value the ATM's invention more than asset-backed securitization. Credit and debit cards, PayPal, and other financial innovations have changed payments. Transaction-cost-reducing innovations are noteworthy. Finance innovations may affect economies and currencies.

Hasan and Du (2023) defines "financial innovation" as new financial goods, services, platforms, and markets. Finance innovation involves creating new goods, services, or methods (Nian, Xinhua et al. 2022). Banking, digital currencies, and other payment mechanisms have advanced recently. Digital technology has changed how financial services companies save, borrow, invest, and buy. Investment brokers help customers purchase and sell financial assets for a commission. Robinhood democratises investing choices, while Stripe helps small businesses make online payments. Consumers, borrowers, and businesses now have more financial institutions to choose from (Nian et al., 2022).

Institutional, product, and process innovations exist. Specialised credit card firms and online-only banks have changed the financial system. Process innovation may be seen in firm operations and information technology, such as ATMs, mobile banking, and online banking. Modern financial instruments include securitized assets, derivatives, weather derivatives, foreign currency-denominated mortgages, hedge funds, exchange-traded funds, private equity, and retail structured products. Institutional innovation includes internet banks, credit card
businesses, and discount brokers. Banking technologies have improved borrowing and lending operations, allowing faster client service. According to Akujor et al. (2020), ATMs, mobile banking, electronic banking, and technological advances strengthen the banking industry in emerging countries. This has resulted in heightened competitiveness within the industry.

Technology has allowed the financial services business to explore new customer care methods (Shniekat, AL_Abdallat et al. 2022, Thunebat, Ali et al. 2022, Al Tarawneh, Alqaraleh et al. 2023). Credit and debit cards, telephone and internet banking, mutual funds and structured products, online trading of financial assets, and risk management strategies have transformed the financial services sector in recent decades. These advances have transformed the delivery of financial services new customer care methods. Credit and debit cards, telephone and internet banking, mutual funds and structured products, online trading of financial assets, and risk management strategies have transformed the financial services sector in recent decades. These advances have transformed the delivery of financial services. Financial services organisations must use disruptive technologies like artificial intelligence, advanced analytics, automated machinery, cloud computing, and blockchain to capitalise on innovation. Pashang and Weber (2023) significant work analyses how automation and machine learning affect AI applications in banking. This research examined how AI affects the banking business today. This study examines the pros and cons of artificial intelligence (AI) and its effects on various professions. Quantitative and qualitative methods were used. This research found that varied AI technologies have benefited numerous financial industries. AI has shown promise in fraud detection, credit scoring, and customised financial services (facilitated by robo-advisors and chatbots).

Pashang and Weber (2023) studied Kajiado County deposit-accepting savings and credit cooperative organisations to determine how financial innovation affects performance. The research found that product, process, and organisational improvements drive deposit-taking institutions' performance. Staff and institutional flexibility, security, and regulatory compliance hinder new ideas. AI in financial innovation faces several obstacles. Data security and transparency concerns have increased due to AI investment in the financial services sector. New AI solutions in financial services must address these and other issues. Balahur, Jenet et al. (2022) predict that organisations will face data quality, security, compliance, transparency, explainability, and trust issues.

2.4.3 Organizational implications of financial innovation implementation

The financial system helps corporations and consumers manage risk (Alqaraleh, Almari et al. 2022, Jawabreh, Shniekat et al. 2022, Shan, Xiao et al. 2022). This function requires financial instruments or agreements that allow firms and households to mitigate and assume risks according to their risk proclivities and thresholds, as well as the financial system's ability to oversee these instruments' risks. These innovative financial innovations may be limited by financial market defects, limiting their accessibility. Since the borrower and investor have the financial instrument, it is a natural asset. The financial system facilitates end-borrower-end-investor intermediation in this case. It may also provide a secondary market for the asset, enabling end-investors to trade (Lin and Chen 2018).

2.4.4 Implementation of artificial intelligence for credit risk management of financial innovation

Loan extensions are difficult for banks. When banks lend to unqualified borrowers, they risk problems. A debtor defaults when revenue stops. Sheng (2021) found that US credit card delinquencies rose 1.4% in six months in 2020. AI-powered credit record reviews may reduce
default rates. Mobile banking apps monitor spending and collect data. Sheng (2021) says financial organisations may foresee loan distribution concerns, including customer bankruptcy or deception.

Financial firms face credit risk when lending money. Financial organisations are increasingly using AI to estimate the likelihood of a counterparty defaulting on their loan. Probabilistic analysis may help banks decide whether to approve a loan or need higher interest rates or collateral. Sheng (2021). Financial organisations predict losses using credit risk modelling. The models inform lenders of a borrower's default likelihood and financial consequences.

AI might improve credit decision-making speed, accuracy, and cost. AI may also combine additional factors for a more thorough and evidence-based result. Artificial intelligence uses sophisticated metrics to score loans. Lenders may therefore choose applicants with a lower default rate and trustworthiness but no credit history. AI is objective. Computers seldom have prejudices (Bachinskiy, 2019).

2.4.5 Implementation of artificial intelligence for a personalized banking experience

AI in customised banking improves customer service. Through customer contacts, the AI system learns about their behaviour. Financial institutions may personalise their goods and services to meet their customers' unique needs, fostering meaningful connections and long-term partnerships. Post-crisis, the usage of robo-advisors and chatbots in financial services has increased. These technologies help clients make investing, banking, and insurance decisions. The Future Today Institute's 2017 study defines a "bot" as an AI-based software programme that automates a certain operation. Algorithm-based robo-advisors provide investing and financial planning services. A decade ago, "robo-advisor" wasn't employed in families, but it's become popular in banking. Despite its name, this phenomenon is not robotic. Robo-advisors tailor portfolios to investors' needs and risk tolerance. Chatbots and robo-advisors can provide tailored, conversational, and seamless interactions to customers in several sectors thanks to NLP and ML algorithms. Millennials, who are less able to justify the costs of human advising services and less dependent on them for investing comfort, prefer chatbots and robo-advisors. Financial institutions are using chatbots for self-service. Conversational interfaces and chatbots for customer support have received more funding in recent years. Financial chatbots need plenty of customer interaction data and advanced natural language understanding engines.

Bank consumers have trouble distinguishing between human and artificial interfaces as natural language processing technology advances. The three largest Japanese banks are using AI and robots to improve customer service. According (Sheng 2021, Cao, Gu et al. 2023, Yu, Li et al. 2023), the Mizuho Group uses a robotic system for asset management and document preparation. Banks personalise beyond chatbots. Numerous financial institutions use enormous amounts of consumer transactional data to analyse customer spending habits and provide customised advice for achieving their customers' financial objectives. This sort of service includes advice on cutting monthly costs and a visual representation of the consumer's spending habits (e.g., the three main areas where they spent the most this month). If you don't have enough money for recurrent transactions, your bank may warn you.

2.5 Theoretical Review

2.5.1 The constraint-induced financial innovation theory

Hangl, Krause et al. (2023) proposed constrained-induced financial innovation. The theoretical framework states that corporate financial innovation is driven by financial
improvement. A corporation faces policy and organisational management barriers while trying to improve financial performance. Constraints provide managerial stability and reduce financial institution efficiency. According to Hangl, Krause et al. (2023), financial organisations innovate to overcome these constraints. In markets with more limits, financial innovation may reduce operating costs, which encourages commercial banks to embrace it (Chen, Chen et al. 2023).

2.5.2 The demand oriented theory

The demand-oriented hypothesis states that the capital market's income and substitution impacts are a function of financial instrument demand, income, interest rates, and alternative goods. In 1956, Gurley and Shaw presented this hypothesis. Greenbaum and Haywood (1971) hypothesised that the increase in capital market-investable assets and diversification costs are related. Investors manage portfolio diversity to reduce risk and increase returns within a risk threshold using H. M. Markowitz's methodology. Portfolio management costs—including diversification costs—occur simultaneously. Costs rise with portfolio value. When portfolio management costs exceed asset returns, the theoretical framework suggests financial innovation. The banking industry seeks alternatives to save costs or boost income as benefits decline. The replacement effect shows that interest compensates for capital use.

Each financial service is an n-dimensional vector with time, risk, and liquidity as its three dimensions. An endless number of permutations of such features might provide an infinite number of financial services. This theoretical framework defines an invention as a unique tool that incorporates many parts. It helps capital market players respond to demand. Schematically, invention development is:

![Figure 2](image)

**Figure 2** The demand-oriented theory of innovation's enabling conditions  
**Source:** Stauder, El Kadaoui et al. 2023.
2.5.3 Empirical reviews

Nian, Xinhua et al. (2022) examined how technology affected the southern Tamilnadu banking business. Information technology has improved financial services, product development, and real-time information systems. The study examined customer service accessibility and technology-based service enhancement strategies. The descriptive study collected data using an open-ended questionnaire. Principal component factor analysis was used to investigate six customer service accessibility factors: banking services, add-on services, front office services, technology-enabled services, safety, and dependability. Banking services are the main determinant of customer service access. Technology-enabled services were optimised using a single-sample t-test. Weekly account statements, email notifications, and SMS capability for cash transactions were the most important methods that needed improvement. The study suggests that banks should prioritise customers and provide cutting-edge, affordable services.

Nian, Xinhua et al. (2022) examined how banking innovations affected Lebanon’s commercial banks’ profitability and return on assets. This study examined mobile banking, debit and credit cards, ATMs, internet banking, point-of-sale terminals, and electronic money transmission. Research survey data was collected. Banking innovations have a statistically significant favourable effect on Lebanon's business enterprises' profitability and return on assets. Overall, new banking practices boost financial performance. Performance is a continuous process that benefits financial institutions and their clients.

Ijeoma, Akujor et al. (2020) examined how product innovation affects Kenyan commercial banks’ finances. This research examined how core, formal, and enhanced product innovation affect commercial bank financial performance. The explanatory study included 106 senior and branch managers from nine commercial banks. This study included research questionnaires, face-to-face interviews, and secondary data from commercial banks' 2013 audited annual financial accounts. The multiple regression study showed that product innovation negatively impacted Kenyan commercial banks' financial performance. The study shows that further research may provide useful insights that the present examination missed.

3 METHODOLOGY

3.1 Research Design

A "design" is a drawing or blueprint used to create an item or system. Li, Wang et al. (2022) defines a research design as a systematic and strategic framework for data gathering and analysis for a given research topic. Investigations follow the above remark. This study used survey methods. The researchers were able to define, record, examine, and interpret the variables using the specified approach. The large sample population enhances the data's value.

3.2 Population of the Study

The population of this study is made of all the staff of Arab Bank, Bank of Jordan, Capital Bank of Jordan, Jordan Kuwait Bank, Arab Jordan Investment Bank commercial banks in Amman, Jordan.

3.3 Sample and Sampling Technique

The Krejcie and Morgan (1970) was used to determine a 143 sample size for the study. Management staff made up the sample population for the study.
3.4 Research Instrument

The research uses the structured instrument tagged "Artificial Intelligence Applications for Financial Process Innovation Questionnaire" (AIAFPIQ). Section A gathered demographic data, whereas Section B asked study-related questions.

3.5 Validity of the Instrument

The research instrument was given to validate in by research expert in test and measurement. The purpose was to ensure that items on the questionnaire were properly worded to meet the respondents’ level of understanding and comprehensively covered the research objectives.

3.6 Reliability of the Instrument

Data was coded for Cronbach's alpha evaluations. Dependability was 0.89. The research instrument was chosen for its high dependability index.

3.7 Method of Data Analysis

Statistical analysis included means, standard deviations, and t-tests. The mean and standard deviation were used to answer research questions, and the hypotheses were tested using t-tests at.05 level of significance.

4 DATA ANALYSIS AND DISCUSSION

Research Question 1: How does implementation of artificial intelligence for personalized banking experiences affects promotion of financial process innovation by commercial banks in Jordan

<table>
<thead>
<tr>
<th>Implementation of artificial intelligence for personalized banking experiences affects promotion of financial process innovation by commercial banks in Jordan</th>
<th>X</th>
<th>SD</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image recognition</td>
<td>3.65</td>
<td>0.84</td>
<td>Agreed</td>
</tr>
<tr>
<td>Voice recognition</td>
<td>3.28</td>
<td>0.92</td>
<td>Agreed</td>
</tr>
<tr>
<td>Sentiment analysis</td>
<td>3.55</td>
<td>1.03</td>
<td>Agreed</td>
</tr>
<tr>
<td>Virtual financial assistants</td>
<td>3.82</td>
<td>0.95</td>
<td>Agreed</td>
</tr>
<tr>
<td>Automated Transactions</td>
<td>3.97</td>
<td>1.19</td>
<td>Agreed</td>
</tr>
<tr>
<td>Grand mean</td>
<td>3.65</td>
<td>0.99</td>
<td>Agreed</td>
</tr>
</tbody>
</table>

Source: Table extracted from SSPS.

Implementation of artificial intelligence for personalized banking experiences affects promotion of financial process innovation by commercial banks in Jordan, as shown in table 1 overall index score of 3.65 with a standard deviation of 0.99. With a mean of 3.97 and a standard deviation of 1.19, question item (5), which claims that "automated transactions" came in first place while question item (2), which claims that "voice recognition" had least mean score of 3.28 and standard deviation of 0.92. Thus, implementation of artificial intelligence for personalized banking experiences positively affects promotion of financial process innovation by commercial banks in Jordan.
Research Question 2: How does implementation of artificial intelligence for credit risk management affects promotion of financial process innovation by commercial banks in Jordan

Table 2. Mean rating analysis of implementation of artificial intelligence for credit risk management affects promotion of financial process innovation by commercial banks in Jordan

<table>
<thead>
<tr>
<th>Implementation of Artificial Intelligence for Credit Risk Management Affects Promotion of Financial Process Innovation by Commercial Banks in Jordan</th>
<th>X</th>
<th>SD</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive analysis</td>
<td>3.78</td>
<td>1.02</td>
<td>Agreed</td>
</tr>
<tr>
<td>Market risk analysis</td>
<td>3.79</td>
<td>0.63</td>
<td>Agreed</td>
</tr>
<tr>
<td>Validating and back testing risk models</td>
<td>3.81</td>
<td>0.58</td>
<td>Agreed</td>
</tr>
<tr>
<td>Risk reporting</td>
<td>3.87</td>
<td>0.58</td>
<td>Agreed</td>
</tr>
<tr>
<td>Assess the creditworthiness of prospective borrowers</td>
<td>3.83</td>
<td>0.52</td>
<td>Agreed</td>
</tr>
<tr>
<td>Grand Means</td>
<td>3.80</td>
<td>0.67</td>
<td>Agreed</td>
</tr>
</tbody>
</table>

Source: Table extracted from SSPS.

Implementation of artificial intelligence for credit risk management affects promotion of financial process innovation by commercial banks in Jordan. As shown in Table 2, the overall index score of 3.80 with a standard deviation of 0.67. With a mean of 3.87 and a standard deviation of 0.58, question item (4), which claims that "risk reporting" came in first place while question item (1), which claims that "predictive analysis had least mean score of 3.78 and standard deviation of 1.02. Thus, implementation of artificial intelligence for credit risk management positively promotes financial process innovation by commercial banks in Jordan.

4.1 Hypotheses Testing

Hypothesis I: Implementation of artificial intelligence for personalized banking experiences does not promote financial process innovation by commercial banks in Jordan.

Table 3. Summary of t-test analysis of implementation of artificial intelligence for personalized banking experiences does not promote financial process innovation by commercial banks in Jordan

<table>
<thead>
<tr>
<th>Personalized Banking Experience</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean Difference</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132.87</td>
<td>173</td>
<td>.000</td>
<td>14.828</td>
<td>14.61 - 15.05</td>
</tr>
</tbody>
</table>

Note: *Significant at 0.05 level; df= 172; N= 174; critical t-value = 1.96

Source: Table extracted from SSPS

The calculated t-value is shown as (132.87) in the table above. The crucial t-value (1.96) was used to compare this result to in order to determine its significance at the 0.05 level with 172 degrees of freedom. The actual t-value, which was 132.87, was higher than the crucial t-value, which was 1.96. Consequently, the outcome was noteworthy. The result therefore means implementation of artificial intelligence for personalized banking experiences does positively promotes financial process innovation by commercial banks in Jordan.

Hypothesis II: Implementation of artificial intelligence for credit risk management does not promote financial process innovation by commercial banks in Jordan.
Table 4. T-test analysis of implementation of artificial intelligence for credit risk management does positively promotes financial process innovation by commercial banks in Jordan

<table>
<thead>
<tr>
<th>Credit Risk Management</th>
<th>Test Value = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Difference</td>
</tr>
<tr>
<td></td>
<td>15.563</td>
</tr>
</tbody>
</table>

Note: *Significant at 0.05 level; df= 172; N= 174; critical t-value = 1.96

Source: Table extracted from SPSS.

The above table presents the obtained t-value as (132.87). This value was tested for significance by comparing it with the critical t-value (1.96) at 0.05 level with 172 degrees of freedom. The obtained t-value (132.87) was greater than the critical t-value (1.96). Hence, the result was significant. Consequently, the findings indicate a substantial impact of implementation of artificial intelligence for credit risk management does positively promotes financial process innovation by commercial banks in Jordan.

5 DISCUSSION OF FINDINGS

The study shows widespread agreement that AI can provide a personalized banking experience and credit risk management as a result of implementation of artificial intelligence for financial process innovations for commercial banking in Jordan. The significance of this result is in consonance with the work of Cai, Zhu et al. (2020) who opines that financial innovation and performance was similar. Artificial intelligence and other innovations were seen as improving customer service and customization. Participants agreed to use artificial intelligence for credit risk management based on the results. The survey found nine AI-powered credit management apps. Jordanian banks saw opportunities to use artificial intelligence (AI) in credit evaluation and administration. Market risk analysis, predictive analysis, risk model validation and back testing, risk reporting, and future borrower creditworthiness evaluation are examples of AI in credit management. These methods use AI to improve credit management.

6 CONCLUSION

In conclusion, this study has addressed a significant issue concerning the integration of artificial intelligence (AI) within the operational framework of Jordanian commercial banks, with a primary focus on credit risk management. The study's overarching objective was to illuminate the transformative potential of AI adoption in enhancing financial operations within this specific context. The research hypothesis, succinctly put, posited that strategic integration of AI technologies could yield notable improvements in diverse facets of financial services, including credit assessment, risk analysis, financial projections, risk modeling, and customer experience enhancement within the domain of Jordanian commercial banking. The methodology employed for this investigation encompassed a systematic research design underpinned by survey methods. This approach facilitated the collection of pertinent data from a well-defined sample of participants drawn from major commercial banks in Amman, namely Arab Bank, Bank of Jordan, Capital Bank of Jordan, Jordan Kuwait Bank, and Arab Jordan Investment Bank.

The study's findings underscored the transformative potential of AI integration within the financial services landscape of Jordanian commercial banks. The analysis of gathered data revealed that, through the strategic application of AI-driven technologies such as machine learning, natural language processing (NLP), and computer vision, significant advancements can be achieved. These encompass the refinement of borrower credit assessments, meticulous
analysis of market risks, heightened accuracy in financial prognostications, rigorous validation of risk models, comprehensive risk reporting, and an advanced approach to evaluating borrower creditworthiness. Furthermore, the study highlighted AI's capacity to reshape customer service paradigms by offering tailor-made financial solutions that augment customer experiences and offer guidance toward optimal financial choices.

The significance of this research extends beyond its immediate scope. It contributes to a broader understanding of AI's potential for fostering financial innovation within the Jordanian banking landscape. By showcasing the myriad benefits of AI-driven credit risk management and customer service enhancement, this study advocates for the strategic adoption of AI as a catalyst for comprehensive operational refinement and enduring competitiveness.

However, study is not without its limitations. The sample size, while representative, may have inherent constraints, potentially influencing the generalizability of findings. Moreover, the utilization of a specific research approach may warrant exploration of alternative methodologies for a more comprehensive understanding. Looking forward, this study prompts further avenues of exploration. Future research could delve into the wider implementation of AI across various sectors of the financial industry, examine pertinent regulatory frameworks, and assess the long-term viability of AI-driven practices. To encapsulate, this study presents a comprehensive analysis of AI integration within Jordanian commercial banks' financial operations. By unraveling the transformative potential of AI, it furnishes a roadmap for strategic innovation, shaping the trajectory of financial institutions within a dynamic and evolving landscape.

REFERENCES


Balahur, A., et al. (2022). "Data quality requirements for inclusive, non-biased and trustworthy AI."


