Eurasian Academy of Sciences Social Science Journal (International Refereed & Indexed)
Eurasian Academy of Sciences Social Sciences Journal
2025 Volume: 63 S: 133 - 154
Published Online November 2025 (http://socialsciences.eurasianacademy.org)
http://doi.org/10.17740/eas.soc.2025.V63.08

USE OF ARTIFICIAL INTELLIGENCE IN FINANCE AND NEW NUMBER SYSTEMS

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Received Date: 03.09.2025 Revised Date: 16.10.2025 Accepted Date: 05.11.2025

ABSTRACT

Artificial intelligence is increasingly becoming a pivotal element in everyday life; its effects are widely felt across all sectors and professional domains. Within this scope, the accounting profession is likewise influenced by this transformation; and, from the perspective of every state's indispensable objective of preventing tax losses, artificial intelligence is assessed as capable of delivering significant advantages. In the reporting context, professional judgment is inherently a human process; therefore, it is concluded that artificial intelligence will not directly substitute the accounting reporting function. As in many fields today, opportunities and risks arising from digitalization and the use of artificial intelligence are actively debated in accounting; and it is observed that artificial intelligence focused on developing intelligent systems with human-like capabilities such as learning, planning, speaking, and problem-solving has begun to be applied in the accounting sector. The integration of artificial intelligence into accounting offers various conveniences for practitioners and users; however, it also points to potential issues that may emerge in the future. In banking, artificial intelligence applications are widely employed for obtaining market data, delivering banking services to customers, and facilitating communication; these applications are reported to strengthen banks' reputations, enhance customer loyalty, contribute to new customer acquisition, reduce branch workloads, and increase service delivery speed. Thanks to AI-enabled solutions, banks are accelerating their access to customers and expanding the range of services they can offer with each passing day. With the digitalization of financial services, making individual investment decisions in an increasingly varied, complex, and volatile financial environment is becoming more challenging; rapidly evolving technology particularly artificial intelligence applications stands out as an indispensable support tool for individual investors. The proliferation of AI-based investment instruments (such as robo-advisors and algorithmic platforms) brings to the fore questions of how individual investors' attitudes, susceptibility to influence, and usage tendencies toward these tools are shaped within their decision-making processes. The aim of this study is to examine this interaction in depth and to shed light on individual investors' acceptance and usage tendencies of artificial intelligence in decision-making.

Keywords: Artificial Intelligence, New Number Systems, Finance, Accounting

FİNANS ALANINDA YAPAY ZEKANIN KULLANILMASI VE YENİ SAYI SİSTEMLERİ

ÖZET

Yapay zekâ, giderek günlük yaşamın temel unsurlarından biri hâline gelmekte; etkileri tüm sektörler ve mesleki alanlar genelinde yoğun biçimde hissedilmektedir. Bu kapsamda muhasebe mesleği de bu dönüşümden etkilenmekte olup, her devletin vazgeçilmez hedeflerinden biri olan vergi kayıplarının önlenmesi açısından yapay zekânın önemli avantajlar sağlayabileceği değerlendirilmektedir. Raporlama sürecinde mesleki yargı doğası gereği insana özgü bir süreçtir; bu nedenle yapay zekânın muhasebe raporlama işlevinin doğrudan yerini almayacağı sonucuna varılmaktadır. Günümüzde birçok alanda olduğu gibi muhasebede de dijitalleşme ve yapay zekâ kullanımından kaynaklanan fırsatlar ve riskler aktif biçimde tartışılmakta; öğrenme, planlama, konuşma ve problem çözme gibi insan benzeri yetkinliklere sahip akıllı sistemler geliştirmeyi amaçlayan yapay zekâ uygulamalarının muhasebe alanında kullanılmaya başlandığı gözlemlenmektedir. Yapay zekânın muhasebeye entegrasyonu, uygulayıcılar ve kullanıcılar için çeşitli kolaylıklar sunmakla birlikte, gelecekte

ortaya çıkabilecek olası sorunlara da işaret etmektedir. Bankacılık sektöründe ise yapay zekâ uygulamaları; piyasa verilerinin elde edilmesi, müşterilere bankacılık hizmetlerinin sunulması ve iletişimin sağlanması amacıyla yaygın biçimde kullanılmakta; bu uygulamaların bankaların itibarını güçlendirdiği, müşteri bağlılığını artırdığı, yeni müşteri kazanımına katkı sağladığı, şube iş yükünü azalttığı ve hizmet sunum hızını yükselttiği bildirilmektedir. Yapay zekâ destekli çözümler sayesinde bankalar müşterilere erişimlerini hızlandırmakta ve sundukları hizmet yelpazesini her geçen gün genişletmektedir. Finansal hizmetlerin dijitalleşmesiyle birlikte, giderek daha çeşitli, karmaşık ve oynak hâle gelen finansal ortamda bireysel yatırım kararları almak zorlaşmaktadır; hızla gelişen teknoloji, özellikle yapay zekâ uygulamaları, bireysel yatırımcılar için vazgeçilmez bir destek aracı olarak öne çıkmaktadır. Yapay zekâ temelli yatırım araçlarının (robo-danışmanlar ve algoritmik platformlar gibi) yaygınlaşması, bireysel yatırımcıların bu araçlara yönelik tutumlarının, etkilenebilirlik düzeylerinin ve kullanım eğilimlerinin karar verme süreçleri içinde nasıl şekillendiğine ilişkin soruları gündeme getirmektedir. Bu çalışmanın amacı, söz konusu etkileşimi derinlemesine incelemek ve bireysel yatırımcıların karar verme süreçlerinde yapay zekânın kabulü ve kullanım eğilimlerine ışık tutmaktır.
Anahtar Kelimeler: Yapay Zekâ, Yeni Sayı Sistemleri, Finans, Muhasebe

1. INTRODUCTION

Artificial intelligence stands out as a concept that elicits broad curiosity upon first encounter across professions, fundamentally because an abstract phenomenon like “intelligence” is evoked together with the qualifier “artificial.” This characterization heightens interest in the concept; however, for many, there remains insufficient knowledge and systematic inquiry concerning its content and the themes it represents.

To grasp the notion of artificial intelligence in a sound manner, it is necessary to diverge from classical computer thinking based on data-processing paradigms. The issue is not merely executing algorithmic operations via computer programs, but rather detecting salient features in the environment and producing outputs appropriate to them. For example, when interacting with a computer without a keyboard, the system processes commands, performs tasks, and reflects results through units such as voice or graphical displays. It is also deemed feasible for the system itself to generate programs capable of performing these functions; a substantial portion of ideas once envisioned as science fiction are now accepted as realized. The rapid advancement and diffusion of computer technology play a decisive role in this development.

It is noted that examinations of artificial intelligence in the accounting field have a history of approximately fifty years; according to a study conducted by Manpower Group (2016), the accounting and finance domain is among the sectors most affected by artificial intelligence. In this direction, it is foreseen that AI technology can replace human activities in certain functions; at the same time, due to technological developments that transform the way accountants work, new demands emerge from the public, and owing to regulations introduced by institutions, activities concerning the future may involve uncertainty. Adaptation to innovation is regarded as essential for overcoming this uncertainty; many scholars share and advocate their views on the subject at the international level.

Over the last thirty years, with the widespread use of computers in the accounting profession, paper-, pen-, and ledger-based practices have been abandoned; the computerized era has rapidly gained prevalence due to efficiency achieved in recording, storage, and reporting processes. Nevertheless, in today’s swiftly evolving technological context, computerized data recording, storage, and reporting processes may prove inadequate in meeting the needs of information users who seek cost-effective, rapid, and accurate decision-making.

As in many professions today, digitalization and the use of artificial intelligence are discussed extensively in accounting; AI—prioritizing the development of intelligent systems endowed with human-like features such as learning, planning, speech, and problem solving—has begun to be applied in the accounting sector. The idea of integrating AI into accounting offers considerable conveniences for practitioners and users; however, it also carries cautionary signals regarding potential issues that may arise in the future.

2. CONCEPTUAL FRAMEWORK

2.1. The Use of Artificial Intelligence in Finance and New Number Systems

With the financial crisis triggered by the 2008 bankruptcy of Lehman Brothers Investment Bank, a new period commenced in which numerous economic and financial theories were tested. Keynes's "Liquidity Trap Theory" became the dominant instrument in post-2008 monetary policy employed by central banks institutions bearing the core responsibilities of managing the value of money and ensuring price stability ultimately leading policy interest rates to approach the zero lower bound. Central banks, which assumed a critical role in expanding the money supply and monetary base, have sought to stabilize economic recovery through low interest rates; reduce unemployment and trade deficits; and stimulate economic activity via a controlled increase in the general price level. In the finance field, extensive innovations and developments have been observed in addition to foundational topics such as capital flows, exchange rate regimes, balance of payments, derivatives, behavioral finance, portfolio theory and management, Basel regulations and capital adequacy, internet banking, distribution channels, and credit cards. It is noted that the services sector has experienced continuous innovation and transformation since the Bretton Woods and Smithsonian Agreements (Dirican, 2015).

In the digital economy era, as money takes on an electronic form, the money supply becomes liberalized; in response to the global financial crisis, major central banks are seen to have continuously increased liquidity. The rapid development of payment systems and the active participation of civil society organizations impose a requirement on financial intermediaries in the market and particularly on private-sector firms operating in banking and financial services to adapt more swiftly to the technologies of the new world.

2.2. The Use of Artificial Intelligence in Finance

As technological advancement and digitalization gain momentum, numerous financial institutions have pursued digital transformation to enhance service quality. With the rapid progression of technology, telecommunications, and media companies, digital transformation processes have accelerated; for various financial institutions banks foremost among them digital transformation has shifted from being a source of competitive advantage to becoming a necessity (Aysan et al., 2022). Accelerated further by the Covid-19 pandemic, digitalization has strengthened the integration of data analytics and artificial intelligence technologies, leading to notable changes in the financial sector. AI-enabled solutions have rapidly proliferated across diverse application areas in finance, including risk management and credit scoring, robo-advisory and asset management, fraud detection, and customer analytics; in parallel, efficiency in financial services has increased while customer experience has improved meaningfully (Topuzoğlu & Çevik Tekin, 2024).

Artificial intelligence has emerged as a critical instrument for effective financial management by enhancing the timing, automation, and accuracy of transactions within financial processes. Focused on developing investment strategies with maximal precision

and incorporating algorithmic trading applications that respond swiftly to fluctuations in financial markets, AI is recognized as making a substantial contribution to improving the accuracy of investment decisions (Özer, 2025).

The use of AI in finance offers broad opportunities in terms of technological innovation and is leveraged intensively in risk management processes beyond credit analysis and financial forecasting. Through these capabilities, AI can reshape classical financial processes, enabling them to proceed more efficiently, rapidly, and accurately. The rapid advancement of AI in the financial domain is emphasized as an unavoidable reality (Duan et al., 2019).

2.2.1. Robo-Advisory and Portfolio Management

Artificial intelligence is widely employed in financial investment processes through applications such as financial analysis, investment forecasting, and portfolio analysis; with competencies like deciphering big data, modeling complex relationships, and identifying patterns, it continues to expand its sphere of influence. Owing to these capabilities, AI aims to produce more accurate results by increasing consistency in price forecasts; accordingly, the use of AI in financial prediction processes yields more efficient outcomes (Özer, 2025). For example, various AI methods such as Support Vector Machines (SVM) and backpropagation neural networks have been reported to exhibit more consistent performance relative to classical statistical approaches, standing out with higher prediction accuracy rates (Huang et al., 2004).

A study by Guo (2024) examining the implementation of deep learning–based models (MLP, CNN, LSTM, and Transformer) in long–short portfolio strategies offers a comprehensive comparison of AI-driven and traditional investment recommendations using S&P 500 and NASDAQ data. The models employed are evaluated with respect to financial performance indicators such as return, Sharpe ratio, and maximum drawdown; during testing, all deep learning models achieve a significant advantage over traditional methods in both Sharpe ratio and total return. These findings indicate that AI-enabled investment tools can provide an effective alternative in portfolio optimization and can generate higher and more accurate forecasts than conventional approaches.

Positioned as a portfolio management instrument leveraging AI-enabled technologies, robo-advisory offers a range of investment solutions at low cost and is regarded as a supportive method within digital client journeys. This technology uses different algorithms to manage investor portfolios; through these algorithms and techniques, decisions are generated under the influence of variables such as expectations, market conditions, and risk. Thanks to risk-adjusted approaches, robo-advisors are noted to outperform traditional methods across investment instruments (Özer, 2025).

Due to this performance improvement and various issues that may arise in human advisory processes, demand for robo-advisory has been increasing, while the influence of human advisory in financial processes has been declining. This trend introduces new and rational alternatives for investors by mitigating potential problems and biases they might encounter in human advisory (Brenner & Meyll, 2019).

2.2.2. Algorithmic (Automated) Trading and Execution

Algorithmic trading described as a pre-designed computational method that transmits numerous investment orders automatically is also referred to as automated trading. Algorithmic trading systems autonomously execute trading decisions via pre-specified

software, within which applications based on technical analysis, text-based (news/sentiment) analysis, and high-frequency trading strategies are implemented. Algorithms require market data to generate investment forecasts; they analyze these data to produce predictions and derive investment strategies by identifying temporal indicators in financial datasets through various methods. This technology is characterized by complex and dynamic system properties and is employed to anticipate market dynamics and support effective investment decision-making (Özer, 2025).

Through robo-advisory and algorithmic execution technologies, investors can make faster and more efficient decisions; because artificial intelligence is a core component of these technologies, it constitutes a critical element in trading and investment processes. The role of AI in these processes is expected to strengthen progressively; accordingly, practice-oriented studies in this framework have become a necessity.

2.2.3. Fraud Detection

Issues such as forgery and fraud, frequently encountered in financial processes, can be identified using artificial intelligence techniques, which go beyond traditional reliance on historical data by detecting anomalies within large datasets. Machine learning algorithms exhibit meaningful accuracy rates in identifying such cases; accordingly, various financial institutions—banks foremost among them employ AI-based tools to analyze instances of forgery and fraud. These tools play a significant role particularly in detecting different forms of financial abuse, such as insurance fraud and credit card fraud (Topuzoğlu & Çevik Tekin, 2024).

2.2.4. Credit Scoring and Risk Management

Artificial intelligence is leveraged intensively in the banking sector for various purposes, primarily credit scoring, as well as customer relationship management and fraud detection. The use of AI in banking has been reported in the literature to reduce operational costs and increase profitability (Königstorfer & Thalmann, 2020; Narang et al., 2024). AI-enabled credit scoring and rating systems demonstrate high accuracy in forward-looking prediction performance; by mitigating different credit risks—default foremost among them—they facilitate access to credit for individuals and institutions that previously lacked access to banking services (Tigges et al., 2024).

Support Vector Machines, genetic algorithms, and especially artificial neural networks are among the leading techniques in the context of credit scoring; neural networks are positioned as one of the artificial intelligence methods within information technologies. These models are widely employed to forecast financial and economic time series and are used as flexible function approximators when deciphering complex patterns in financial outputs. The Artificial Meta-Plasticity Neural Network (AMMLP) approach is reported to deliver higher performance in credit scoring compared to current classification algorithms in situations where rare events are critically important (Özer, 2025).

While AI applications have produced noteworthy outcomes in enhancing access to credit and creditworthiness for borrowers with limited access to services, they also raise concerns due to various legal, ethical, and regulatory issues including bias. Consequently, the need to strengthen oversight and governance mechanisms has been a subject of discussion.

2.2.5. Customer Service Management and Chatbots

In the realm of customer relationship management, the use of new technologies to deliver and enhance a high-quality customer management process while reducing costs has become increasingly prevalent (Esmer & Şaylan, 2021). Artificial intelligence, in particular, can conduct customer-specific, personalized marketing activities and can be readily integrated into branding and customer management processes in both developed and developing countries (Kumar et al., 2019). AI-based customer service management improves operational efficiency and customer experience, thereby raising satisfaction levels a finding supported in the literature (Prentice & Nguyen, 2020). By personalizing, standardizing, and enhancing customer interactions, AI elevates customer service management, generating positive affect in the process and influencing customers' cognitive and emotional evaluations (Huang & Rust, 2020; Han et al., 2022). Strengthening perceived usefulness is identified as a fundamental requirement for enhancing customer experience (Ameen et al., 2020).

AI-powered chatbots have become widely used applications in customer relations; deep learning techniques, in particular, play a decisive role in their development by increasing their capacity to interact with humans. Owing to these capabilities, chatbots improve customer experience by enhancing customers' technological competence and their trust in the brand and system; research in marketing similarly shows that chatbots, by improving communication quality, generate positive outcomes in the customer management process.

In financial services, AI chatbots enable service improvements by facilitating service delivery that aligns with customer needs and preferences; these tools also play an important role in optimizing customer portfolios and maximizing investment returns. Within risk and forecasting management, data processing and predictive analytics are leveraged to generate more strategic investment decisions; however, chatbots humanized through anthropomorphic features may foreground psychological factors, exhibit risk-averse behavioral patterns in investment processes, and offer more cautious recommendations to investors (Mogaji et al., 2022; Khan et al., 2025; Cui, 2022).

The success of chatbots integrated into and widely used within financial technologies depends on levels of satisfaction, trust, privacy, and anthropomorphism; in the financial sector, these tools face various challenges related to privacy, integration, and security. It is emphasized that new conceptual models are needed to overcome ethical difficulties that arise particularly in online interactions (Özer, 2025).

2.2.6. Regulation and Compliance (RegTech)

With the use of artificial intelligence in finance, it becomes necessary to examine various biases and regulatory issues, chief among them employment loss. Establishing trust in the financial ecosystem through the proper application of technology is positioned as a strategic priority for both the finance and AI sectors. It is asserted that the creation of ethical principles for AI will enhance the value of AI-supported solutions and strengthen the legitimacy of decision-making processes (Aswin, 2024; Khurana, 2024; Narang et al., 2024).

In financial applications of AI, alongside positive effects, it is expected that fundamental requirements such as explainability, fairness, and robustness will be met. Developed Regulation Technologies (RegTech) increase alignment and efficiency between AI and financial processes, reduce costs, and by elevating accountability contribute to making financial services safer and more comprehensible (Giudici et al., 2023; Liang, 2024).

In light of these requirements, the Key AI Risk Indicators (KAIRI) framework is introduced, aligned with the principles of transparency, fairness, accuracy, and sustainability. This framework aims to mitigate different types of risks associated with the use of AI in financial services and, by supporting trustworthy and auditable AI processes, strengthens the resilience of the sector (Giudici et al., 2023).

2.3. AI and Digitalization Applications that Enhance Customer Experience and Engagement in the Financial Sector

It is noted that products and services emerging from the convergence of artificial intelligence and digitalization with finance positively increase the level of customer interaction. The current era is characterized as an AI-enabled digital age; this transformation has been made possible by declining data storage and processing costs, expanded accessibility, and rapid advances in AI technologies. The technology infrastructure strengthened by digitalization offers high automation potential and, when risks are controlled, contributes to improving the speed and accuracy of customers' decision-making processes (Saraylıoğlu, 2025).

AI technologies are reported to increase revenues through heightened personalization in customer and employee services, while reducing costs via high automation, lower error rates, and more efficient resource utilization. Analytics derived from large datasets enable the discovery of previously unobserved opportunities, thereby facilitating the development of innovative application areas.

In assessing the relationship between banking and AI, the primary aim is to analyze customer data to understand preferences and needs; through such analyses, personalized service and support capable of addressing customer queries and concerns in real time—are made possible. Moreover, through AI applications, banks can deliver tailored financial advice, targeted product marketing, proactive fraud detection, and shorter wait times on support lines (Kreger, 2023).

2.3.1. Face Recognition–Based Payment Applications

It is reported that the first examples of face recognition systems emerged in the 1960s, evolved with automated approaches in the 1970s, and came to prominence with AI technologies in 1988. Today, with technological advances, they have transformed into a mature application ecosystem pursued through multilayered stages (Baydemir, 2021). These stages are briefly presented below (Baydemir, 2021).

I. Knowledge-Based Face Recognition: This method, grounded in rule-based approaches, is designed to locate the face and extract distinguishing facial features; it rests on a cognitive model of how the human brain encodes typical faces.

II. Invariant Feature Based Face Recognition: Aiming to identify stable facial characteristics that remain unaffected by pose, viewpoint, and lighting conditions, this method uses invariant properties such as texture patterns and skin tone—for face detection and recognition.

III. Template Matching–Based Face Recognition: Standard face and facial-part templates are stored and compared with input images based on similarity; recognition is performed by analyzing the degree of resemblance to flexibly registered templates or individual reference images.

IV. Appearance-Based Face Recognition: Unlike template matching, this approach identifies faces using datasets constructed from images captured under different shapes, positions, and conditions; it encompasses a broad family of techniques, including linear discriminant analysis, discriminative common vectors, distribution-based methods, artificial neural networks, and decision support systems.

Contactless technology–oriented applications, which gained popularity prior to the Covid-19 pandemic and became critically important during the pandemic, have seen high demand in consumer markets. Contactless solutions have reduced labor costs and increased transaction volumes in financial contexts, aided by the effective dissemination of marketing promotions via mobile applications (Lee, 2023).

In large and rapidly developing economies such as China, Alipay's Smile to Pay, Tencent's WeChat Frog Pro, and solutions like UnionPay are positioned as leading examples in face recognition–based payment systems (Rousselot, 2021). As technological progress continues, it is expected that this new generation of contactless, face recognition–based payment systems will gain widespread acceptance in both developed and developing economies, including European countries, Japan, and the United States (Saraylıoğlu, 2025).

2.3.2. Application of the Internet of Things in the Financial Sector

Structures formed by connecting multiple computers or mobile systems are defined as "networks". The internet is characterized as a global network architecture that enables a vast number of devices worldwide to communicate with each other and, beyond merely supporting e-mail transmission and voice communication, provides access to an extensive set of information, data, services and applications (Saraylıoğlu, 2025).

The Internet of Things (IoT) is defined as an integrated system of smart devices that collect data for specific purposes and transfer the collected data to cloud environments via internet connectivity. Each device is assigned a unique identifier, enabling precise differentiation of data sources. It is stated that IoT has emerged through the seamless integration of wireless communication, sensor technologies and radio-frequency identification (RFID) systems, and that IoT not only enhances individuals' daily living comfort but also assumes a critical role in meeting the specific requirements of cities and industries, including the financial sector.

Architectures designed for IoT are predominantly built on wireless networks with the objectives of low energy consumption and high efficiency, while radio-frequency technologies diversify IoT data transmission methods by providing dedicated infrastructures for large-scale devices and broad physical surfaces. However, the seamless integration of IoT devices into different sectors, such as banking, insurance and capital markets, generates significant challenges for device developers. In particular, the need to ensure uninterrupted, secure and real-time data flow compatible with financial regulations increases the complexity of design and implementation processes.

Moreover, it is emphasized that IoT devices can operate even under harsh environmental conditions—for instance, devices deployed on the ocean floor that monitor changes in water temperature and thereby contribute to the early detection of natural disasters such as tsunamis and hurricanes (Saraylıoğlu, 2025). From a financial perspective, such IoT-based early warning systems play a strategic role in risk management, catastrophe modelling, insurance pricing and the protection of financial assets, by enabling more accurate assessment and proactive management of climate- and disaster-related risks.

2.3.3. Near Field Communication

Near Field Communication (NFC) technology is defined as a short-range wireless communication standard that enables data transfer between devices at distances shorter than 10 cm. In payment systems, NFC operates through a combination of a chip and an antenna embedded in the device; it typically allows rapid, low-friction transactions without requiring a PIN, while additional authentication (e.g. PIN or biometric verification) is mandated once predefined transaction limits are exceeded to ensure security.

NFC chips can be configured in devices to function as a passive card, an active reader, or to perform both roles simultaneously. Data transmission is conducted via radio-frequency signals in either active–active or active–passive communication modes. It is stated that NFC-based payment solutions such as Apple Pay and Google Pay have become increasingly widespread, and that the mobile Point of Sale (mPOS) market has expanded in parallel with this trend. However, the use of NFC-enabled mobile devices as POS terminals entails certain security risks, as such devices may remain more vulnerable to digital attacks compared with traditional, dedicated POS terminals (Gümüş et al., 2020).

NFC technology is considered to hold substantial potential for mobile payment systems. By using NFC-enabled smartphones, users are able to store multiple payment card credentials on their devices and execute payments simply by tapping the terminal. In contactless ticketing applications, NFC-compatible devices streamline ticketing and payment processes, particularly in public transportation and event management. The mobile payment ecosystem requires users to possess both an NFC-enabled phone and a secure mobile payment application, where sensitive payment data can be stored within a secure element. It is emphasized that, despite the apparent simplicity of contactless payment at the user interface level, NFC-based mobile payments are supported by a complex ecosystem involving financial institutions, payment service providers, device manufacturers and technology vendors, and that this ecosystem generates significant economic value for stakeholders in the financial sector (Saraylıoğlu, 2025).

2.3.4. Use of QR Code Technology in Financial Technologies

It is stated that banks have developed innovative solutions to enable their customers to perform card-free transactions at ATMs. Thanks to NFC technology available in smartphones, users are able to establish a connection with ATMs without using a physical card, and conduct cash withdrawal and deposit transactions digitally. This application allows cash withdrawals without any physical contact with the ATM, while making it mandatory for customers to log in via the bank’s mobile application using their customer ID and password. After selecting the cash withdrawal option in the application menu and entering the desired amount, the camera of the smartphone is activated, the QR code displayed on the ATM screen is scanned, and the transaction is completed once the code has been successfully read. It is emphasized that this process offers a faster and more convenient experience for users compared with traditional card-based methods (Gümüş et al., 2020), and that such digital innovations render banking services more user-friendly while enabling financial transactions to be executed in a secure and efficient manner.

In mobile payment processes, QR codes are reported to be employed through three main methods (Saraylıoğlu, 2025):

- A QR code generated by the merchant is scanned by the customer, and the payment information is automatically transferred to the customer’s mobile device.

- The customer scans a QR code and is redirected to a web page where the payment transaction is completed.
- A QR code that contains the customer's credit card or other payment information is presented by the customer and scanned by the merchant to execute the transaction.

Each of these QR code-based methods constitutes a fast, easily accessible and widely applicable solution, as they can operate independently of platform and require relatively low hardware investment. It is stated that these advantages significantly contribute to the increasing popularity of QR codes within mobile payment technologies and to their strategic positioning in the broader digital finance ecosystem.

2.3.5. Digital Assistants

The earliest examples of chat-based user interfaces were developed in the 1960s, when Weizenbaum initiated this field with ELIZA, a virtual chat system that simulated a conversation with a psychotherapist. Users interacted with ELIZA by typing natural-language expressions and forming grammatically correct sentences with appropriate punctuation; the program parsed these expressions, generated a response and then handed control back to the user, thus sustaining the interaction (Weizenbaum, 1966). Today, such interactions occur in text-based form through devices such as mobile phones, computers, smart televisions and smart speakers, and virtual assistants and chatbots have assumed permanent roles in many domains considered important by users (Saraylıoğlu, 2025). For instance, Siri on Apple devices was launched in 2011, Alexa on Amazon platforms in 2015 and Google Assistant in 2016 (Eren, 2021).

ChatGPT, a highly popular large language model developed by OpenAI, is stated to support users across various domains, including finance, technology, education and healthcare, by providing information, generating text, answering questions and assisting in the creation of creative content (ChatGPT, 2024).

Digital assistants, also referred to as virtual assistants or AI assistants, are defined as software agents that interact with users and perform various tasks by leveraging advanced technologies such as artificial intelligence and natural language processing. They are reported to have a broad task spectrum ranging from providing account balance information to generating personalized financial advice, and to serve institutional goals of transforming customer interactions and managing internal processes more efficiently (Balcıoğlu, 2023).

By means of AI and machine learning technologies, digital assistants are able to learn from each interaction and improve their accuracy and effectiveness over time. Through the analysis of customer behaviour and preferences, they enable financial institutions to deliver customized and proactive services that significantly enhance the customer experience. By providing continuous 24/7 service, they meet the accessibility and convenience expectations of modern digital customers and contribute to the transformation of customer service in the financial sector into a more interactive, personalized and customer-centric structure (Er and Yücel, 2023).

In the financial domain, digital assistants are reported to simplify and render more transparent the transaction process by requesting customer approval at each stage of the interaction. Customers gain an important advantage from the ability to easily access information regarding the scope and timing of the consent they provide. However, it is noted that the lack of algorithmic transparency in chatbots constitutes a barrier, particularly in

sensitive data domains such as identity-related or otherwise highly confidential information (Sağlam and Nurse, 2020).

Another challenge is associated with the processing of complex responses provided by users while interacting with the assistant. Instead of a simple answer such as “yes, I approve”, a user may reply with a more complex statement such as “okay, I approve, but you may not process any private information about my family, especially about my sibling!”. Such cases are stated to require more detailed examination and more advanced consent-management mechanisms.

An important advantage of digital assistants is their ability to centralise popular communication channels. In contemporary conditions, where businesses interact with customers through numerous tools such as Facebook Messenger, SMS and e-mail, banks are able to collect data effectively across all platforms via virtual assistants, rather than developing separate solutions for each channel. In this way, digital assistants eliminate the need for repeated development or adaptation for each individual application and can reduce the requirement for additional budget allocation by financial institutions that aim to improve user experience (Pantano and Pizzi, 2020).

2.3.6. Natural Language Processing (NLP) in the Financial Sector

Natural Language Processing (NLP), a subfield of artificial intelligence, is defined as a technical and quantitative discipline that employs computational algorithms and methods to analyse, interpret and generate human language. Positioned increasingly within the financial sector, NLP is reported to encompass capabilities such as sentiment analysis on financial texts, information extraction, and the generation of automated trading signals and risk alerts, while at the same time supporting decision-making and risk-management processes (Osterrieder, 2023).

The historical development of NLP is described as an evolution from early rule-based approaches to contemporary deep learning-based models. This progression is stated to have positioned NLP as a critical technology for the processing, analysis and interpretation of financial texts. The adoption of advanced NLP models is viewed as a significant milestone in the automation of financial services, enabling the emergence of modern digital assistants and providing an important perspective on the future trajectory of NLP-based financial applications (Oyewole et al., 2024).

NLP is reported to play a guiding role in the more efficient and accurate analysis of news, financial reports and other textual data produced in the financial sector, thereby enabling institutions and professionals to make more informed decisions and to detect trends and patterns. The main advantages of NLP in finance are summarised as follows (Oyewole et al., 2024):

- By analysing the sentiment expressed in financial news, professionals are able to gauge market reactions to specific events and formulate better-informed financial decisions.
- Systematic information extraction from financial documents—particularly annual reports, quarterly earnings announcements and other financial statements—constitutes an important application area of NLP. Through such systems, analysts can collect data rapidly and accurately in order to assess a firm’s performance, financial position and forward-looking expectations, and can, in light of the extracted information, propose more robust investment decisions.

- Via NLP technologies, suitable trading signals and risk alerts can be generated automatically. Real-time financial data and news flows can be analysed and, based on predefined criteria, transformed into automated trading signals and risk warnings. This process is stated to enable professionals to take faster and more accurate trading decisions while reducing the likelihood of human error.

2.3.7. Open Banking

Open banking is defined as a model in which banks share customer data within a legal framework and on the basis of the customer's explicit consent. The revised Payment Services Directive (PSD2), enacted by the European Union, is reported to impose on banks in Europe the obligation to share customer data with users and third parties where customer consent has been obtained. This data sharing is conducted via Application Programming Interfaces (APIs), whose core function is to enable the integrated operation of different applications and to allow one application to make use of functionalities that reside in another application's systems. In the FinTech ecosystem, API-based systems are emphasised to bear critical importance for accelerating and streamlining data sharing (Koç, 2024).

Open banking is stated to introduce an innovative approach to financial services by enabling users to manage their financial data and assets more effectively, thereby facilitating more informed financial decision-making. In this model, customer data are shared under clearly defined security standards and in accordance with regulatory requirements, which in turn supports the holistic monitoring of financial transactions and the selection of the most appropriate products and services. In studies examining users' motivation to adopt open banking, trust, expected effort (perceived ease of use) and performance expectancy (perceived benefits of using the application) are reported to emerge as key determining factors (Saraylıoğlu, 2025).

Open banking is described as a structure that not only provides advantages to individual customers but also fosters innovation and new areas of competition between banks and FinTech companies. This system is stated to transform the traditional roles of banks and to lay the groundwork for a new financial services ecosystem. At the same time, open banking gives rise to new questions in the domains of regulation and data privacy, thereby contributing to the adoption of different governance strategies across global markets. It is underlined that digitalisation offers banks the opportunity to strengthen customer relationships and to obtain competitive advantage in parallel with the transformation of traditional banking structures (Treasury & Risk, 2017).

2.4. The Impact of Artificial Intelligence and Digitalisation on Financial Risk

It is stated that the deep learning capabilities of artificial intelligence (AI) provide substantial contributions to financial institutions, particularly in the development of reliable and rapid solutions for risk management and decision support systems (Saraylıoğlu, 2025).

AI applications are reported to create a significant impact on the optimisation of strategies and decision-making processes in financial risk management by processing large-scale and complex financial data sets and delivering more in-depth analyses of potential risks. The main elements highlighted in this context are summarised as follows (Sari and Indrabudiman, 2024):

Rapid and Accurate Data Analysis: AI enables the processing of high-volume financial data within a short time frame, thereby allowing the swift detection of risk signals or anomalies relating to investments, market fluctuations and other economic indicators.

Risk Forecasting with Predictive Models: By using machine learning techniques, AI supports the construction of models that predict future risks on the basis of historical data, thus enabling institutions to identify potential problems in advance and to take appropriate preventive measures.

Efficiency in Decision-Making: Through real-time data analysis, AI systems generate automated recommendations and alerts, contributing to faster responses to changing market conditions and other risk factors.

Automation in Risk Management Processes: In areas such as security monitoring and the identification of fraudulent behaviour, AI detects suspicious activities automatically, thereby increasing operational efficiency and strengthening the effectiveness of internal control mechanisms.

Adaptation to Environmental Changes: Owing to their capability to learn continuously from new data and adapt to evolving market conditions, AI-based systems provide advantages in the management of dynamic and non-stationary risks.

The principal AI-based applications in financial risk management are exemplified as follows (Sari and Indrabudiman, 2024):

Fraud Prevention: AI is employed to detect suspicious activities in financial transactions, with the aim of preventing losses arising from fraudulent behaviour.

Credit Risk Assessment: AI models are used to assess the credit risk of potential borrowers more accurately, thereby enabling institutions to take more informed and risk-sensitive lending decisions.

Portfolio Management: AI contributes to the optimisation of investment portfolios by balancing risk and return profiles, thus supporting investors in achieving their objectives with lower risk exposure.

Operational Risk Management: In the identification and mitigation of operational risks, AI-driven approaches enhance efficiency and effectiveness, which in turn supports profitability and business continuity.

The interaction between AI and financial risk management is stated to have the potential to increase the levels of accuracy, speed and granularity in the identification, measurement and management of risks, and this impact is reflected positively on financial performance and operational resilience (Sari and Indrabudiman, 2024).

2.5. The Effects of Artificial Intelligence on Financial Management Practices

Artificial intelligence is defined as an interdisciplinary technology that enables machines and computer systems to acquire capabilities analogous to human intelligence, such as learning, reasoning, problem-solving, language understanding and decision-making (Topuzoğlu and Tekin, 2024). It is stated that, through continuously updated algorithms, AI not only performs predefined tasks but also attains the capacity to analyse events in greater detail and to generate forecasts when necessary. This development has led to positive transformations in many sectors and has allowed individuals and institutions in the financial domain to manage their financial processes more efficiently and in a more user-friendly manner.

For example, it is reported that algorithms analysing users' spending patterns within financial applications can provide detailed suggestions on saving, as well as

recommendations concerning accumulation and investment, which are presented via daily reminders or notifications. Many mobile finance applications are described as going beyond merely tracking users' expenses, income and budget status, and, by means of AI-supported algorithms, generating personalised financial advice (Pamuk, 2025). Furthermore, some applications can identify periods in which users tend to overspend and categories in which budget overruns occur, generate tailored alerts accordingly, and offer functionality that can be utilised not only by individual users but also effectively in the financial management of small enterprises.

AI is stated to have evolved in such a way that it enables the development of applications not only in finance but also in education, security, the arts and healthcare, thereby profoundly influencing the underlying infrastructure of each sector and triggering fundamental transformations and updates. Through these transformations and innovations, AI is reported to provide significant advantages at both the individual and global levels, with three main benefits summarised as follows (Pamuk, 2025):

Speed and Efficiency: Owing to the rapid analysis of large-scale data, user transactions can be processed quickly, and financial operations can be executed with reduced latency.

Reduction of Errors: By decreasing human-induced errors, AI makes it possible to minimise potential error margins from the outset in critical areas such as budget monitoring and financial planning.

Predictive Capability: On the basis of past transaction data, AI can perform risk analysis on individual budgets, evaluate variables such as income–expense balance, investment and savings, and offer forward-looking recommendations that support more robust financial decision-making.

2.6. Artificial Intelligence Applications and Banking

Artificial intelligence (AI) is defined as a field of science that examines intelligent human behaviour with the aim of enabling machines to act in a similar manner. The conceptual foundations of AI are stated to have been laid by Alan Turing, who proposed that a machine could understand and communicate effectively with a human interlocutor (Bughin et al., 2017). The design of intelligent computer systems that possess human-like cognitive functions such as perception, reasoning, learning, problem-solving and interaction with the environment is identified as a central objective of this discipline (Barr, Feigenbaum and Cohen, 1981).

AI is positioned as the capability to imitate human behaviour through various techniques and is reported to encompass a broad set of concepts, including machine learning, deep learning, cognitive computing, image recognition, natural language processing, augmented intelligence and intelligence amplification (Öztürk, 2024). Access to fundamental and technical financial analysis is described as having become faster and easier through AI systems that can collect and process large volumes of data and news flows. Deep learning is characterised as a technique used in the implementation of machine learning, while machine learning is presented as a preferred approach for achieving AI objectives (Chollet and Allaire, 2017).

It is stated that AI-enabled devices successfully perform their tasks by perceiving events in their environment and executing corresponding actions, and that the assumption of human-like cognitive functions such as learning and problem-solving by computers

constitutes a defining feature of AI. Inspired by the human body, the term “artificial neural network” is reported to have been introduced to denote computational architectures modelled on biological neural structures (Pirim, 2006).

The banking sector is described as increasingly turning to AI-based internet and mobile application services in order to maintain low cost levels, respond to the needs of a growing young population, remain competitive and prevent customer attrition. Bank managers are stated to bear the responsibility of closely monitoring technological innovations that emerge within a rapidly developing and changing digital environment (Sıebel, 2017). Technology-driven new products not only reduce costs but also enhance customer satisfaction and attract new clients; banks are reported to accelerate their digital transformation processes through virtual assistants, online applications, interactive voice response systems, websites and AI-supported solutions (Işkın, 2012; Gündoğdu and Akbaba, 2021).

AI is emphasised to offer significant benefits to users in the financial sector by making transactions faster and more secure, reducing operational costs and providing 24/7 accessibility. Banking transactions can be carried out securely through customer-specific configurations and robust encryption practices (Öztürk, 2024). In order to prevent loans from becoming non-performing, banks are reported to employ AI-based applications to examine customers’ key financial statements, identify potential problems at an early stage and take precautionary measures. In the areas of credit allocation and customer analysis, AI enables faster and more reliable assessments, thereby contributing to the reduction of credit and counterparty risks (Ceran, 2019).

2.7. Some Examples from Türkiye

2.7.1. Artificial Intelligence Application: Etiya

It is stated that Etiya launched its first artificial intelligence (AI) product in 2015 following its R&D activities in the AI domain, and that this solution was developed for customer service and call-centre environments in which written communication is intensive. The system is reported to analyse customer expressions across all channels, including e-mail, messaging and social media, and to generate automatic responses through its natural language processing (NLP) component, directing customers to human agents only where deemed necessary. In pilot implementations, this solution is stated to have reduced response times in written channels by 50% and, owing to its rapid content-understanding capability, to have delivered cost savings of around 40% in call-centre operations. This information is reported to be drawn from an NTV article covering Etiya as the provider of Türkiye’s first AI application (Anon, 2018).

Etiya is described as a leading software company that delivers AI-based, customer experience-oriented digital transformation through its award-winning product portfolio. Founded in 2004, the company is reported to operate with more than 850 qualified employees across three continents and eight countries (Aksu, 2019). Its microservices-based architecture, DevOps methodology and AI-centric portfolio are stated to provide agility and flexibility to business processes and to generate competitive advantage for its clients.

It is indicated that Etiya offers turnkey, end-to-end digital transformation solutions to numerous customers worldwide in sectors such as telecommunications, finance and retail, and that its business processes and commercial assets are certified in accordance with the latest TM Forum standards, namely TM Forum Frameworx version 17.5. The company is

reported to hold the highest number of TM Forum Business Process Framework Level 3 certifications among all vendors. Its portfolio is stated to integrate innovative AI technologies, including natural language processing, prediction and recommendation systems, and to enable the rapid delivery within a few months of products and solutions through the "Connected Customer First" approach, which prioritises digital customer experience and agile methodology.

Etiya is further reported to have received the TM Forum Disruptive Innovation Award in 2019 with its Fizz project and the Outstanding Catalyst Innovation Award with its Digital Twins proof-of-concept project, thereby demonstrating performance that goes beyond existing standards in customer relations, innovation and growth and expansion objectives (Anon, 2018).

2.7.2. Dahi.ai / Yapaytech

It is stated that Yapaytech was originally established as a technology company and that, as of 2013, it aimed to develop applications based on natural language processing (NLP) and machine learning algorithms. The company's most well-known product is reported to be the chatbot platform "Dahi.ai", which provides an infrastructure that enables users to develop their own conversational bots without requiring technical expertise in AI technologies. Machine learning algorithms are employed to ensure that conversational human–machine interactions progress as naturally as possible; however, it is noted that the product operates primarily on a rule- and condition-based logic. Although it is not positioned as a fully fledged AI technology in its essence, an AI-based model is stated to be embedded within the tool (Anon, 2017).

The application is described as having the potential to constitute a turning point for numerous initiatives that have thus far progressed quietly in the area of natural language processing for accelerated bot extensions on Facebook Messenger. Among the ventures seeking to capitalise on this opportunity is Yapay Teknolojiler, which develops virtual assistants capable of receiving Turkish voice and text commands from corporate clients and is reported to have opened its NLP APIs to all companies for broader use (Yıldız, 2023).

2.7.3. Veslabs / Jetlink

Jetlink is described as one of the chatbot development initiatives built on a local language-processing library and is positioned as a rapidly growing solution within this field. Through the Jetlink Chatbot Framework, the platform is reported to support both flow-based chatbot configurations and responses to customer needs via natural language understanding. In addition, a wide range of machine-learning-based recommendation mechanisms is stated to be offered through the live support panel, with the aim of facilitating the daily work routines of customer representatives and enhancing the efficiency of customer service operations (Yıldız, 2023).

Yapay Teknoloji is defined as a technology company focusing on natural language processing and machine learning, with its most widely known product being the chatbot platform Dahi.ai. Dahi.ai is reported to provide an infrastructure that enables users to build their own conversational bots without requiring any technical expertise, and this infrastructure is strengthened through data collection, text generation and prediction methods. Human–machine interaction within the chatbot environment is stated to be rendered as natural as possible with the support of learning algorithms, thereby contributing

to more seamless and efficient digital customer experiences in sectors such as finance, e-commerce and telecommunications (Anon, 2018).

2.7.4. Paym.es

Webrazzi is described as a media company that monitors developments in the internet domain in Türkiye and worldwide. Within this context, Paym.es is defined as a fintech initiative that enables secure purchase and sale transactions through chatbots developed for messaging applications. The platform is reported to aim at simplifying the e-commerce experience by eliminating complex forms and at making approval processes more manageable for users engaged in social commerce.

It is stated that Paym.es places particular emphasis on creating the perception that users are accompanied by an intelligence similar to the human mind during the transaction process. To this end, the platform aims to provide a personalised experience based on social media interactions, product characteristics and dialogue content. Various decisions—such as publishing products, filtering content, generating lists of popular products and resolving problems encountered in the purchasing process are reported to be undertaken automatically by the platform.

Paym.es is further stated to seek the development of a system capable of analysing dialogues between buyers and sellers and generating comprehensive responses, thereby enhancing the efficiency and fluidity of social commerce interactions (Anon, 2017). Decision-making mechanisms within the platform are reported to be supported by insights derived from user interactions, which contributes to more data-driven and user-centric financial transaction processes in digital commerce environments.

2.8. The Role and Effects of Artificial Intelligence in the Future of Financial Management

It is stated that, in the near future, multiple new features may be integrated into AI-supported personal finance and budgeting applications, and that several salient themes can be identified within this context (Pamuk, 2025). It is indicated that conversational interfaces may be embedded into financial tracking applications, enabling users to address queries such as “How much did I spend on bills last month?” directly and verbally to the application. In this way, individuals are expected to be able to interact with the system in everyday language, without requiring technical financial knowledge, and to exercise control over their financial transactions through intuitive dialogue-based interfaces.

It is further noted that, by adhering to security standards comparable to those used in banking applications, AI-powered systems may identify unusual or suspicious financial transactions in advance and alert users accordingly. By activating advanced security measures to prevent the completion of such transactions, these applications are expected to contribute to the protection of users against fraud and unauthorised activities. For users who experience difficulties in maintaining a balanced budget, small yet motivating mechanisms such as in-app rewards, badges and level-advancement tasks are envisaged as design elements that may support individuals in achieving their budgeting targets.

Moreover, it is stated that the scope of financial tracking applications may be expanded and deepened so as to transform them into integrated platforms that consolidate all financial transactions and include personalised virtual investment advisory services. Within this framework, AI-driven tools are expected to provide tailored recommendations

regarding savings, portfolio allocation and risk management, thereby supporting more informed and disciplined financial decision-making processes at the individual level.

In summary, AI-enabled budgeting and financial tracking applications are argued to have the potential to generate a profound transformation in financial management capabilities not only at the individual but also at the societal level. Through such applications, individuals may regulate their income and expenditures more effectively, remain protected against fraud risks, communicate comfortably with the system in natural language and perceive financial management processes as more engaging and attractive due to gamified mechanisms such as rewards and level progression.

3. CONCLUSION

It is stated that artificial intelligence has become a key factor in everyday life and that its effects are observed across all sectors and professions, including the accounting profession, which is described as being directly exposed to this transformation. In this study, the implications of artificial intelligence for the field of accounting are reported to be summarised as follows.

In the tax domain, it is indicated that AI offers several positive outcomes simultaneously, including the early identification of tax risks, the minimisation of human-induced error margins and the reduction of administrative costs associated with taxation. From the perspective of preventing tax losses which constitutes a fundamental objective of governments AI is reported to present a significant strategic advantage.

From an audit standpoint, it is expressed that all kinds of records and documents produced in digital environments and processed through algorithms may be subjected to audit procedures with a high level of assurance. The capacity of AI-driven systems to analyse large volumes of transactional and documentary data in real time is expected to strengthen risk-based auditing practices and to support more effective internal control mechanisms.

With regard to financial reporting, professional judgement is characterised as an inherently human process, and it is concluded that AI will not fundamentally alter the essence of the accounting reporting function. Instead, AI-based tools are expected to assume a complementary role, primarily by automating routine, data-intensive tasks such as classification, reconciliation and anomaly detection—so that accounting professionals may allocate more time to interpretation, strategic analysis and decision support.

It is noted that, over the last three decades, the accounting profession has moved away from paper- and ledger-based practices through the adoption of computer-assisted accounting applications, and that the use of computers has become widespread due to their ability to provide more efficient methods of recording, storing and reporting data. However, within today’s rapidly evolving technological environment, it is stated that these computer-based processes of data entry, storage and reporting are no longer sufficient to meet the expectations of information users who seek cost-effective, rapid and efficient decision-making tools.

In contemporary debates, digitalisation and the use of artificial intelligence in accounting are reported to have come to the fore, in parallel with developments observed in many other professions. With the emphasis on the development and utilisation of intelligent machines that emulate human capabilities such as learning, planning, speech and problem solving, AI is described as having started to gain a concrete foothold in the accounting sector. The idea of integrating AI into accounting is stated to provide various conveniences for both

practitioners and users, while at the same time pointing to potential problem areas for the future, including ethical concerns, data security issues and changes in professional roles and competencies.

It is further stated that AI applications are used by banks for acquiring market data, delivering banking services to customers and facilitating communication processes. These applications are reported to strengthen banks' reputations, support the retention of existing customers and the acquisition of new ones, reduce branch workloads and increase service speed. At the same time, it is emphasised that the operation of such systems requires a robust technological infrastructure and that, for this reason, banks continue to expand their technological investments, particularly in the field of software.

The shift of banks towards internet and mobile banking applications is explained by the need to remain competitive and to prevent customer loss, as well as by the objective of reducing costs and accessing a growing young customer base, in line with the demographic dynamics of the country. It is noted that banks seeking to reach their customers via the internet generally initiate the process through user-name creation and password delivery, thereby enabling customers to access banking services with their assigned credentials and confidential passwords (Parasız, 2016).

Owing to AI-based applications, banks are reported to be able to establish contact with customers more rapidly and to continuously broaden the range of services offered, in an environment where competition among banks remains intense and where institutions providing the most up-to-date and fastest services occupy a leading position in the market. With the development of internet and mobile banking, almost all branch-based transactions are stated to have become executable through digital channels. In order to adapt to the rapidly expanding competitive landscape, enterprises are reported to make use of technology with the aims of developing new products, reducing costs and increasing customer satisfaction, while simultaneously targeting the acquisition of new customers through innovative, AI-supported financial solutions.

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