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The use of artificial intelligence in financial services: Implications for banking

Cemil Senel[1], Muhammed Veysel Kaya[2]
1 Assoc. Prof, Ankara Haci Bayram Veli University,Türkiye
cemil.senel@hbv.edu.tr
2 Prof, Ankara Haci Bayram Veli University,Türkiye
muhammed-kaya@hbv.edu.tr

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Abstract

This study examines the expanding role of Artificial Intelligence (AI) in financial services, with a particular focus on its implications for the banking sector. Drawing on stakeholder theory and the resource-based view, the paper evaluates how AI functions as a strategic capability that enhances efficiency, decision-making, and customer-centric service delivery. Key applications—including customer analytics, credit scoring, fraud detection, and regulatory compliance—are reviewed alongside emerging ethical and governance challenges such as algorithmic bias, transparency, and data protection. The paper also analyzes Turkey's regulatory developments, highlighting the BRSA's digital banking framework and the growing integration of AI in local financial institutions. Policy recommendations are proposed to ensure responsible adoption through fairness audits, explainability standards, and institutional governance mechanisms. Overall, the study underscores AI's transformative potential in banking while emphasizing the need for robust oversight to balance innovation with consumer protection.

Keywords: Artificial Intelligence; Banking; FinTech
Jel codes: G21; O33

1. Introduction

The rapid proliferation of Artificial Intelligence (AI) technologies has fundamentally reshaped traditional banking models by enabling a transition from static, product-centered operations to dynamic, data-driven, and customer-centric service delivery. Modern banking institutions increasingly rely on AI tools to automate internal operations, strengthen decision-making processes, and deliver personalized financial services. According to McKinsey Global Institute, effective implementation of AI could generate up to **USD 1 trillion annually** for the global banking industry, particularly through improved customer targeting, enhanced credit scoring accuracy, and significant reductions in operational costs (Bughin et al., 2018).

The acceleration of digital transformation during the COVID-19 pandemic further amplified the necessity of AI-enabled services. Remote banking, heightened cybersecurity concerns, and changing customer expectations

forced financial institutions to adopt more adaptive and intelligent systems. The pandemic effectively functioned as a "stress test" for banks' digital infrastructures, revealing that institutions with prior investments in AI and automation demonstrated greater resilience and service continuity (Demirgil & Kara, 2020).

In Turkey, this global trend has been mirrored by regulatory advancements driven by the Banking Regulation and Supervision Agency (BRSA). The **2022 Draft Regulation on Digital Banking and Banking-as-a-Service** established the groundwork for integrating AI into digital-only banks, open banking ecosystems, and embedded finance applications. AI is now positioned as a central component of Turkey's national financial innovation strategy and a key enabler of financial inclusion goals.

Against this backdrop, this paper aims to provide a comprehensive overview of AI deployment in banking, synthesizing international best practices, academic insights, and Turkish regulatory developments. It evaluates major AI applications—such as customer analytics, fraud detection, credit scoring, AML/KYC compliance—and explores associated risks and governance dilemmas. By presenting a holistic discussion, the study seeks to contribute to ongoing debates concerning ethical, operational, and policy dimensions of AI adoption in financial services.

2. Theoretical Framework

The study is grounded in **stakeholder theory**, which emphasizes the importance of balancing diverse stakeholder interests (Freeman, 1984), and the **resource-based view (RBV)**, which positions AI as a strategic, hard-to-imitate capability that reinforces competitive advantage (Barney, 1991). From the RBV perspective, AI functions as a value-creating asset in banking, enhancing organizational learning, operational efficiency, and decision quality.

Furthermore, AI adoption in financial institutions can be understood through the **Technology Acceptance Model (TAM)**, which suggests that perceived usefulness and ease of use strongly influence employee and customer acceptance of technology. In addition, Gomber et al.'s (2017) **FinTech innovation diffusion framework** highlights how technological change in banking diffuses through market demand, regulatory adjustments, and competitive pressures. Combining these perspectives allows for a multidimensional interpretation of AI adoption—both as an operational enabler and a strategic necessity.

3. Applications of AI in Banking

AI has been integrated into banking operations across numerous areas, each contributing to efficiency, personalization, and risk mitigation. The most prominent application domains are summarized below.

3.1 Customer Service and Interaction

AI-driven **Natural Language Processing (NLP)** tools and chatbots have revolutionized customer communication. Banks worldwide utilize virtual assistants capable of resolving common queries, conducting transactions, and offering personalized advice 24/7. Arner et al. (2017) argue that such systems reduce service costs while improving response speed and customer satisfaction.

In Turkey, several major banks—including İşbank, Akbank, and Garanti BBVA—have deployed advanced NLP-based assistants that integrate with mobile applications, enabling conversational banking and biometric security features.

3.2 Credit Scoring and Lending

AI enhances credit scoring models by incorporating **alternative data** sources such as behavioral patterns, digital footprints, and consumption habits. These data-driven models outperform traditional logistic regression-based scoring tools by identifying nonlinear relationships and reducing default risk (Bastani et al., 2019).

Machine learning techniques have also made lending decisions more inclusive, allowing unbanked or thin-file customers to gain access to credit (Jagtiani & Lemieux, 2019). For emerging markets like Turkey, this offers significant potential for expanding SME financing and microcredit penetration.

3.3 Fraud Detection and AML Compliance

Financial fraud and money laundering represent significant challenges for global banks. AI-based anomaly detection systems leverage **neural networks** and **unsupervised learning** to identify suspicious transactions in real time (Levi et al., 2020). Such systems adapt dynamically to evolving fraud patterns, unlike rule-based detection mechanisms that require constant manual updates.

The European Banking Authority (EBA, 2021) highlights AI's role in improving AML compliance by reducing false positives and enhancing case prioritization.

3.4 Regulatory Compliance and KYC Automation

RegTech applications enabled by **Robotic Process Automation (RPA)** and AI have automated routine compliance tasks such as customer verification, reporting, and monitoring. AI improves the accuracy of KYC processes by detecting document forgery, validating identities, and cross-referencing large datasets.

For Turkish regulators—which have increasingly emphasized financial integrity—AI offers a valuable tool to strengthen oversight and reduce regulatory burdens.

4. Risks and Ethical Considerations

Despite notable efficiency gains, AI systems pose several ethical, legal, and governance risks that must be addressed to ensure responsible adoption.

4.1 Algorithmic Bias and Fairness

AI systems trained on biased datasets may inadvertently discriminate against certain demographic groups. Barocas et al. (2019) warn that algorithmic bias can lead to unfair lending decisions, creating long-term reputational and regulatory consequences. Bias audits and diverse training datasets are therefore essential.

4.2 Transparency and Explainability

Many ML models—especially deep learning architectures—operate as "black boxes," making their decision-making processes difficult to interpret (Doshi-Velez & Kim, 2017). For high-risk domains such as credit scoring or fraud detection, lack of explainability undermines trust and complicates regulatory supervision.

4.3 Data Protection and Cybersecurity

AI systems require massive amounts of personal data, raising concerns over privacy and security. Under the **EU GDPR**, financial institutions must ensure data minimization, explicit consent, and strong cybersecurity controls (Voigt & Von dem Bussche, 2017). Turkey's **KVKK** imposes similar obligations, signalling the need for robust governance mechanisms.

5. AI in the Turkish Banking Context

Turkey has witnessed a growing momentum toward AI adoption in banking. Key national developments include:

- **BRSA (2022)** draft regulations encouraging AI use in digital-only banks and open banking ecosystems.
- **SPK and Borsa İstanbul**, which promote AI in algorithmic trading, market surveillance, and portfolio optimization.
- Academic studies such as Yücel and Elitaş (2021), who examine ESG responsiveness linked with AI-driven sustainability analytics.
- Industry reports—e.g., TUBİSAD (2022)—highlighting AI applications in customer service, risk modeling, and compliance automation.

Turkish banks have shown considerable progress, yet challenges remain regarding talent acquisition, regulatory clarity, and ethical governance.

6. Policy Recommendations

To ensure safe, transparent, and inclusive AI adoption, the following regulatory and institutional actions are proposed:

6.1 Regulatory Recommendations

- Develop **explainability standards** for high-risk AI algorithms in line with EBA (2021).
- Harmonize BRSA's digital banking framework with EU AI Act principles.
- Establish mandatory **algorithmic fairness checks** for credit scoring and fraud detection systems.

6.2 Institutional Recommendations

- Create **AI ethics committees** within banks to oversee fairness, transparency, and accountability.
- Invest in bias detection tools, model-monitoring systems, and adversarial robustness testing.
- Enhance cross-border cooperation to promote interoperability of AI risk management standards.

7. Conclusion

AI represents a paradigm shift in modern banking, enabling financial institutions to operate more efficiently, innovate rapidly, and deliver personalized services at scale. Banks that integrate AI strategically are likely to gain superior competitive advantage, operational agility, and customer loyalty.

However, the adoption of AI is not without risks. Algorithmic bias, lack of explainability, and data privacy concerns demand rigorous governance frameworks. Regulators must remain agile, refining legal standards for transparency, fairness, accountability, and risk management.

In Turkey, aligning national regulatory structures with global best practices is critical to promoting innovation while safeguarding consumer rights. As AI continues to evolve, future research should explore its socio-economic impacts in emerging markets, its implications for labor markets within the financial sector, and its role in fostering financial inclusion.

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