

# Research on AI-Based Smart Finance Innovation Models and Their Impact Mechanisms

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**Abstract.** With the rapid advancement of artificial intelligence (AI) technology, smart finance is undergoing profound transformation. This paper systematically investigates three core applications of AI in the financial sector: in risk management, machine learning is used to integrate multi-source data, significantly improving the accuracy of credit assessment and the effectiveness of fraud detection; in investment decision-making, alternative data analytics reshape the paradigm of fundamental research; and in customer service, AI enables intelligent and personalized user experiences. The study also analyzes the symbiotic relationship between the digital economy and smart finance, revealing how the restructuring of data elements reshapes the financial value chain. At the level of innovation models, this paper focuses on the practical pathways and challenges of robo-advisory, digital lending, blockchain finance, and financial cloud services. The findings show that in China, current AI applications in finance still face bottlenecks such as data privacy concerns, algorithmic opacity, and lagging regulation, particularly in emerging areas like digital lending and robo-advisory.

**Keywords:** Artificial Intelligence; Smart Finance; Fintech; Blockchain; Risk Control.

## 1. Introduction

In the era of the digital economy, artificial intelligence (AI) is profoundly reshaping the financial services ecosystem. As a core driving force of financial innovation, AI has evolved from a supportive tool to a catalyst for systemic transformation. It is widely applied in key areas such as risk management, investment decision-making, and customer service. By analyzing non-traditional data sources such as social media behavior and logistics information, machine learning significantly improves the accuracy of credit scoring models. Meanwhile, blockchain-based smart contracts have reduced cross-border settlement times from the traditional three days to just three minutes, injecting new momentum into digital trade. At the same time, the deep integration between smart finance and the digital economy has given rise to platform-based ecosystems, but it also raises concerns related to data monopolies, algorithmic bias, and privacy leakage.

However, the practical implementation of AI in the financial sector still faces non-negligible bottlenecks. These include algorithmic opacity, which undermines model interpretability; underdeveloped mechanisms for data privacy protection; and a regulatory lag that cannot keep pace with rapid technological advances. In some developing countries, phenomena akin to "data feudalism" have even emerged. To address these issues, it is necessary to conduct systematic research from both macro-institutional and micro-technical perspectives to clarify how AI embeds into financial systems, transforms financial models, and introduces new risk mechanisms and regulatory gaps. This study aims to explore the following core questions: 1. What are the typical application models of AI in the financial sector today? 2. What are the similarities and differences in the challenges faced by different countries or regions in developing smart finance? 3. How can institutional design and technical governance promote the sustainable development of AI-enabled finance?

In terms of methodology, this paper adopts a mixed approach that combines literature review, case analysis, and comparative study. On one hand, it synthesizes recent literature on AI applications in finance to extract common models and risk categories. On the other hand, it examines representative

cases from China, the United States, and Indonesia to analyze technological implementation paths and regulatory responses, revealing the differentiated evolution of AI-empowered finance.

This research has both theoretical and practical significance. Theoretically, it helps build a systematic framework and evaluation dimensions for AI applications in finance. Practically, it provides valuable insights for financial institutions to optimize AI deployment strategies and for regulatory bodies to refine policy tools—ultimately supporting a development trajectory for smart finance that is safer, more transparent, and more equitable.

## **2. A Review of AI Technology Applications in the Financial Sector**

### **2.1 Smarter and More Efficient Risk management**

AI has brought revolutionary breakthroughs to financial risk control: by leveraging machine learning techniques to deeply analyze massive datasets, AI captures nonlinear relationships that traditional methods struggle to detect, significantly improving the accuracy of credit scoring models. Additionally, AI transcends the limitations of traditional financial data by integrating non-traditional data sources such as social media behavior and consumer preferences, constructing multi-dimensional and comprehensive user credit profiles. This enables automated credit decisions with response times measured in seconds, greatly enhancing service efficiency and customer experience. Furthermore, through behavioral pattern analysis and anomaly detection, AI accurately identifies fraud risks—such as sudden large transactions—thus building a robust financial security network. These four innovations collectively propel risk control systems towards intelligent, real-time, and precise development[1].

### **2.2 Rdefine Investment decision-making**

AI not only rapidly analyzes market data but also processes novel information such as satellite imagery and social media trends. Some fund companies have achieved astonishing annualized returns of 71.8% using AI trading strategies. Morgan Stanley, for example, analyzes satellite images of shopping mall parking lots to predict retail performance. Robo-advisory services adjust investment plans according to users' consumption habits and currently manage assets exceeding \$340 billion.

### **2.3 Improve Customer Service Experience**

With continuous advancements in AI technology, intelligent customer service systems have enhanced their performance and functionality. By integrating AI with natural language processing and other technologies, intelligent customer service can provide faster, more accurate, and smarter support. These systems offer personalized assistance based on users' needs and history, improving customer satisfaction. Moreover, intelligent customer service operates around the clock, unrestricted by time or location, enabling users to receive help anytime and anywhere[2].

### **2.4 The Symbiotic Relationship between the Digital Economy and Smart Finance**

The integration of the digital economy and smart finance has transcended mere technological applications, forming a bidirectional, reconstructive ecosystem. The essence of this relationship lies in the mutual shaping between data elements and financial functions. On one hand, behavioral data generated by the digital economy—such as mobile payment trajectories and social network activity—are deconstructing traditional financial credit assessment systems. Compared to static credit reports, these real-time, multidimensional data streams capture richer user profiles, ranging from consumption smoothness to risk preference tendencies[3]. Empirical studies by the World Bank indicate that countries adopting digital behavioral data have increased their financial inclusion coverage by an average of 29%. However, the distribution of these data dividends is uneven: leading tech companies gain data control through platform monopolies, weakening the bargaining power of small and medium enterprises[4]. For example, in Indonesia, small businesses' e-commerce operational data

are mandatorily used for credit evaluation, but they cannot freely choose their loan providers, resulting in a new form of “data feudalism.”

On the other hand, the technological evolution of smart finance is reshaping the operational logic of the digital economy. Blockchain-based smart contracts, through their “code-as-law” autonomous mechanisms, have compressed cross-border settlement times from the traditional three days to three minutes.[5] This leap in efficiency has directly activated global digital trade: for instance, cocoa farmers in Africa can connect directly with European buyers via DeFi protocols, eliminating intermediary bank fees and increasing profits by 40%[6]. However, technological empowerment also comes with a restructuring of systemic risks—the 2022 collapse of the Terra stablecoin exposed the fragility of algorithmic economies. When panic on social media combined with on-chain liquidation algorithms to create a positive feedback loop, \$40 billion in market value evaporated within three days, and the traditional financial “lender of last resort” mechanism completely failed in this scenario[7].

### **3. Major Innovative Models of Smart Finance**

#### **3.1 Robo-Advisor**

Robo-advisors leverage natural language processing, big data analytics, and algorithmic modeling to provide investors with low-cost, customized, and round-the-clock asset allocation services. This model significantly lowers the threshold for wealth management, allowing clients with low to moderate net worth to access professional financial services. For example, platforms such as Wealthfront and Betterment have attracted a large user base in the U.S. market[8]. In China, platforms like Tencent Licitong and Ant Fortune have integrated robo-advisory functions to enhance user engagement and investment activity. The core of robo-advisory lies in its algorithms and data, and the level of returns and portfolio volatility largely depend on model accuracy and data quality.[8] Nevertheless, this model still faces challenges such as the “black box” nature of algorithms and controversies over the legality of investment advice, calling for stronger regulatory adaptation and further research on algorithm interpretability.

#### **3.2 Digital Lending Model**

Digital lending is one of the fastest-growing areas in smart finance. By mining unstructured data such as user behavior, consumption records, and social relationships, this model enables accurate credit assessments and rapid loan issuance for individuals and small businesses. Compared to traditional lending processes, digital lending offers significant advantages in terms of risk control efficiency, approval speed, and customer acquisition costs. For example, JD Finance’s “Jingdong Baitiao” and Ant Financial’s “Jiebei” leverage extensive e-commerce ecosystem data to both manage risk and expand their user bases to hundreds of millions[9]. However, digital lending has also given rise to social issues such as financial exclusion, excessive borrowing, and privacy breaches. Regulators must strike a balance between encouraging innovation and preventing systemic risks.

#### **3.3 A Blockchain-Based Financial Model**

Blockchain technology, characterized by its decentralization, traceability, and tamper-resistance, offers innovative solutions for a variety of financial scenarios. In particular, it has significantly reduced transaction costs and improved transparency in areas such as cross-border payments, bill circulation, and supply chain finance. For instance, Ripple’s blockchain-based payment network enables global settlement within seconds, drastically shortening the transfer time compared to the traditional SWIFT system. In China, banks such as China Merchants Bank and WeBank have launched pilot applications of blockchain in services like letters of credit and digital bills, contributing to the development of a distributed financial infrastructure[10]. However, blockchain applications still face challenges such as performance bottlenecks, lack of unified standards, and unclear legal recognition, which require further refinement over time.

### 3.4 Financial Cloud Service Model

Financial cloud services provide technological support such as elastic computing, secure storage, and distributed databases, helping traditional financial institutions migrate their information systems to the cloud and promoting the implementation of the “Banking as a Service (BaaS)” concept. Alibaba Cloud, Tencent Cloud, and other providers hold significant positions in the domestic financial cloud market, offering strong technical support to small and medium-sized banks, internet insurance companies, and others. This model enhances the flexibility and scalability of financial operations, but concerns around cloud security and data sovereignty remain major issues for enterprises[11]. Therefore, the development of financial cloud services relies not only on technological advances but also requires continuous policy and regulatory support.

## 4. Discussion

In China, the integration of artificial intelligence and finance is advancing rapidly, particularly in areas such as robo-advisory services, digital lending, and financial cloud services. However, this development also faces several potential challenges. The first one, **data privacy protection remains insufficient**. Although the *Personal Information Protection Law* has been enacted, there is still a lack of detailed regulation regarding the collection and use of user behavior data in financial scenarios. In digital lending, for example, issues such as "passive authorization" or even "excessive authorization" are common, raising serious concerns about privacy breaches and data misuse. What is more, **the lack of algorithmic transparency and interpretability** is a critical issue. Most current AI models rely on "black box" decision-making logic, making it difficult for users and regulators to understand how decisions are made or how risks are evaluated. This not only undermines public trust but also weakens financial risk control capabilities. The next, **regulatory technology (RegTech) development is lagging behind**. Traditional regulatory frameworks are struggling to keep pace with the rapid evolution of AI models and the increasingly fluid nature of cross-platform data flows. There is a clear lack of real-time monitoring and risk warning systems tailored to AI-powered financial products. Looking ahead, the development of smart finance in China should focus on several key areas: improving legal and regulatory frameworks that emphasize data rights and privacy; accelerating research into explainable AI to enhance transparency and accountability of models; and promoting RegTech infrastructure to build an intelligent, data-driven prudential regulatory system. Only through coordinated progress in institutional reform and technological innovation can China’s smart finance transition from “technology-driven growth” to “regulatory-led governance,” paving the way for a safer, more transparent, and inclusive financial ecosystem[12][13].

## 5. Conclusion

This study systematically examines the current applications and development trends of artificial intelligence (AI) technology in the financial sector, yielding the following key findings:

First, AI technology has deeply penetrated the entire financial service workflow. In risk management, machine learning algorithms significantly enhance the accuracy of credit assessment and the effectiveness of fraud detection by integrating multi-source heterogeneous data. In investment decision-making, the introduction of alternative data such as satellite imagery and social media analytics has revolutionized traditional research paradigms. Meanwhile, AI-powered customer service systems leverage natural language processing to deliver highly efficient user experiences. Second, the research reveals that smart finance development is characterized by a distinct technologically-driven paradigm. Emerging technologies such as blockchain and cloud computing are fundamentally reshaping financial infrastructure and operational models. Efficiency gains are particularly pronounced in core areas including payment clearing, asset management, and credit services.

However, the study also points out important problems: a lack of clear algorithms, weak data privacy protections, and outdated regulations are all holding back the long-term growth of smart finance. These challenges reflect both technical bottlenecks and institutional misalignment. This research has certain limitations. The scope lacks sufficient coverage of emerging market cases, while the depth of analysis regarding technological ethics requires further strengthening. Future studies should focus on: 1. exploring innovative applications of AI in inclusive finance, 2. optimizing regulatory frameworks for smart finance, and 3. analyzing coordination mechanisms for global digital financial governance.

Overall, the integration of AI and finance has entered a phase of deepening development. Achieving healthy and sustainable progress in smart finance necessitates balancing technological innovation with risk prevention, while harmonizing efficiency gains with equitable access. This requires continuous technological breakthroughs alongside systematic improvements in institutional frameworks.

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