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Intelligent Service Robots in Banking: What Drives Organizational Adoption Intentions?

Lu Tong*, Qianying Song, Wenting Zhang

School of Economics and Management, North China University of Science and Technology, No. 21, Bohai Avenue, Caofeidian New Town, Tangshan City, 063210, Hebei Province, China

*Corresponding Author Email: tonglu@ncst.edu.cn

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Abstract

With the vigorous and healthy development of China's new financial industry and the breakthrough development of artificial intelligence and robotics, the financial industry is constantly accelerating its own digital and intelligent transformation to enhance its core competitive advantage. The application and development of intelligent robots is not only an epitome of its development process, but also a top priority in promoting its transformation and upgrading. Based on the research and analysis of the core motivations of financial institutions to deploy intelligent robots, this paper comprehensively focuses on the differences in the development of intelligent robots at home and abroad, especially analyzing the application process of intelligent robots in Chinese financial institutions under the strong support of the Chinese government, deeply understands the application motivations behind it, and explores the significant roles and contributions of intelligent robots in reducing the operating costs of the financial industry, reducing operating risks, building intelligent integrated platforms, and forming new competitive advantages. Furthermore, it provides development suggestions focusing on different application motivations, and proposes to further deepen the integrated development of artificial intelligence and the financial industry through specific methods such as strengthening reasonable supervision and establishing a multi-level talent system, improve the operating efficiency and profitability of financial institutions, bring about a leap in product and service quality, promote the transformation and upgrading of the financial industry, and win broader prospects and development space.

Keywords: Intelligent Robots, Financial Industry, Adoption Drivers, Industrial Integration

Introduction

In the new era and new journey, China actively promotes the healthy and sustainable development of new financial formats, allowing the three major financial formats to play a greater role in the comprehensive construction of a socialist modernized country. The new financial formats that have emerged in the development of China's financial industry include inclusive finance, green finance, and technology finance (Yan,2024). The current research mainly focuses on the background of technology finance, integrating technological innovation

into the traditional financial industry. The financial industry is committed to building a modern financial service system that is in line with China's national conditions, actively promoting digital transformation, continuously increasing investment in intelligent robots, and achieving deep integration of digital technology with practical application scenarios and business processes. In this process, intelligent robot systems, as a fusion model of digital technology and cutting-edge technology, are gradually penetrating into the construction of the new generation of financial institutions. It plays a crucial role in promoting the transformation of the financial industry towards digital services, providing high-quality services to customers, and enhancing overall competitiveness (Di,2024). The main purpose of this study is to explore in depth the motivations behind the use of intelligent robots in the financial industry. Through the study of a complex dynamic network composed of various entities, the research assists the bank's management, as the core decision-making body, in further promoting the in-depth development of intelligent robots in areas such as reducing operational costs and improving business processing efficiency. And by proposing recommendations such as establishing a robust data security system and a multi-tiered talent development system, it not only meets customers' demands for more convenient, precise, and personalized service experiences but also enhances bank employees' willingness to cooperate when facing the pressure of technological replacement, thereby providing a deepening of theoretical significance and an expansion of practical implications for the collaborative development of different entities in this regard.

Development of Intelligent Robots

The development of intelligent robots abroad has the following characteristics: firstly, continuous innovation in key technologies to promote industrial development; Secondly, the application fields are constantly expanding and penetrating into people's daily lives; Thirdly, countries should develop unique intelligent robots based on their own advantages. When ChatGPT, AutoGPT, humanoid robots, and RPA all burst onto the scene in 2022-2024, the banking industry did not exhibit the traditional "technology adoption cycle", but rather presented a situation where "urgency" and "competitiveness" coexisted. Industrial Bank, Construction Bank, JPMorgan Chase, and DBS Bank successively released multiple news about "robots taking up positions" within six months, forming a rare "institution - technology - market" resonance.

With the continuous advancement of global intelligent robot technology and the growing market demand, the development of intelligent robots abroad will be even more rapid in the future, which will have a profound impact on human society. The development of intelligent robot related technologies in foreign countries is relatively mature, represented by developed countries such as the United States, Japan, and Germany. The types of intelligent robots are constantly enriching, and their application fields are becoming increasingly widespread (Shen,2018). Among them, service robots have had a profound impact on the social life of the public, providing effective means to cope with the future global aging population. However, as the maturity and integration of fintech technologies continue to improve, intelligent robots and digital employees have been widely applied in various scenarios, enhancing business efficiency and user experience. Nevertheless, the application of artificial intelligence is a "double-edged sword", and the banking industry still needs to closely monitor the potential risks brought about by intelligence during the application process (Lu&Wang,2021).

In the past social development process of China, the research and application of robots have not only promoted the development of social industrialization, but also improved people's living standards. Intelligent robots belong to the third generation of robots in China. Intelligent robots are equipped with many sensors for recognition and positioning, and can cleverly integrate various information to make actions. At the same time, possessing the ability for in-depth learning and being able to flexibly adapt to various environments. However, the current development of intelligent robots in China still lags behind the world's advanced level, facing various challenges such as the gap between core technology and international advanced level, and the imperfect industry standards and regulatory system. Therefore, China needs to clarify its goals in the field of intelligent robots, take timely development measures that are in line with China's actual situation, and strive to narrow the gap with the world's leading level. Under the joint promotion of policy support, technological innovation, and various social demands, the future development prospects of intelligent robots are very broad.

The Process of Applying Intelligent Robots to Financial Institutions

The application process of intelligent robots in financial institutions is a process that gradually deepens and expands with the continuous advancement of technology.

With the development of technology, basic technologies in the field of artificial intelligence such as natural language processing and machine learning have begun to make initial progress. The development of computer technology has made it possible to process large amounts of data, providing technical support for the application of intelligent robots in the financial field. From 2011 to 2015, China's financial industry mainly focused on online business in terms of application technology, and did not place special emphasis on artificial intelligence. Technological development also had limitations at that time; The relevant technology gradually matured after 2016 and has been widely applied in the financial industry. China has also introduced many policies to encourage the integration of artificial intelligence and finance during this stage. Elevating the development of artificial intelligence as a national strategy and making the use of artificial intelligence to build smart finance one of the key tasks (Li&Wang,2022). The State Council released the "New Development Plan for Intelligent Manufacturing" in July 2017. The Financial Technology Development Plan (2019-2021) issued by the People's Bank of China also clearly stated that financial institutions should actively promote the application of artificial intelligence in the business field, and promote the development of financial service channels and service models to be proactive, personalized and intelligent(Chen,2022).Nowadays, in terms of technology, the application of blockchain technology is more prominent, which can explore the potential of integrating information platform resources with artificial intelligence, big data, blockchain and other technologies.

The Motivation for Applying Intelligent Robots in the Financial Industry

Reduce the Operating Costs of the Financial Industry

The application of intelligent robots in the financial industry does not require too much manual service, and may only require a piece of program code to achieve batch business processing. Commercial banks can reduce their personnel input and replace manual labor with intelligent robots to help customers solve problems. This means that people only need to manage and update code, reducing the operational and management pressure of commercial banks and improving service speed, thereby reducing corresponding costs (Ma,2023). It also reduces the cost of correcting and modifying errors after they occur. At the

same time, intelligent robots do not require salary, benefits, or incentives, and financial institutions can invest more resources into core businesses and innovative development to improve resource utilization efficiency.

The intelligent robots commonly used in the financial industry at present are guided service robots, including two types: machine vision lobby managers and intelligent control lobby managers(Pan,2016).Machine vision lobby managers use robots instead of human eyes to recognize and judge customers' appearance and behavior, and can conduct real-time on-site marketing based on these characteristics to complete some repetitive tasks, thereby reducing the cost of manual customer service recruitment and training in this area. The intelligent control lobby manager can independently provide on-site services without human intervention, such as delivering tea and water, explaining business, etc. This not only provides customers with a new experience and timely and accurate responses, but also improves the service efficiency of the institution. There is also an intelligent robot platform online, where customers can click on their mobile phones anytime and anywhere to handle business without having to personally go to offline branches, reducing the volume of business at offline branches and thus lowering offline operating costs(Ma,2023).For example, the famous Industrial and Commercial Bank of China has greatly reduced the capital and manpower investment of offline branches and lowered operating costs by creating an online intelligent service platform, expanding business processing channels, optimizing online service models, and improving the efficiency of online platform services. The use of manpower substitution, error cost substitution, and site substitution to structurally compress costs has greatly reduced the operating costs of the financial industry.

Reduce Business Risks

Intelligent robots significantly reduce manual operations in financial services through automated and intelligent processing workflows, thereby significantly improving processing speed and reducing error rates. When conducting business transactions and credit evaluations, intelligent robots can not only analyze relevant traditional data, but also incorporate some non numerical data for comprehensive analysis, such as social and consumption habits. In the overall financial market, intelligent robots can also provide more refined and comprehensive market analysis, make reasonable predictions, and timely discover market opportunities and risks. This enables financial institutions to achieve more refined risk management and compliance monitoring.

Intelligent robots can also assist the financial industry in establishing an effective and practical regulatory system to cope with the increasingly complex economic environment and constantly changing customer needs. At the same time, intelligent robots have also improved regulatory efficiency and increased information transparency, thereby reducing overall business risks for the financial industry and customers. For example, Bank of Communications has developed a series of models, such as anti money laundering hidden case mining model, anti telecom fraud branch feature ranking model, etc. These models not only improve work efficiency and expand business scale, but also significantly enhance the ability to combat financial crimes (Qian,2023).

Building an Integrated Platform

We actively promote the construction of financial technology platforms, aiming to establish an intelligent dialogue robot service system that integrates panoramic coverage, all-round capabilities, and high efficiency. The achievement of emotional resonance marks a new era in the development of artificial intelligence. It not only enables technology to understand the direct meaning of language, but also deeply perceive emotions and understand subtle cultural differences. This lays a solid foundation for intelligent robots to provide more in-depth and comprehensive customer service (Tian,2024). By fully leveraging the precise response, high information density, and rich emotional interaction capabilities of language services, we effectively enhance customer stickiness and trust, and provide customers with warm 24/7 intelligent services. Intelligent robots have advanced intelligent perception and expression abilities, intelligent cognition and learning abilities, and provide efficient basic dialogue service support for reaching customers. At the same time, leveraging intelligent robot services to create a new integrated platform for financial institutions, providing precise services to customers through big data driven digital support capabilities.

Currently, bank intelligent robots are evolving from "branch welcome robots - branch digital employees - all scenario ecological service robots", extending the bank's financial service tentacles to medical insurance centers, government centers, medical and health care, surrounding communities, etc., achieving cross-border services in the “finance+government” industry (Di,2024).Intelligent robots are driving the exponential expansion of service radius, while the deep integration of intelligent robot service system and cross-border services in all scenarios creates favorable conditions for the construction of an integrated platform in the financial industry.

Forming New Competitive Advantages

With the popularization of financial technology, some traditional financial institutions lack the drive for transformation and upgrading, resulting in a situation of low overall service efficiency and high service costs. By applying intelligent robots, traditional financial institutions can transform their operational models and risk control methods, promote the digitization, platformization, and intelligence of traditional service processes, improve service efficiency and user experience, and reduce service costs and risks (Ma,2023).

The application of intelligent robots demonstrates the positive attitude of the financial industry towards embracing new technologies and pursuing innovation, which helps to enhance the image and competitiveness of enterprises in the market. In the digital age, customers are more inclined to choose financial institutions with advanced technology and innovative services. In real life, a securities company that takes the lead in launching intelligent investment advisory services can often attract more younger and technology-based investors, thus occupying an advantageous position in market competition.

When a large number of peer banks deploy robots, banks that have not done so face the risk of "institutional decoupling". For instance, after HDFC Bank in India launched EVA, the average monthly customer inquiries grew rapidly, forcing ICICI Bank to launch a similar robot within three months. This "robot competition" does not stem from cost-benefit calculations but is the result of institutional isomorphism and behavioral imitation.

Intelligent robot technology has opened up new business areas and service models for the financial industry. For example, intelligent robots can be used to carry out intelligent marketing activities, improving marketing effectiveness and customer conversion rates through precise customer profiles and personalized marketing recommendations. ICBC's pioneering deployment of embodied robots in Changzhou was primarily driven by the need to meet the People's Bank of China's assessment requirements for "intelligent service barrier-free outlets", rather than cost considerations. By using robots for customer diversion and identity verification, ICBC transformed the regulatory hard target of "customer waiting time < 15 minutes" into a programmable task. Similarly, Barclays Bank introduced RPA in the anti-money laundering scenario to comply with the UK FCA's new regulation of "T+1" timeliness for suspicious transaction reports. Research shows that when regulators incorporate "robot density" into the assessment system, banks will proactively expand the application scenarios of robots, creating a "regulation-technology" resonance.

Meanwhile, intelligent robots can also be applied to emerging fields such as supply chain finance and digital currencies, creating new business growth points for the financial industry. We should fully utilize the positive aspects of intelligent robots to meet the diverse needs of customers, shape the competitive advantage of the financial industry, and drive the development of the real economy. At the same time, we should also be vigilant about the negative impact of intelligent robots.

Motivational Solution Strategies

Deepening Technological Integration and Continuous Upgrading

In the process of applying intelligent robots to the financial industry, although intelligent technology is currently developing rapidly, the maturity of intelligent technology is still relatively low to some extent. In the current exploration period where technology applications are not yet mature and stable, we should not only focus on technological updates, but also on the overall application of the system(Huang&Chang,2017).With the continuous development of technologies such as 5G, IoT, big data, and cloud processing, robots are able to learn autonomously and deeply, and can automatically extract and judge financial service types, enhancing their autonomous intelligence and learning capabilities.

At the same time, with the investment and development of more advanced autonomous learning and deep learning algorithms, intelligent robots can surpass preset rules, autonomously identify patterns, extract knowledge, and optimize strategies from massive financial transaction data, user interaction logs, and market dynamics. Realize automatic identification of financial service types and scenarios, autonomous judgment of risk points, and ultimately promote the evolution of financial services towards higher levels of intelligence, automation, and even "unmanned". Due to the complexity of core technologies and the periodicity of research and development investment, the development and application of intelligent robots rely on cooperation with technology companies. The financial industry should actively establish deep strategic partnerships with leading technology companies and research institutions, and conduct in-depth research and analysis in the fields of artificial intelligence and human brain science(Shen,2018).To understand and master the current development status of industrial robots, artificial neural networks and other technologies, and continuously promote the application, demonstration and promotion of intelligent robots in the financial industry.

Although current intelligent robot technology has achieved significant results in core financial fields such as financial model optimization and capital allocation management, there is still enormous room for further optimization. This indicates that the continuous improvement of algorithms and technologies related to intelligent robots in the future will be a key factor in enhancing the profitability and operational efficiency of financial institutions. It is worth noting that the exploration of the application of intelligent robots in the financial industry in China is still in its early stages and has extremely broad development prospects. Especially, advanced network security protection technologies should be fully utilized to build a comprehensive security protection system, providing solid support for the application of intelligent robots in the financial industry.

Strengthening Compliance Monitoring and Data Security Governance

The financial industry inevitably encounters some security issues in the process of applying intelligent robots. This requires the establishment of a regulatory tracking mechanism, the establishment of a dedicated team, or the use of intelligent tools to monitor domestic and foreign financial regulations in real time, as well as the latest developments in regulatory policies, and timely attention to changes in financial regulations and regulatory policies. We also need to establish a standardized process for quickly and accurately translating and embedding the new regulatory requirements into the decision-making logic, transaction rules, and operational processes of intelligent robots, integrating the new regulatory requirements into the programs and rules of intelligent robots, and ensuring that the operation of robots always meets compliance requirements. Thus, when anti money laundering laws and regulations are updated, financial institutions can adjust the transaction monitoring rules and processes of intelligent robots in a timely manner, deploy compliance robots for real-time transaction monitoring and automated report generation, and reduce compliance burdens.

In addition, the widespread application of intelligent robots has put forward new requirements for regulatory agencies within the financial industry to enhance the professional competence of regulatory personnel, ensure that intelligent robots comply with regulatory regulations, and can carry out corresponding regulatory work. Enhancing and deeply utilizing regulatory technology, intelligent robots themselves are also tools to improve regulatory efficiency. Regulatory agencies need to improve their professional capabilities, develop monitoring tools for intelligent algorithm models and apply them, conduct stress testing and bias auditing to ensure that the decision-making process of intelligent robots is transparent, interpretable, and the results are fair and non discriminatory. “Robot density, service inclusiveness, and algorithm explainability” into macroprudential assessment to prevent banks from incurring technical debt due to competition; banks should establish a ternary governance structure of "customer-employee-robot" to ensure that technology adoption and organizational culture evolve in tandem.

On the other hand, based on the functions and business requirements of intelligent robots, fine tuned data access control is implemented, and a strict hierarchical data access permission system is designed and implemented for intelligent robots with different functions based on the "minimum permission principle". Specifically, the chatbot responsible for basic customer service can only access necessary customer identification and the content of this conversation; Robots used for credit risk assessment can access a wider range of financial history and behavioral data, but their permissions should be strictly limited to datasets directly related to risk assessment and desensitized. At the same time, establish detailed access audit logs. Once

information vulnerabilities are discovered, the intelligent robot will notify relevant technical personnel for corresponding repairs, updates, tracking, etc. in the first time to ensure that the system is always in a secure state.

Building a Multi-tiered Talent Development and Transformation System

In the process of promoting the integration of intelligent robots into financial institutions, in addition to paying attention to their technological progressiveness, privacy security and information leakage, it is also necessary to create a good environment and focus on the cultivation of talents in many aspects. From a national perspective, the successful deployment and application of intelligent robots highly rely on a talent pool with composite knowledge and skills. Resolving the talent bottleneck is the long-term foundation for unleashing technological potential, ensuring compliant operations, and ultimately achieving all application motivations.

The government should proactively formulate and implement relevant policies and measures, establish special funds to encourage interdisciplinary research, reform the higher education curriculum system, and cultivate new talents who possess profound financial knowledge, solid mathematical foundations, proficiency in AI algorithms, and engineering practical abilities. Create an environment that encourages innovation, stimulate the vitality of researchers, accelerate the research and development process of intelligent robot technology, provide solid technical support for the widespread application of intelligent robots in the financial field, and provide a source of vitality for the long-term development of financial intelligence. From the perspective of financial institutions, they can promote the deep application of intelligent robots within financial institutions by building an intelligent robot talent training system, optimizing talent training mechanisms, and building intelligent service platforms.

At the same time, financial institutions also need to focus on cultivating new talents with good comprehensive literacy and innovation ability, optimize talent introduction, evaluation, and incentive mechanisms, and attract and retain core talents with a background in financial technology. At the same time, provide clear transformation paths and skill enhancement support for existing employees to meet the development needs of the financial industry and better serve the socio-economic development. For experts in the financial field, lifelong learning and ability expansion are necessary at the individual level. As financial practitioners, we must deeply understand the inevitability of digital transformation in the industry. We should not only establish a strong awareness of lifelong learning, but also go beyond traditional fields, actively learn new knowledge and skills such as data science and technical ethics, focus on improving our core abilities in intelligent data analysis and interpretation, technology application scenario design, human-machine collaboration management, etc., and deeply understand the urgent demand for composite talents in the financial industry (Jiang,2023).To meet the new requirements of deep integration of intelligent robots into financial business.

Conclusion

The widespread application of intelligent robots in the financial industry demonstrates the vigorous development of financial technology and marks a historic transition from a labor-intensive service paradigm to an algorithm driven digital ecosystem paradigm. Through in-

depth exploration of the motivations for the use of intelligent robots in the financial industry, it is not difficult to find that the application motivations of intelligent robots include reducing operating costs, reducing business risks, building integrated platforms, and forming new competitive advantages. The introduction of intelligent robots not only promotes the intelligent transformation of financial services, but also significantly improves the operational efficiency and profitability of financial institutions.

We need to fully leverage their positive aspects to serve the diverse needs of the real economy and customers, while also finding ways to curb their negative aspects. The maturity of technology, the security of data, and compliance monitoring all require us to give high attention.

Therefore, technology companies update their technology and robot systems in a timely manner to accelerate technological progress. Each department should pay attention to implementing specific policy measures to prevent privacy, security, and information leakage, providing solid support for the widespread application of intelligent robots in the financial market. In addition, with the continuous advancement of technology and the deepening expansion of the market, the application prospects of intelligent robots in the financial industry will be even broader, and there is a greater need to strengthen talent cultivation in various aspects. The maturity of intelligent finance depends not only on the depth of technological innovation, but also on the synchronous evolution of institutional adaptability and humanistic inclusiveness. This requires academia, regulatory agencies, and industry practitioners to jointly explore a third path - to embrace the technological revolution while safeguarding the social value foundation of the financial industry, and to build a new intelligent financial ecosystem that combines efficiency, resilience, and warmth. To effectively drive the application of intelligent robots in the financial industry, the industry needs to further explore and achieve a leap in product and service quality.

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