

Research on The Application Path of Financial RPA Technology in The Digital and Intelligent Transformation of Manufacturing Industry

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Abstract: With the accelerated digital and intelligent transformation of manufacturing, financial RPA technology, as a key tool connecting business processes with data intelligence, is reshaping the financial management model in manufacturing. This research starts from the pain points of financial processes in manufacturing, combining the characteristics of RPA technology, and proposes a four-dimensional application path: "process reengineering—technology integration—organizational change—ecosystem collaboration." This research shows that RPA can drive the transformation of manufacturing finance from a calculation-oriented model to a strategic one through standardized processes, cross-system data integration, and human-machine collaboration mechanisms. However, it is necessary to avoid the risks of over-reliance on technology and governance deficiencies.

Keywords: Financial RPA; Manufacturing Industry; Digital and Intelligent Transformation; Human-machine Collaboration; Strategic Finance.

1. Introduction

In the context of global industrial chain restructuring, China's manufacturing sector is facing unprecedented transformation pressures. Rising costs and squeezed profit margins have become critical issues that need to be addressed urgently, with digital and intelligent transformation seen as an effective means for achieving refined management. At the same time, the demand for transforming traditional manufacturing financial functions has become increasingly prominent, with problems such as fragmented processes and data silos needing to be resolved through technological solutions. Against this backdrop, the MIIT's "Intelligent Manufacturing Development Plan (2025)" clearly highlights the importance of data empowerment, emphasizing the integration of RPA (Robotic Process Automation) with AI and OCR (Optical Character Recognition) technologies, providing a core engine for financial automation.

This research aims to explore the technical pathways for financial digital intelligence in manufacturing, analyze the current application status and challenges of RPA in manufacturing scenarios, and propose practical solutions. By thoroughly examining policy guidance and technological development trends, this research not only provides theoretical support for the financial digital intelligence transformation in manufacturing but also fills the gap in systematic research on RPA in manufacturing scenarios, making it of significant academic value and practical significance.

2. Analysis of Core Points in Manufacturing Financial Process and RPA Adaptability

2.1. Core Point

First, the high-frequency repetitive operations in the financial processes of manufacturing are a significant pain point. For example, bank-enterprise reconciliation needs to

process over ten thousand transaction records every month, and the daily workload for invoice entry also reaches more than a thousand. These highly repetitive tasks not only consume a large amount of human resources but also easily lead to errors due to human fatigue.

Secondly, system fragmentation is another pain point in the financial process of manufacturing industry. Data between different systems such as financial system, production system and supply chain system cannot be automatically transferred, resulting in serious information island phenomenon. This not only affects the timeliness of data processing, but also increases the difficulty of cross-departmental collaboration.

Moreover, the risk of human error is an issue that cannot be ignored in the financial process of manufacturing industry. In the process of manual verification, errors such as amount misalignment and tax rate misjudgment are easy to occur due to human factors.

2.2. RPA Adaptability Analysis

For high-frequency repetitive operations, the clarity of RPA rules makes it an ideal choice for handling such standardized processes. RPA robots can accurately execute predefined rules, such as voucher generation rules, thereby significantly reducing human errors and enhancing work efficiency.

Regarding the issue of system fragmentation, the non-intrusive nature of RPA technology enables it to easily overcome the barriers between different systems and achieve cross-platform operation. For instance, RPA can automate the operation of U-blocking in online banking, thereby enabling the automatic flow of data between different systems and effectively addressing the issue of information silos.

The application of RPA technology can significantly reduce such risks. Since RPA robots operate strictly according to preset rules when performing tasks, their accuracy and consistency are much higher than manual operations, thus effectively reducing financial risks caused by human errors.

In summary, the adaptability of RPA technology in manufacturing financial processes is reflected in its clear rules,

non-intrusiveness, and cost-effectiveness. RPA technology can effectively address core pain points such as high-frequency repetitive operations, system fragmentation, and risks of human error, significantly enhancing the efficiency and accuracy of manufacturing financial processes. As RPA technology continues to develop and be applied, it is expected to further optimize financial process management in manufacturing in the future.

3. Application Path of Financial RPA in The Digital and Intelligent Transformation of Manufacturing Industry

3.1. Business Process Reconfiguration: From "Fragmentation" to "End-to-end Automation"

1. Procurement Part

In the procurement phase of manufacturing, supplier reconciliation is a critical step to ensure the accuracy of financial data. Traditionally, this process often relies on manual operation, which is not only time-consuming but also prone to errors. By introducing financial RPA technology, the automatic export of procurement data and the generation of reconciliation statements can be achieved, thereby improving efficiency and accuracy. Specifically, RPA combines OCR technology to identify invoice information, automatically import the data into the financial system, and match it with warehouse receipts to automatically offset temporary accounts payable. This process not only reduces human intervention, but also shortens the reconciliation cycle and enhances the real-time performance and accuracy of financial data.

2. Production Part

Cost aggregation and allocation is the core content of manufacturing production management. Under the traditional model, this process often requires a large amount of manual operation, resulting in low data processing efficiency and high error risk. After the process is redesigned, the financial RPA will utilize the working hour data exported from the production system to automatically allocate costs to the appropriate cost centers based on predefined rules and generate cost analysis reports. This automated workflow significantly enhances the efficiency and accuracy of cost data processing, providing strong support for production decisions.

3. Sales Part

Revenue recognition and customer reconciliation are key steps to ensure the accuracy of sales data. In traditional methods, this process relies on manual verification, which is inefficient and prone to errors. Under the RPA-enabled model, the system automatically imports invoice data from the electronic tax bureau and matches it with sales orders in the financial system, thereby achieving automatic revenue recognition and customer reconciliation. For abnormal orders, RPA can issue alerts, thereby enabling timely detection and handling of potential financial risks.

3.2. Technology Integration: Build An "RPA+" Intelligent Financial Ecology

1.RPA+OCR

Through the combination of RPA and OCR technology, digital processing of paper documents can be realized. For

example, RPA can automatically scan invoices and input their information into the system, reducing the error and time cost of manual entry.

2.RPA+AI

Combined with AI technology, RPA can perform more complex tasks, such as intelligent audit. For example, in contract management, RPA can automatically verify the compliance of contract terms, improving the efficiency and accuracy of audit.

3.RPA+BI

The combination of RPA and business intelligence (BI) technology enables automated report generation. For example, RPA can collect financial data in real time to generate a cash flow forecast dashboard that provides real-time decision support for management.

3.3. Organizational Change: Building An RPA Excellence Center (CoE)

1. Functional Design

To effectively implement RPA technology, manufacturing companies can establish dedicated RPA Excellence Centers (CoEs) responsible for the promotion and application of RPA technology. The CoE can be divided into an Innovation Group, a Delivery Group, and an Operations Group. The Innovation Group is tasked with exploring new RPA application scenarios, such as carbon emission data calculation. The Delivery Group focuses on developing and deploying RPA bots, like the bank-enterprise reconciliation bot. The Operations Group monitors process stability and performs anomaly log analysis.

2. Implementation Mode

In terms of implementation mode, a hybrid CoE can be adopted, that is, unified standards are set at the group level, while each sub-factory can flexibly adapt according to its own situation. For example, the hybrid model of Yonyou can be referred to realize the combination of standardization at the group level and personalization at the sub-factory level.

3.4. Ecological Synergy: Supply Chain Finance and Data Sharing

1. Supply Chain Collaboration

RPA technology can drive the collaborative work of the supply chain. For example, RPA can automatically push accounts payable data to the core enterprise platform, accelerate the supplier financing process, and improve the efficiency and response speed of the entire supply chain.

2. Industrial Data Pool

By collecting data from upstream and downstream enterprises through RPA, industry cost benchmark models such as auto parts cost index can be built. This not only helps enterprises to control their own costs, but also provides reference data for the whole industry and promotes the digital and intelligent transformation of the whole industry.

In conclusion, the application path of financial RPA in the digital and intelligent transformation of the manufacturing industry covers a comprehensive transition from process reengineering and technology integration to organizational change and ecosystem collaboration. By implementing these paths, manufacturing enterprises can achieve the automation and intelligence of financial processes, thereby enhancing overall operational efficiency and market competitiveness.

4. Challenges and Countermeasures

In the process of digital and intelligent transformation of the manufacturing industry, the application of financial RPA technology has become an important means to improve efficiency and reduce costs. However, during the implementation process, a series of challenges are also faced, and corresponding countermeasures are needed to ensure the smooth progress of the transformation.

4.1. Main Challenges

1. Insufficient Process Adaptability

Manufacturing production plans often need to be dynamically adjusted based on market demand, supply chain conditions, and other factors. This variability can lead to the rapid obsolescence of pre-set RPA rules, especially when handling urgent orders. The RPA system may fail to promptly adapt to new process requirements, thereby affecting overall operational efficiency.

2. Data Security Risks

In the application of financial RPA, automated operations often require identity authentication through security devices such as U shields. However, automated processes may increase the risk of account theft, especially in the absence of effective monitoring and management, and data security issues are particularly prominent.

3. Employee Resistance

The introduction of financial RPA often comes with a redefinition of traditional financial personnel's skills. Some employees may develop resistance due to the difficulty in transitioning their skills. According to survey results, 40% of employees in companies report needing retraining after the implementation of financial RPA technology to adapt to new job requirements. This not only affects employee motivation but can also lead to talent loss.

4.2. Response Strategies

1. Dynamic Process Monitoring

To cope with the problem of insufficient process adaptability, enterprises should introduce process mining (Process Mining) technology to timely discover and optimize RPA rules through real-time monitoring and analysis of business processes. This technology can help enterprises quickly adapt to changes in production plans and ensure the efficient operation of RPA systems.

2. Hierarchical Management of Permissions

In order to reduce data security risks, enterprises should adopt USB Hub hardware isolation sensitive operations and implement hierarchical permission management. In the real RPA scheme, through hardware level isolation, unauthorized access can be effectively prevented and the security of financial data can be ensured.

3. Talent Echelon Construction

In order to alleviate employee resistance, enterprises should set up a "RPA+ finance" composite job promotion channel to encourage employees to learn new skills and adapt to digital transformation. By providing training and career development planning, employees can be helped to smoothly transition to new job roles, thus reducing resistance in the transformation process.

To sum up, although financial RPA faces many challenges in the digital and intelligent transformation of manufacturing industry, these challenges can be effectively addressed by implementing dynamic process monitoring, permission

hierarchical management and talent echelon construction strategies, so as to promote enterprises to develop in a more intelligent and automated direction.

5. Conclusion and Prospect

5.1. Research Conclusion

By analyzing the application of financial RPA in the digital and intelligent transformation of manufacturing, this research draws the following conclusions: RPA technology can significantly enhance financial efficiency and decision-making quality in manufacturing by reengineering processes, integrating technology with organizational change. Specifically, RPA excels in automating repetitive and rule-based financial tasks, thereby reducing human intervention, lowering operational error rates, and improving data processing speed and accuracy. Furthermore, the introduction of RPA promotes standardization of financial processes, providing more reliable data support for decision-making, thus enhancing decision quality.

However, the successful implementation of RPA is not unconditional. This research found that the degree of standardization in business processes is one of the key factors for the successful implementation of RPA. Processes with a high degree of standardization are more likely to be replaced by automation tools, thereby improving efficiency. At the same time, companies need to establish an effective Center of Excellence (CoE) governance mechanism to ensure the smooth implementation and continuous optimization of RPA projects. The strength of CoE governance directly affects the depth and breadth of RPA technology application within the company, as well as its long-term value realization.

5.2. Research Prospect

With the continuous progress of technology, financial RPA has a broad application prospect in the manufacturing industry. The future development trend is mainly reflected in the following aspects:

1. Technology Convergence

RPA will evolve towards hyper-automation (Hyperautomation), integrating low-code development platforms with artificial intelligence (AI) technology. Low-code platforms will enable non-technical personnel to participate in the design and optimization of RPA processes, further lowering the barrier to automation implementation. At the same time, the integration of AI technology will enhance RPA's decision support capabilities, such as using machine learning algorithms to optimize financial forecasting and risk assessment.

2. Ecological Expansion

The application of RPA will extend from within enterprises to the collaboration of industrial chains, building a digital twin financial system for manufacturing. Digital twin technology can create a virtual model corresponding to physical assets in the real world, enabling comprehensive monitoring and management of these assets through real-time data synchronization. In the financial sector, digital twin technology will enable companies to control costs more accurately, prepare budgets, and plan finances more effectively, thereby enhancing financial transparency and collaborative efficiency across the entire industrial chain.

In summary, financial RPA plays a crucial role in the digital and intelligent transformation of manufacturing, with broad application prospects. However, it also faces challenges in

technological integration and ecosystem expansion. In the future, companies need to continuously explore and practice to maximize the application of RPA technology, driving the digital and intelligent transformation of manufacturing finance.

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