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Research on the Application of RPA Technology in Gree Electric Appliances

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Abstract

With the deep integration of big data, artificial intelligence, cloud computing and other digital technologies in accounting, Robotic Process Automation (RPA) has become a core tool for digital transformation in manufacturing finance due to its non-intrusive deployment, rule-based process automation, and 24/7 stable operation. Taking Gree Electric Appliances as a case, this paper adopts case study and data analysis to systematically review RPA practices in accounting, budget management, cost control and risk early warning. It analyzes the challenges of human-machine collaboration and system compatibility as well as solutions, evaluates the effects of cost reduction, efficiency improvement, risk control and competitiveness enhancement, and summarizes replicable paths. The study shows that RPA can effectively shorten financial cycles, reduce labor and error costs, improve data accuracy, and promote the transformation of finance from accounting-oriented to value management-oriented, providing references for digital transformation of large manufacturing enterprises.

Keywords

RPA, Accounting Process, Financial Digitalization, Gree Electric Appliances.

1. Introduction

With the deep integration of digital economy and real economy, new-generation information technologies such as big data, artificial intelligence, blockchain, and cloud computing have accelerated their penetration into the accounting field. Big data technology enables efficient collection, integration, and in-depth analysis of massive and multi-dimensional accounting data to provide data support for strategic decision-making. Artificial intelligence replaces manual repetitive operations through machine learning, image recognition and other technologies, optimizes accounting processes and assists intelligent decision-making. Blockchain ensures the authenticity and compliance of accounting data with its tamper-proof and traceable features. Cloud computing provides flexible computing power and storage resources, reduces enterprise IT deployment costs, and improves the collaboration efficiency of information systems.

At present, corporate finance is transforming from the traditional accounting model to digitalization, intelligence and value creation. As a lightweight and easily deployable automation technology, RPA is applicable to financial processes with high repeatability, standardization, clear rules and large volumes. It can effectively release human resources, promote financial personnel to transform into high-value management work, and become an important starting point for enterprise digital transformation [1].

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2. Analysis of RPA Technology Application in Enterprises

2.1. Case Selection

Founded in 1991, Gree Electric Appliances initially focused on household air conditioners and was listed on the Shenzhen Stock Exchange in November 1996. After more than 30 years of development, the group has built a brand portfolio centered on Gree, TOSOT, and Jinghong, evolving into a global industrial group integrating R&D, production, sales, and service. It operates in two major sectors: household consumer goods and industrial equipment, with a core business in home appliances. Gree owns six core technologies including intelligent connectivity and artificial intelligence for smart home systems. Its products are sold in more than 190 countries and regions, with independent-brand exports accounting for nearly 70%. Notably, Gree central air conditioners have ranked first in domestic market share for 14 consecutive years and served national key projects such as Beijing Daxing International Airport and the Hong Kong-Zhuhai-Macao Bridge, with over 100,000 global projects across transportation hubs, data centers, and cold-chain logistics. With strong competitiveness and industrial influence, Gree is a benchmark for digital transformation in China's manufacturing industry, providing an ideal case for studying RPA applications in accounting practices.

2.2. Application of Main Functional Modules

In the financial management of Gree Electric Appliances, the data automation processing module of RPA technology plays a key supporting role. In the financial data collection link, RPA can automatically capture data from multiple business systems such as sales and production according to preset rules, complete integration, classification and summary, unify scattered data, and provide a timely and complete data basis for financial analysis and management decision-making. In the report preparation link, RPA automatically calls data and quickly generates standard statements such as balance sheet and income statement through built-in logic in accordance with accounting standards and internal requirements, replacing manual collection, verification, calculation and typesetting, and greatly improving preparation efficiency and data accuracy. In the budget management link, RPA compares actual expenses with budget indicators in real time, gives an immediate early warning when exceeding the threshold, tracks over-expenditure items and links, assists in timely strategy adjustment, and ensures the standardized and effective implementation of the budget.

In terms of accounting, RPA automatically identifies key invoice information with the help of OCR technology, accurately inputs it into the financial system and completes verification to ensure invoice compliance. In the generation of bookkeeping vouchers, RPA automatically generates vouchers in strict accordance with accounting rules based on invoices and business documents, reducing manual errors and improving the standardization and accuracy of accounting [2]. On the whole, RPA is deeply applied in scenarios such as financial accounting, report preparation and budget monitoring, significantly improving the efficiency of financial work, reducing operational risks, and providing solid support for the digital and intelligent transformation of Gree Electric Appliances.

2.3. Implementation Process

In terms of intelligent accounting, Gree Electric Appliances has realized the automation of repetitive accounting processing with the help of RPA. Faced with massive daily sales orders, purchase invoices and expense reimbursement documents, RPA automatically completes data capture, bookkeeping, accounting and reimbursement according to preset rules, effectively reducing manual errors, improving accounting efficiency and data accuracy, freeing financial personnel from basic accounting to focus on high-value work such as financial analysis and decision support.

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In performance management, RPA effectively solves the difficulties of performance data collection and complex calculation. At the end of each month, quarter and year, the robot automatically collects multi-dimensional data such as attendance, performance, progress and satisfaction across systems, accurately calculates performance scores and generates reports according to the evaluation model, eliminating manual calculation deviations, ensuring fair and efficient assessment, and making performance appraisal more in line with the actual business rhythm.

In the cost management link, RPA monitors raw material market prices and supplier quotations in real time through crawler technology, automatically calculates the benefits of procurement schemes combined with the internal cost model, gives timely early warnings when prices are abnormal or better suppliers appear, assists the procurement team in optimizing bargaining and procurement strategies, strictly controls procurement expenditures, and significantly improves the enterprise's cost competitiveness.

In the field of risk management, RPA realizes 24-hour uninterrupted risk monitoring, covering key dimensions such as macroeconomics, industry policies, internal financial indicators and supply chain security. The system compares data with risk thresholds in real time, and quickly pushes information when an early warning is triggered, helping enterprises conduct early judgment and timely response, and effectively improving risk prevention, control and emergency response capabilities.

On the whole, RPA is deeply applied in four scenarios: accounting, performance, cost and risk control, comprehensively improving the automation and refinement level of Gree Electric Appliances' management, and providing strong support for the efficient operation and steady development of the enterprise.

2.4. Implementation Difficulties and Solutions

Human-machine collaboration problem: After the introduction of RPA, the division boundary between manual and robot is blurred, which is prone to problems such as repeated operations and low efficiency. For example, in expense reimbursement audit, RPA can complete invoice compliance verification and data entry, but special scenarios such as the rationality of business entertainment expenses still require manual professional judgment. Poor collaboration is likely to cause audit loopholes and process jams.

Solutions: Gree optimizes business processes, clarifies the division of responsibilities between humans and machines, and formulates standardized operating specifications and collaboration manuals. In the reimbursement process, RPA completes the preliminary review and basic entry, abnormal documents are automatically transferred to manual review, and after manual processing, the information is sent back to the robot for subsequent processes, realizing seamless connection throughout the process. At the same time, a normalized communication and feedback mechanism is established, and the information department regularly evaluates the collaboration effect and continuously optimizes it, significantly improving the efficiency of human-machine collaboration.

System compatibility problem: Gree has multiple coexisting systems such as finance, business and office. Frequent problems such as unstable data transmission and function call failure occur when the old ERP is connected with RPA, which directly affects the automatic operation.

Solutions: The technical team formulates classified solutions through comprehensive compatibility evaluation: upgrade the system versions that can be updated in a timely manner; customize interface programs and middleware for systems that cannot be upgraded to realize data format conversion and protocol adaptation. A special data bridging program is built for the old ERP system to ensure stable data access and transmission of RPA, fundamentally solving the problem of abnormal data interaction and providing reliable support for the stable operation of the whole RPA process.

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2.5. Implementation Effects

2.5.1. Cost Reduction

Labor cost: Before the application of RPA technology, the financial department of Gree Electric Appliances needed to invest a lot of labor in repetitive accounting work. For example, in the invoice processing link, many financial personnel originally spent a lot of time manually entering invoice information and verifying authenticity. After the application of RPA, only a few personnel are required to monitor the operation of the robot and handle exceptions. Most of the labor is released and can be transferred to high-value work such as financial analysis and budget management, resulting in a significant reduction in labor costs. According to statistics, the annual labor cost in invoice processing business is saved by about 20%.

Error correction cost: Manual operations in the past were prone to data entry errors and calculation mistakes, and subsequent error correction required extra time and effort, increasing enterprise costs. RPA technology greatly reduces such human errors with its high accuracy. Taking financial statement preparation as an example, the number of statement adjustments caused by data errors has dropped significantly after the application of RPA, and the corresponding error correction cost has been reduced by about 30%, effectively improving the overall quality and efficiency of financial work.

2.5.2. Efficiency Improvement

Financial data processing speed: In links such as data collection, sorting and report generation, RPA robots can realize automatic and rapid processing, greatly shortening the work cycle. The preparation time of monthly financial statements of Gree Electric Appliances has been shortened from the original average of 5 working days to about 2 working days, enabling financial information to be provided to management in a more timely manner, providing strong support for decision-making and enhancing the company's ability to respond to market changes.

Business process circulation efficiency: Taking the expense reimbursement process as an example, through RPA technology to realize automatic audit and payment operations, the entire reimbursement cycle has been shortened from the original average of about 15 days to within 7 days, significantly improving employee satisfaction. At the same time, it reduces the impact of slow reimbursement processes on business development and optimizes the company's internal operation efficiency.

2.5.3. Improvement of Data Accuracy

Invoice processing accuracy: With the help of advanced OCR technology and strict verification rules, the invoice information entry accuracy of RPA's invoice identification and verification function module has increased from about 90% of manual operation to over 99%, effectively avoiding tax risks and inaccurate financial accounting caused by wrong invoice information, and ensuring the accuracy of financial data sources.

Financial statement data quality: In the process of financial statement generation, RPA robots operate in strict accordance with preset calculation logic and data integration rules, avoiding possible errors in manual calculation and data summary, greatly ensuring the accuracy of statement data. It provides a reliable basis for the company's management to make strategic decisions and financial analysis based on accurate data, helping the company better grasp market dynamics and optimize business layout [3].

3. The Impact of RPA Technology on Gree's Competitiveness

3.1. Impact of Cost Optimization

In terms of operation cost control, Gree Electric Appliances has a wide business coverage and many process links. In the traditional mode, data collection, sorting and approval are highly dependent on manual work. Especially in the supply chain, data transmission lags and high

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error rates seriously affect operation efficiency. After the introduction of RPA technology, robots can automatically capture and integrate data from multiple systems such as suppliers and logistics in real time, and accurately push them to corresponding departments, greatly reducing manual intervention, and effectively lowering communication and coordination costs as well as error correction costs caused by information errors. According to estimates, the relevant operation costs in this scenario are reduced by about 15%.

Labor cost optimization is also significant. In the past, the financial department needed to invest a lot of labor in handling repetitive work such as invoice audit, reimbursement verification and report preparation, which was time-consuming and laborious. RPA automatically completes invoice information identification, entry and verification with the help of OCR technology, requiring only a small number of personnel to be responsible for exception handling and process monitoring. The financial statement preparation cycle is shortened from one week to 2–3 days, and a large number of financial personnel can be transferred to high-value work such as financial analysis and budget management. On the whole, the labor cost of the financial department is saved by about 20%.

From the perspective of cost optimization path, RPA directly reduces labor input by replacing manual completion of rule-based tasks; reduces error correction expenditures such as account adjustments and tax supplementary payments through high-precision operations; and adopts non-intrusive deployment without large-scale transformation of existing systems, reducing system adaptation costs. Under multiple effects, RPA effectively improves Gree Electric Appliances' cost structure, strengthens the enterprise's cost advantage, and significantly enhances market competitiveness.

3.2. Impact of Efficiency Improvement

In terms of financial data processing efficiency, in the traditional mode, Gree Electric Appliances' business system data is scattered, and financial personnel need to manually log in multiple systems to export, sort and summarize data. Monthly data processing takes several days and is prone to errors. After the application of RPA, robots can automatically capture financial data from sales, production, inventory and other systems synchronously according to preset rules, quickly complete data cleaning, classification and integration, compress the workload of several days into hours, greatly improve data timeliness and provide timely support for management decision-making.

In terms of financial statement generation, in the traditional mode, quarterly statement preparation requires manual data collection, complex calculation and format adjustment, taking nearly half a month. RPA robots can automatically extract integrated data, accurately generate balance sheets, income statements and other statements according to built-in calculation logic, and automatically complete format optimization, shortening the quarterly statement cycle to within one week and significantly improving preparation efficiency. The expense reimbursement process has also been significantly optimized. Traditional reimbursement requires manual document delivery, multi-level approval and ticket-by-ticket verification, with a cycle of up to half a month and low efficiency. After the introduction of RPA, employees submit invoices online, robots automatically identify information, verify invoices, circulate approvals and trigger payments, and the process cycle is compressed to within one week, which not only improves employee satisfaction but also avoids the impact of process lag on business development.

In summary, RPA effectively reduces time loss and error rate by automatically replacing repetitive and cumbersome manual operations in accounting processes, optimizes process connection, and promotes more efficient and smooth financial work. The efficiency improvement enables Gree Electric Appliances to have a faster market response speed, gain a

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significant time advantage in market competition, and further enhance the enterprise's comprehensive competitiveness and sustainable development capacity.

3.3. Enhancement of Market Competitiveness

RPA technology enhances Gree's market competitiveness in multiple dimensions through cost optimization, response speed-up and decision-making empowerment. In terms of pricing strategy, RPA effectively reduces labor costs, operational waste and error correction costs, optimizes the enterprise's cost structure, and makes pricing more flexible. Gree can either moderately reduce prices on the premise of ensuring profits to seize the market with high cost performance, or stabilize prices to improve profit margins. Faced with fierce competition in the air conditioning industry, the enterprise relies on cost advantages to carry out promotional activities, increasing sales volume and consolidating market position while ensuring profits.

In terms of market response speed, RPA realizes real-time and accurate processing of financial data, helping management make rapid decisions. When raw material prices fluctuate, the system can quickly integrate data across the entire chain such as procurement and production, helping the enterprise timely adjust production plans and procurement strategies, and quickly launch products and services adapted to the market. In the expansion of smart home business, Gree uses RPA to monitor financial data in real time, quickly adjusts production configuration and pricing for products with low profits but good market response, and increases promotion, effectively expanding market share.

At the strategic decision-making level, RPA provides high-quality data support for enterprises. Through automatic processing and in-depth analysis, management can clearly grasp the profitability, cost structure and development trend of each business segment, improving the scientificity of strategic planning. In diversified layout, Gree uses RPA to analyze business data such as household appliances and intelligent equipment, accurately assess development potential and risks, increase resource investment in high-quality businesses, continuously optimize business structure, and lay a solid foundation for long-term steady development.

In summary, RPA digital and intelligent technology continuously empowers Gree Electric Appliances in terms of cost, efficiency and decision-making, significantly enhancing its market competitiveness and providing important support for the enterprise to maintain industry leadership and achieve high-quality development.

4. Conclusion

In terms of cost optimization, RPA technology significantly reduces labor and error correction costs of Gree Electric Appliances. For example, in businesses such as invoice processing and financial statement preparation, a large amount of labor is released to engage in more valuable work, resulting in obvious labor cost savings. At the same time, additional expenses such as statement adjustments and tax supplementary payments caused by human errors are greatly reduced, overall improving cost-effectiveness.

From the perspective of efficiency improvement, both financial data processing speed and business process circulation efficiency have been greatly improved. For example, the preparation time of monthly financial statements is greatly shortened, and the expense reimbursement cycle is also significantly reduced, enabling financial information to serve management decision-making in a more timely manner, optimizing internal enterprise operations and enhancing the ability to respond to market changes.

In enhancing market competitiveness, RPA technology helps Gree Electric Appliances optimize its cost structure, making it more flexible in formulating pricing strategies and better coping with market competition. At the same time, relying on more timely and accurate financial data

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support, it has advantages in market response speed and strategic decision-making, helping to consolidate the leading position in the industry and achieve long-term stable development.

In conclusion, the application of RPA digital and intelligent technology in the accounting of Gree Electric Appliances has effectively played a positive role in optimizing costs, improving efficiency and enhancing competitiveness, showing good application value and development potential.

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