Robotic Process Automation Financial Use Cases, Risks, and Cost-Saving Potential

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Abstract. With the development of information technology, Robotic Process Automation (RPA) shows high flexibility and is broadly applied into financial field including company accounts, tax administration, and accounting. It provides substantial benefit in streamlining procedures and saving manhours. However, the mass application of RPA poses dangers in technology, operations and business process, management, and conformance. Moreover, there are still problems like lack of governing capacity and the improper combination with human machine cooperation. Therefore, this paper adopts the literature review approach and proposes a four-dimensional integrated plan, including technology improvement, standardization of operations, strengthening management, and improving productivity. It further optimizes the "technology-risk-management" coupling mechanism in the field of financial automation, puts forward effective enterprise risk prevention and control measures, and identifies opportunities for improving performance in a variety of areas—technology, operations, business processes, transformation, management, and compliance. Based on the financial automation system, this paper provides reference for enterprise financial transformation.

Keywords: Robotic Process Automation, Risks, Cost-Saving Potential.

1 Introduction

Driven by the digital economy, enterprises face multiple demands such as cost reduction and efficiency improvement. Traditional manual financial operations are costly and prone to errors. RPA—a rule-driven, cross-application automation software that deploys rapidly without disrupting existing IT environments—perfectly addresses these challenges across financial operations, bank reconciliation, and invoice management. Today, it stands as one of the fastest-growing enterprise software categories globally, with financial bots already handling bookkeeping, accounting, tax processing, invoice verification, and voucher auto-filling — freeing finance professionals to focus on higher-value analysis. As RPA and AI converge, "hyperautomation" emerges through machine learning and big data analytics, enabling sophisticated decision support on unstructured data and shifting financial automation from "process replacement" to "intelligent empowerment." The

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Chinese RPA market exemplifies this trend, growing from 1.8 billion yuan in 2020 to a projected 14.96 billion yuan by 2026, with accounting and finance remaining the primary application sectors.

RPA has evolved very rapidly, and this has resulted in problems stemming from the rapid implementation of RPA. Some companies view RPA as a "silver bullet," using it as a way of patching integration defects between the different systems, causing much of technical debt to build up. People also have citizen development tends to use the "shadow IT" model leading to many control gaps and security risks; more than one-half (51%) of finance and accounting workers are worried about being replaced by robots. As the company has not set up human-machine collaboration workflow, it will be easy for employees to refuse which, in turn, impacts how RPA initiatives are carried out or successful. Here, it is necessary for the enterprise to create an integrated technological risk control system and effective improvement mechanism in order to find out the balance point of mutual promotion and restriction among technology use, risk mitigation and human-technology fitting terms of technology deployment, risk governance, and worker placement.

Under the impetus of international financial modernization initiatives and competitive pressures from abroad, companies are pursuing automated finance initiatives aggressively: with government also playing a role to accelerate the growth of RPA. The headquarters is where most business decisions are made so the extent to which finance is automated will determine how successful companies' digitalisation strategies are. Thirdly, regulation requirements for finance force companies to deploy RPA and turn financial robots from "nice-to-have" to "must-have". Good RPA governance becomes one of the important criteria for compliance as well.

The literature also provides a multi-dimensional, comprehensive measure of the benefits derived from implementing an RPA project that includes hard (e.g., reduction in full-time equivalent positions) and soft (e.g., increase in customer satisfaction with the quality of service) measures; others include additional dimensions (e.g., improvement in human resource efficiency or organizational control)., creating a "quality-efficiency-compliance-risk" balance of near- and far-term value. Unfortunately, all of them do not provide techniques for distinguishing changes in the efficiency between different forms of government [1].

The studies have shown that organized and well-defined business process is suitable to apply for an RPA in it. In case study tasks like invoicing show highest gains post automation [2]. However, in cases where speciality of organisation / work environment makes it unfit for RPA deployment, the gains are much less impressive [2,3]. In addition, it is shown that centralised control mechanisms would be best suited to standardised tasks, where the federated management schemes are more suitable for various cases [1].

The research work related to risk management is carried out mainly in the following directions: The four-dimensional governing model is put forward. Recommendations such as a federalized model of governance were proposed in order to mitigate risks such as lack of adequate control mechanisms [3,4]. Constructed a five-domain risk management model based on four quadrants of risk classifications; Put emphasis on

personnel risk management, supplementing and improving on the general risk management framework [1,5].

Therefore, this paper analyzes common application cases, main hazards as well as underlying reasons for RPA finance robots in the field of finance industry and builds up technology improvement and management normativeness into an overall four-in-one plan, and an extensive risk management and control framework. It can help refine the “technology-risk-management" coupling mechanism of financial automation and provide some reference suggestions on how enterprises can apply RPA large-scale and enabling financial digitization and value generation.

2 Typical Application Scenarios and Practice of RPA Financial Robot

2.1 Automation of Basic Accounting Processes

Basic accounting processes are highly rule-based, repetitive, with a high volume of data. They represent one of the main use cases for implementing RPA and have a high potential to be automated.

RPA automates finance process in real time: end-to-end, from collecting information to generating and posting vouchers. Through screen capture, it can extract information about transactions automatically, create vouchers according to the pre-defined rules and post entries; perform automatic comparison and flag of data errors and omissions.

Reconciliation with the banks, either directly via a bank-enterprise interface or via simulation of an online banking system. Downloading statements from the bank and matches them to journal entries, with unmatched items tagged, and generating a bank reconciliation statement. This reduces the bank reconciliation process time-cycle of days into hours, representing a low-end RPA software for SMEs [4].

For reimbursement of expenses, upon receipt of a payment claim, RPA+OCR would identify relevant fields on the reimbursement form and cross-check those values against information provided by the submitter for verification. An automated claim for payment would be submitted if qualified. In reality, that entire workflow, which used to take six months for clearance, is done in six hours. This shortens the approval time by about 60%, and reduces the workload of manual examination to 80%，which can effectively reduce the pressure on departments [5].

Based on RPA, people can extract fixed asset information from fixed asset management systems to the calculation model for automatic calculation of depreciation according to a predetermined method and generate voucher. When conducting inventory check, which can automatically compare the asset information and provide surplus and shortage suggestions for adjusting [6]. This situation is applicable for most of manufacturing companies in order to guarantee a proper and sufficient depreciation provision on time as well as improve accuracy in assets control [1].

2.2 Automating Tax Management Processes

Tax administration requires timeliness and accuracy. RPA may help reduce the risk of error in taxation and improve productivity and raise the level of automation.

Utilizing RPA and OCR technology to capture all information from the invoice face, verify the authenticity and validity of the document, perform input tax certification, and complete data association and archiving with business operations. Research has found that this approach increases processing efficiency by over 50% and eliminates the risk of using fake invoices. This application is suitable for enterprises with high invoice volumes [7].

RPA performs template matching of returns during filing, pulls information from different systems and fills in form fields, validates information logically before filing electronically with the revenue department, and so on and also monitors the status of filings and responses. This helps to avoid a late filing situation, or at least makes sure that the return is filed on time.

In the field of taxation analysis, RPA can aggregate multi-dimensional tax data and generate an analysis report according to a set pattern. Analyze changes in corporate tax rates and issue early warning signals, thus supporting the tax planning process. A lot of experience has shown that such technology is often used by financial staff at big companies or company groups [4,8].

2.3 Automated Financial Statement Preparation Process

RPA has been applied to prepare a financial statement by pulling data across different sources, generating and reconcile the statement according to GAAP requirements, and helps prepare notes. Field testing indicates that the preparation time was reduced from day to hour (error rate also significantly reduced). The technique is widely used by listed companies as well as large enterprises [6,8].

Regarding management reporting, customized report metrics and formats are tailored to management needs, extracting relevant data for multi-dimensional analysis [9]. Data drill-down capabilities are supported. This serves as a refined management tool for enterprises, reflecting operational performance and providing a basis for business decision-making.

RPA in Regulatory Reporting allows people to extract data, complete forms based on regulation requirement, generate & validate reports automatically; then loads them into the reporting platform. With such an RPA automation in place, one bank was able to improve its reporting performance by over half (i.e., from 60% faster), lowering the percentage of erroneous reports by more than a factor of five, down to less than half of one percent, and lowered regulatory risk and employee burden.

3 Core Risk Identification and Root Cause Analysis for RPA Financial Robot Applications

This section identifies main risks of an RPA financial application based on the nature of the application as described above under the following three major aspects –

technology, operations and business, and management and compliance and analyzes the reasons for those problems.

3.1 Technical Dimension Risks

The technical risk is a basic risk that arises from the nature of the technology of RPA, as well as the complexity of the environment in which systems are implemented affecting the resilience and security of automation. Major drivers are siloed corporate information technology infrastructures, a lack of standardization in data interfaces, and no direction as to how one might assess the compatibility between an existing system and any particular RPA tool offered by a vendor.

When RPA accesses to multiple systems; Inconsistencies of the interface standards/data format among systems or update/version change in underlining system, may result in data synchronisation errors and script failure, with possible reasons including lack of consideration at the time of tool selection, failure to consider fallbacks when changing systems, and different data interchange protocols [1,3,10].

Because of the changing nature of finance policy and business process, if people change RPA tool version too fast(or retire old version)outdated script may not be synchronized with new processes and requirements in time, which could cause the disconnect between process because of lacking iteration planning, lack of ways to track policy and business change and lack of clear ownership for maintaining scripts.

RPA uses sensitive internal finance information. If no appropriate data encryption is applied on transmitting and storing, reasonable permission control is available, with poor access control and strong back-up mechanism, there is a high possibility that data will leak, be tampered with or lost. Take RPA robots in securities companies for example, sensitive information can be leaked by RPA robots because there are no encryption and audit functions. The root cause lies in the low level of security awareness. nonstandard designs, and absence of an integrated audit program.

In busy time slots, the simultaneous launching of robots can cause a huge amount of running processes, which consumes lots of resources and even leads to system failure, resulting in frozen processes or crashes [7]. For example, when the end-of-year arrives and an enterprise has overloaded servers because it initiated the preparation of its financial statements too late: it may result in an earlier report date. Possible reasons are poor resource allocation, hardware crash, robot debugging problem, or bugs in robot scripts [1].

3.2 Operational and Business Dimension Risks

Risks stemming from uncertainties in process design, human operations, and business changes impact the accuracy and flexibility of automated processes.

Trying to automate a messy, irregular, or poor-quality process tends to produce robot-like stutters and inaccurate information transfer. The wrong setting of the parameters, improper writing of rules, or lack of testing may result in false financial information and deviations from expected behavior when executing programs. An example is the problem with overpayment by a company's robot for filing taxes caused

by the misconfiguration of the tax rates. Possible reasons are that the operator lacks expertise; lack of uniformity in operating protocols; and lack of trials.

As business boundaries grow, as rules change, as organizations restructure themselves with no corresponding changes made in the RPA processes and scripts, RPA processes are not adapting to change. Possible reasons are no linkages exist between business changes and RPA processes; lack of dynamic assessment mechanisms; and lack of coordination between departments [1].

3.3 Management and Compliance Dimension Risks

These are basic risks and arise mostly due to the weakness of governing instruments, internal controls, and others. They affect the compliance and sustainability of automated processes and can cause risks, for example in choosing unsuitable governance models or through resistance by staff members.

When new changes occur in tax policies, accounting standards, or industry regulations, failure to synchronously update RPA processes or properly protect clients' sensitive data in accordance with relevant legal requirements creates compliance risks. The causes are as follows: First, delayed policy implementation; second, lack of compliance validation; third, absence of professional compliance personnel for review [1].

RPA may change the old model of enterprise's internal control mechanism. If responsibility is unclear and the trail is incomplete, internal control gaps, such as those that some global manufacturers experienced when their confidential information was exposed due to not setting up access rights for the robot. Because (first) there are no current internal control standards that apply when using RPA; (second), there are not yet any generally accepted internal control guidelines regarding automation; and (third)lack of appropriate oversight over audits of internal controls.

4 Enhancing the Operational Efficiency and Risk Prevention Measures for RPA Financial Robots

4.1 Technical Optimization Strategies

RPA with the organization's current applications without compromising on the stability of these systems. Some other considerations to take care of during adoption are as follows. Ensuring that before any automation is deployed, there is a test for ensuring smooth interaction between the application being automated (tool) and the target application. There should be three key parameters addressed in this test-case design: data format consistency, and the ability to adapt to system changes. Carry out extensive quarterly tests as well as complete special testing before updating a system version define interoperability test criteria for the tools; create virtual test cases to check the ability of exchanging information among platforms; use system change early warning systems for predicting problems that may affect business processes or scripts, enabling pre-validation of scripts, along with the ability to modify them [1].

Controlled handling of any and all data anomalies that may occur during the course of automatic execution. Divide execution-related anomalies into three categories, namely data correctness anomalies, business idenfitier anomalies, and logic context anomalies. Establish detailed daily analysis mechanism for each category of anomaly type in order to find out and quantify frequent problems. Record the reasons as well as samples into knowledge database systematically so that they can be optimized or prevented from recurrence during processes.

For data security, implement end-of-end encryption to protect corporate financial data and manage access permissions through tiered, role-based controls. To provide more stable systems, to allocate operational resources in the right places and at appropriate times, to scale up capacity prior to peaks, if necessary ,keep track of a set of robot health indicators and alarms and periodically maintain the robot's physical system so as to catch potential issues early.

4.2 Operational and Business-Level Optimization Strategies

Standardise financial process by analysing and mapping best practice and eliminating non-essential activity, specify working practices, and break down workflows in to consistent, common-sense checklists. In terms of work, monitor and detect anomalies in a timely manner, define thresholds at which an anomaly alert is triggered, define response policies, define resolution procedure. and logs exceptions into a KB. optimize the work requirements of every act, specify responsibility and corresponding process in each step, prepare comprehensive operating guides, perform extensive testing of systems and key personnel, and improve training for staff; develop procedures that will be put into effect after a change in business operations.

4.3 Management and Compliance Optimization Measures

Setting up an adaptive audit process. Establish dedicated groups for tracking of the policy rules and internal rules periodically, conducting internal and external audit on a regular basis, embed compliance control points in business process, strengthen internal controls and audits, improve role accountability and separation of duties throughout life cycle enhance audit trails and other important controls, and test the adequacy of internal controls on a regular basis. Strengthen the cultivation of multi-skilled talent and human-machine collaboration. Develop systematic training plans, form a cross-department team, set up good incentive mechanism and communication system, expand the scope of external cooperation. Improve cost control management by focusing on high value RPA application scenario with multi-dimensional modeling. Set up cost accounting, dynamic cost tracking, and cost-benefit evaluation for maximum benefit. Establishing an RPA governance mechanism suitable for the company's own development, build on top of establishing a governance committee at the level of the company itself, to further clarify responsibilities between each party involved in functions, etc., and establish controls over specific domains, dynamically adjusting to changes in the company.

5 Conclusion

Based on literature research and cases, this paper studies RPA finance robots from the following two aspects: application value, risk dimensions, and routes to governing. Results show that RPA is able to mechanize basic accounting tasks, improve productivity, lower cost, and promote the transformation of financial staff. But the enterprise should choose the application point according to the actual situation and face three kinds of risk： technical, operational/business and management/compliance. The most difficult one of which is management and compliance risks. Enterprises need to set up an integrated risk management system that includes technical optimization in order to reduce risks and improve efficiency standardized practices, and strong management. This category includes management controls and internal controls.

The results in this work are not empirically validated at scale, do not sufficiently capture enterprise heterogeneity, and do not account for the effect of combining AI with RPA. Further studies need to improve this model by further experimental verification, design of scenarios choice models and control methods under various industrial backgrounds and scales of enterprises, build up the system of intelligent process automation's risk management and performance measurement, as well as dynamic early-warning and evaluation model to realize finance departmentalization towards creating values and provide support for sustainable development.

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