

An RPA+AI-based Financial Process Optimization of Small- and Medium-sized Enterprises Preparing for IPO

Jiayu Zhang*

School of Accountancy, Shanghai University of Finance and Economics, Shanghai, China

*Corresponding author: joy_zhang@163.sufe.edu.cn

Abstract. The efficiency of enterprise financial management can directly affect the stability and core competitiveness of the organization. For small and medium-sized enterprises, the financial system can even affect the process of their IPO. Therefore, it is necessary to establish a healthy financial workflow for the development of enterprises. However, small and medium-sized enterprises will also face the problems of complicated financial data and high human cost. In the Industry4.0, RPA, as a new digital force, can help enterprises optimize their financial processes, assist employees focus on higher-value works. This article explores the application scenario of RPA in the financial direction and takes company X as an example to design an RPA+AI based financial system. The aim is to provide reference for small and medium-sized companies that are exploring the way to implement digital transformation. According to the analysis, small and medium-sized enterprises always have the problems of process sorting, deployment cost and staff opinions changing. To tackle with these problems, they could build a light digital financial system with five layers and put it into real practice. These results shed light on guiding further exploration of dynamic scheduling in IT department and financial management team in the entire business field.

Keywords: Robot Process Automation (RPA); Artificial Intelligence (AI); IPO; Process Optimization.

1. Introduction

The combination between Robot Process Automation (RPA) and Artificial Intelligence (AI) has become a popular and inevitable trend for improvements in enterprises' digital transformation processes. The rise of RPA could be traced back to 2015 when RPA enterprises such as UiPath, Application Anywhere, Blue Prism, Nice, Work Fusion used visualization drag-and-drop design, operation recording and other technologies. They partially replaced the traditional way of relying on programming to build robot processes and promoted the large-scale application and landing of RPA in the industry [1]. Deloitte& Touche's introduction of financial robot and process automation program in cooperation with Kira Systems in 2016 marked the turning point of RPA's expanding application in market. The Big4 accounting firms then launched their own robot automation assistants one after another to deal with the problems of massive manpower costs in accounting aspect. As RPA vendors improve their software with artificial intelligence, contextual learning, and advanced cognitive capabilities, more and more human-like tasks will be performed by software robots [2]. With the wider application of RPA technology by Wal Mart, Vodafone, American Express, Equifax and other industry giants, the rapid rise of RPA is subverting people's understanding of traditional office methods in the past few years [3].

For the directions in which this paper studies, following are some main domestic and international research progresses. Cheng and Deng analyze the advantages and values of RPA application, build a theoretical framework model targeting financial analysis based on RPA technology and make some suggestions on R&D strategy steps [4]. Ren et al. made an evaluation and research on the pharmaceutical industry and designed to improve a related IPO enterprise's innovation ability to industry average with the implementation of RPA technology [5]. Ernst & Young defined RPA solutions as working through a set of instructions and replicating the manual processes needed to perform tasks which could collaborate with people while improving speed, accuracy and output, thus enhance the profitability, the margins, for the entire firm [6]. Liang revealed that logic 'RPA+AI' is of great significance to promote the intelligent and automatic development in auditing field with dual technology [7]. Liu indicated that 'RPA+AI' application has greatly transformed the way of financial

management and proved its advantage in data processing and information mining to predict and make scientific decisions through a case analysis on Deloitte [8]. It is also suggested that this transformation put forward severe challenges and more stringent requirements for relevant practitioners and it's still a problem in RPA's popularization with a greater scale.

Since enterprises preparing for IPO have many financial affairs with high degree of repeatability and huge amounts of manual operations, it's significant to consider whether to put RPA+AI into real application so that it could provide those enterprises with less labor cost, higher management level, and more useful financial information based on data analysis. According to a study conducted by Centtrip, a financial management consulting agency, more than 70% of small and medium-sized enterprises in the UK now use automation technology in part or all their businesses, as it brings various benefits.

However, the small and medium-sized companies in China always face the challenges of budget deficiency and administrative disarrays, which leads to few cases in RPA deployment. Therefore, consider the way to reshape a healthy financial process architecture suitable for Chinese small and medium-sized enterprises with the motivation of RPA+AI technology is a real problem, while it could give impetus to the construction of enterprise stability and core competitiveness. This article proposes an architecture for financial management process with sharing function and remote monitoring service targeting the small and medium-sized enterprises. It will first give a description to the meaning of RPA and application scenarios. Subsequently, there will be a brief introduction of an IPO small and medium-sized technology company's background with a process optimization workflow designed around its existing financial system based on RPA+AI technology. Finally, the article will evaluate the feasibility of the model with limitations and future outlooks.

2. Description of RPA

2.1 Concept

RPA could be described as the virtual labor force interacting with the existing user system and interface according to the preset program. It could simulate and enhance the interaction process between the user and the computer system, and finally complete the expected tasks to effectively realize the integration of human, business, and information systems. In terms of the main RPA products in the market, there are three types of RPA products that become popular among the business. To be specific, they are customized RPA software, RPA platform that meets specific needs, and RPA platform that supports developers and customers to carry out secondary development, which correspond to three aspects in the service model (PAAS, IAAS, SAAS). With the development of Artificial Intelligence technology represented by deep neural network, RPA has been attempted to integrate with various Artificial Intelligence related technologies (e.g., cloud computing, natural language processing) to break the shackles of traditional RPA that can only engage in simple and repetitive processes. It has been active in more complex and valuable work field.

2.2 Functions

RPA technology has various functions. Figure1 shows the evolved functions of RPA integrated with different technologies. The logic of traditional RPA is to imitate employees' behavior and finish the tasked that pre-programmed automatically. The traditional one doesn't need much intelligence and all it works is to repeat one task like log in and log out. The main function of which includes data retrieval and recording. RPA can perform data retrieval, data migration and data input across systems. However, combining with the Artificial Intelligence technologies, the logic of these RPA transforms from repetitive auto labor to more precise and complicated intelligent robot assistant. There add some main functions as follows:

- Word & Image recognition and processing. Information could be recognized by NLP (natural language processing), OCR (optical character recognition) technology, and characters of structured data, semi structured data, and unstructured data are reviewed and analyzed on this basis.

- Data storage and sorting. Including data lake, data storage, data ingestion, data query, data analysis, data collation and data verification with a mature data engineering workflow.
- Fund risk monitoring. Based on data analysis and indicator monitoring, RPA can realize workflow allocation, standard report release, decision-making based on clear rules, automatic information notification and other functions.
- Financial sharing. With the help of cloud computing, RPA could be linked with multiple digital platforms and uploads the data to realize the super automation and drastically reduce the cost of enterprises.

RPA's automatic feature and AI technologies' intelligence are complementary to achieve innovative progress on workflow optimization. The evolvement of the RPA are given in Fig. 1.

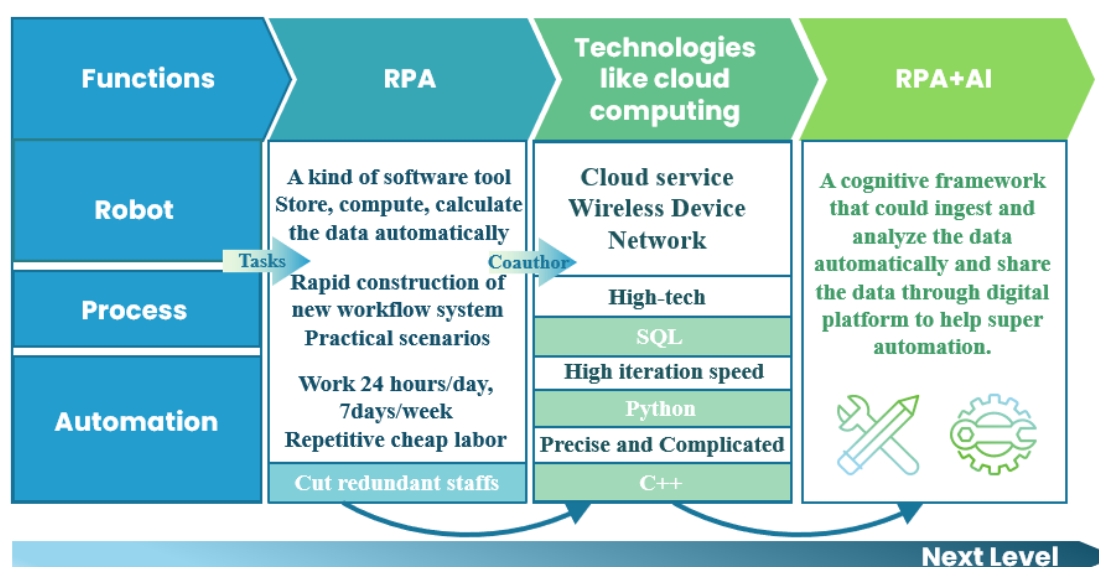


Figure 1. RPA Evolvement.

3. Suitable issues

3.1 Application scenarios

RPA could be applied in various sceneries. Here, this study lists two typical examples: application in Consolidation and Account Reconciliation. Consolidation and Account Reconciliation are two key working steps in financial management process, it's worthful to investigate deeper for those small and medium-sized company to improve the working efficiency of these two complicated issues in the accountancy that majorly faced in practice. Consolidated financial statements is an inevitable problem for those enterprises with parent and subsidiary structure. However, the IPO companies always involve a large number of connected transactions. Therefore, RPA application could assist enterprise to reduce boring works (e.g., manual summary and consolidated offset processing) and improve the input-output efficiency. There are two major pain points in consolidation process. It is required to collect the monthly report from each branch and subsidiary every month, which means a tedious and repetitive reviewing process. Moreover, consolidation needs employees' agility to the newest accounting standards for business enterprises in order to prevent big mistakes.

According to enterprise's own working demand, the RPA could be implemented after a careful evaluation. The enterprise could firstly sort out the main problem that influence the efficiency, select the monthly financial reporting process with clear rules and long labor time, and ultimately implement the process automation. Four main automatic steps in consolidation field are identified: system data export and processing, mail data collection, data summary and consolidation offset, and financial report generation [9]. The four steps could be concluded as following procedures.

RPA firstly exports the data that require from the financial system, completes the calculation of the exchange rate data of the current month and the domestic and foreign consolidated data according to the accounting rules, calculates the ending balance and checks the results. RPA logs in and logs out the email automatically, monitors inbox in real time, collects monthly report documents submitted by subsidiaries, and finally sends collection reminders to employees and managers. RPA ingest the related data and summarize the data submitted by subsidiaries, generating consolidated offset entries according to offset rules. RPA forms the financial report of the current month according to the data.

RPA has been widely implemented by business organizations ranging from automatic invoice processing to automatic calculation of credit to a customer's account [10]. Since the business scale of modern enterprises and volume of transaction data booming, the financial risks have gradually increased when involving the large amount of funds, with the cases including illegal use of accounts and misappropriation of public funds.

No matter whether the mistake is subjective or objective, it might be devastated to the enterprise. For enterprises preparing for IPO in future several years, a transparent and severe financial process would bring benefits and reduce many kinds of troubles. Bank-Enterprise reconciliation is widely used in auditing process to ensure the safety of enterprise funds and standardize enterprise accounting. A Financial Sharing Center based on RPA and cloud computing is responsible for reconciliation of multiple companies with high business homogeneity, heavy workload, and common processes, and following shows the steps of RPA reconciliation. Their tasks could be carried out simultaneously via building a financial sharing center of multiple bank accounts and companies,. By setting established rules in the robot for automatic processing balance reconciliation tables, the bank-enterprise reconciliation could be generated automatically. This kind of RPA reduces workload and ensures accuracy, giving impetus to enhance the reconciliation ability in this sharing center digital ecosystem.

3.2 Typical Application Models

The typical RPA software platform includes three basic components: design platform, robot, and controller [11]. Fig. 2 presents a basic RPA system with these three components in real practice. Design platform is the foundation of RPA construction as it includes various designed services such as business process optimization, script development, test run, and error correction. The financial data analysis robot is also designed by this platform to assist or replace the tasks in financial transformation workflow. The robot can realize the functions like data extraction and output the visualized data analysis report by executing the console command with the help of AI technologies foundations. The controller is also a necessary platform that could monitor and centralize the management of robot operation condition, with additional functions (e.g., human-computer interaction, and process triggering), which improves both the stability and security of financial robot information sharing task.

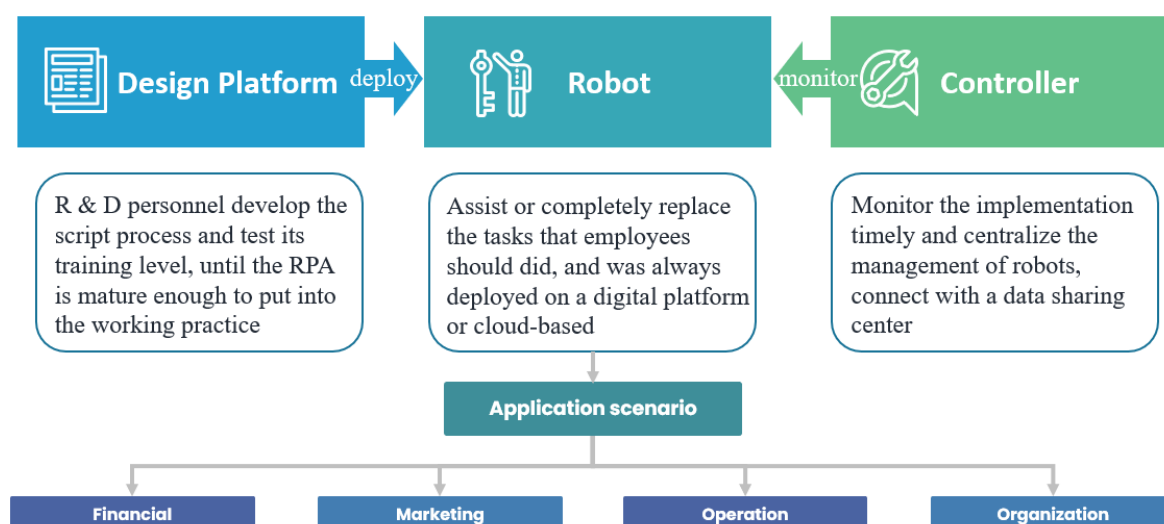


Figure 2. RPA Basic Model

4. Implementation

4.1 Functions Company Background

This article chose a small and medium-sized technology company in Shanghai, and design an appropriate RPA+AI model to improve its financial safety and core competitiveness to accelerate the process on IPO. Company X is a medium-sized technology company located in Shanghai Zhangjiang High-tech Park, and was founded in 2020. In the past 2 years, the company has expanded the market scale dramatically while it has been faced with a chaotic financial management system. The company is preparing for IPO in next few years and the products it sales and the industry where it locates are all really promising. However, lack of an exact financial system made it a hinder to audit and prepare an accurate financial statement. To tackle with this terrible situation, company X could take advantage of RPA and AI technology to deal with both external uncertainties and internal shortages. Building a efficient RPA+AI-based financial process could help company X to manage a large number of regularized and cross system affairs, free the productivity of employees from these repetitive labor, i.e., engage in more creative and challenging strategic work. The process optimization could also help company X obtain greater value promotion and reduce the occurrence of errors and fraud.

Similar to many small and medium-sized companies, there are some actual problems that make company X worried about RPA+AI transformation, which is different from what those headquarters consider. Those problems must be clarified to get down to reveal in the RPA transformation strategy design as follows:

- Process sorting:
- Which process should automation target?
- According to the evaluation of the previous stages, what procedures should be automated?
- Is the function of RPA as envisaged in the prototype stage?
- Staff's opinions:
- Understand the impact of this technology on the role of employees.
- How to organize the redundant staffs? Cut them all or use dynamic scheduling?
- Will RPA cause anxiety and questions of some employees?
- What roles can managers and decision makers play?
- Deployment costs.
- How many funds and what if the budget is in shortage?
- Which kind of RPA product and which RPA company should they choose to minimize the costs?

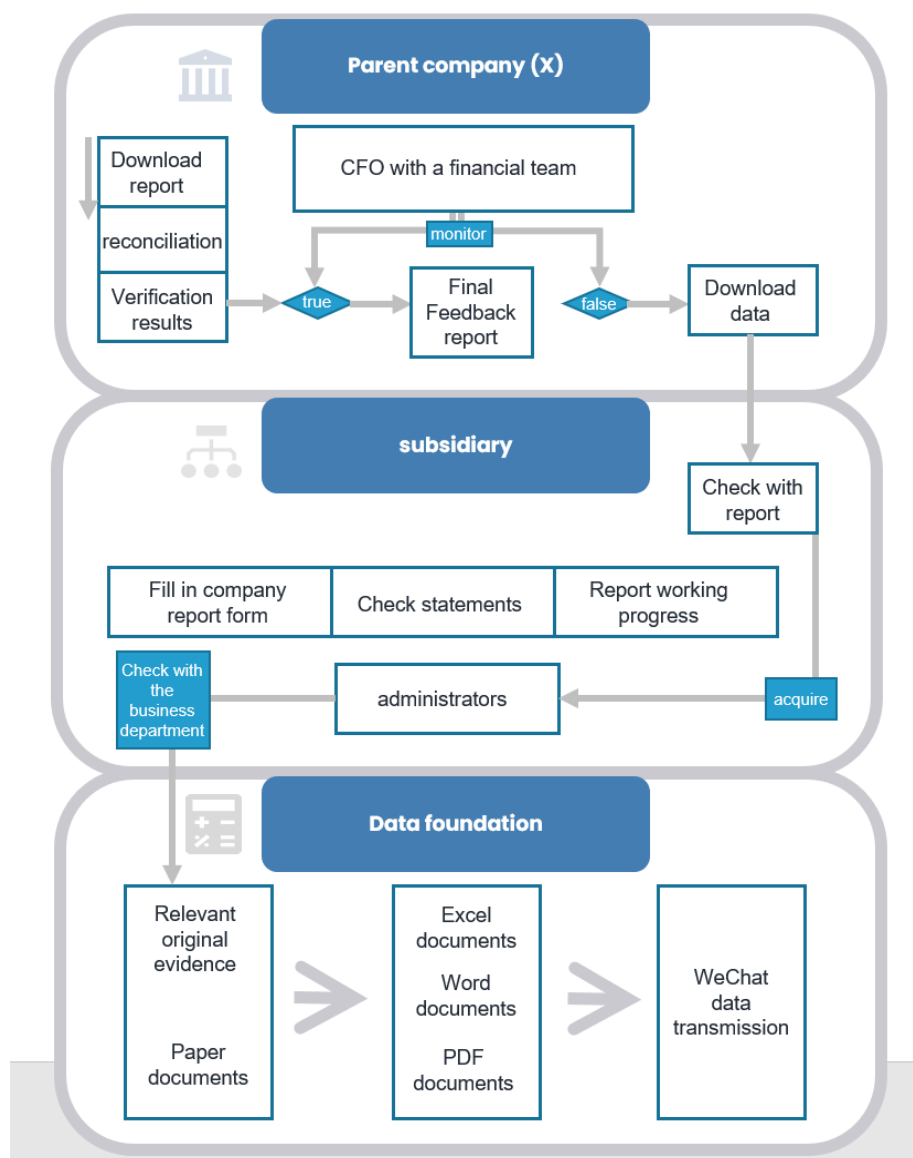


Figure 3. Current financial process of Company X.

4.2 Workflow Optimization Design

The original financial workflow is composed of 3 layers as it depicted in Fig. 3. The subsidiary companies are responsible for finishing their statements monthly with their own financial administrators. The financial team in the parent company is responsible for monitoring the whole financial process, and they worked through a way that costs manpower labor. Additionally, the working progress of parent and subsidiary companies is not coordinated due to lack of information exchange, the feedback report couldn't provide useful financial data. Human labor is also wasted while checking the paper documents and documents uploaded on WeChat.

The optimized financial process consists of 5 structures as sketched in Fig. 4, including infrastructure layer, data layer, service layer, platform layer and application layer, with technology foundation running through the entire field. A financial data sharing platform is highlighted to coordinate the progress of parent and subsidiary companies' progress.

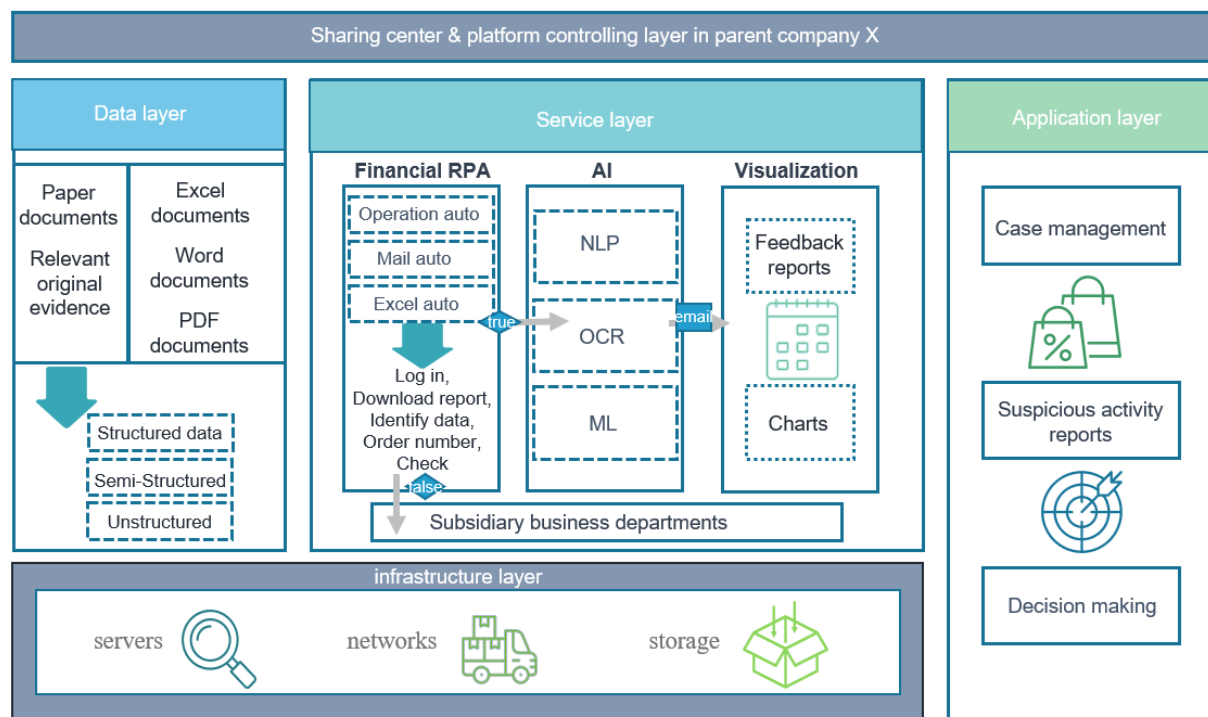


Figure 4. Optimized financial process of Company X.

To be specific, the infrastructure layer provides basic services for other layers, including servers, networks, storage, etc., to ensure the security of the operating environment of the RPA. In addition, the data layer is a database, including the original financial data extracted based on both paper documents and electronic documents. There are many types of data, including structured data, semi-structured data, and unstructured data. Enterprises can take advantage of the RPA to integrate data information between different systems, realize information exchange of a large amount of data, and then extract the required financial data information.

Moreover, the service layer provides RPA + AI services for RPA to realize data visualization and automatically generate financial reports with effective information. This layer is applied through the interface operation automation, mail automation, browser automation, data processing automation, application interaction and other automation functional components, integrating the AI technologies. RPA cooperates with AI technology like natural language processing technology (NLP) to realize the accurate understanding of human language by computers, automatically verify the situation with personnel of relevant business departments, and then automatically send the generated report to relevant personnel in the form of e-mail. Besides, the platform layer is also a control platform designed as the foundation of the Financial Sharing Center. The management and control platform can monitor and trigger the robot operation timely, integrate the data into one platform, and iterate daily. Meanwhile, the application layer is the output result of RPA+AI, i.e., the specific application of financial analysis report in daily work. These analysis results are then used by enterprise managers for case management, suspicious activity reports, and strategic decisions.

To tackle with the problems of cost and budget control, Company X should design a lightweight RPA system in financial process optimization, and could 'test with implementation'. Company X could verify the validity and advantages of process optimization using models including Data Envelopment Analysis (DEA) after it applies the workflow.

5. Limitations & Future Outlooks

The impact of "RPA + AI" on small and medium-sized enterprises still needs time to test and prove its effectiveness. In order to better cope with RPA transformation, enterprises must firstly build a healthy financial system to determine the scenario direction of using RPA. For managers, it is still a

difficult problem of how to treat and guide the employees, help enterprises embrace RPA and lead employees to accept digital transformation. In the era of AI, the substitution of "RPA + AI" for traditional employees is bound to intensify. Managers need to think about how to treat the old employees who are engaged in basic and repetitive work, so as to better balance cost-effectiveness and corporate image. The transformation also puts forward higher requirements for the technical literacy of employees. The way to recruit new talents with digital concepts and systematically train them under the competition of large companies is also a problem worthy of consideration by small and medium-sized enterprises. It still needs a lot of examples and cases to prove how much RPA can contribute to the small and medium-sized enterprises that are going to expand its market share. In the future, small and medium-sized enterprises similar to Company X should also attach great importance on enhancing top design of organization and search the way of combining its IT department with financial department to accelerate the progress of digital transformation. What's more, how to implement dynamic scheduling with more agile methods and change enterprise culture to embrace the failures that may meet in transformation progress is the issue worth considering.

6. Conclusion

In summary, this paper discusses financial system optimization based on scenarios exploration and workflow implementation design. Enterprises including small and medium-sized companies need to introduce new technologies and digital transformation system to meet the current challenges in this new industry 4.0 era, or they will lose their competitiveness in the fierce market. Up to now, the application of RPA+AI is comparative little in China. This article takes an IPO Company X as an example, and design an RPA+AI based financial process based on its existing financial system, detail the operating mechanism and the problems it should tackle to explore the feasibility of Financial Optimization of small and medium-sized enterprises. Nevertheless, there are still many directions that are worth discovering in this financial transformation field. In the future, the successful implementation couldn't be realized without a healthy and transparent top design of organization. Enterprises could continue to investigate the way of dynamic scheduling and department coauthor to improve the input-output efficiency. Overall, these results offer a guideline for enterprises to implement digital transformation in financial field.

References

- [1] Liu Tian. Foresee 2022: Panoramic Map of China's RPA industry in 2022. 2022-7-22 [2022-8-30]. Retrieved from: <https://www.qianzhan.com/analyst/detail/220/220722-5ba2e827.html>.
- [2] Institute for RPA. Introduction to Robotic Process Automation: A Primer. New York, NY: The Institute for RPA, 2015.
- [3] UB Store. Understand the development history of RPA (very brief history of RPA). 2021-4-19 [2022-8-30]. Retrieved from: <https://zhuanlan.zhihu.com/p/365963970>.
- [4] Cheng Ping, Deng Xiangyu. RPA financial data analysis robot: theoretical framework and R & D strategy. Friends of accounting, 2022 (13): 148 - 155.
- [5] Ren Xiangyang, Si Yutao, Jia Yanfeng. Analysis of innovation capability of IPO enterprises on GEM based on RPA. Industrial innovation research, 2022 (09): 135 - 137.
- [6] Ernst & Eng. Robotic process automation (RPA). [2022-8-30]. Retrieved from: https://www.ey.com/en_gl/tax/robotic-process-automation-rpa.
- [7] Liang Meiyi. Audit logic path and framework construction based on "Ai + RPA" dual technology architecture. Business accounting, 2022 (01): 29 - 33.
- [8] Liu Zezhong. Application analysis of Intelligent Finance under "RPA + AI" mode. Modern business, 2021 (04): 177 - 180.
- [9] Robot bot. RPA case. | RPA robot helps large state-owned banks realize consolidated report automation. 2021-11-11[2022-8-30]. Retrieved from: <https://laiye.com/news/post/1391.html>.

- [10] Lacity, M., L. Willcocks, and A. Craig, A. Robotic Process Automation at Telefónica 02, 2015. Retrieved from: <https://www.umsl.edu/~lacitym/TelefonicaOUWP022015FINAL.pdf>.
- [11] Huang Yongai, Xu Biyun. China RPA application trend report [R]. Ifenxi, March 2021.