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RPA or Generative AI? A Comparative Review of Accounting Automation in Accounts Receivable and Expense Reimbursement

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Abstract. Mainstream accounting automation technologies are mainly divided into robotic process automation (RPA) and generative artificial intelligence (GenAI). RPA is a relatively mature technology that has been widely used, especially for standardized and repetitive tasks, whereas GenAI is an emerging technology that has demonstrated strong potential and remarkable capabilities. This paper employs a structured literature review approach, primarily covering relevant literature from 2020 to 2025, and compares the application performance of RPA and GenAI in accounts receivable and expense reimbursement processes. Regarding accounts receivable, efficiency, accuracy, and reliability are used as key evaluation criteria. For expense reimbursement, the comparison emphasizes flexibility, error-handling capabilities, and user interaction. The findings indicate that RPA demonstrates superior consistency and stability in standardized, repetitive task processes, remaining dominant in tasks such as invoice matching and cash receipts. GenAI significantly outperforms RPA in ambiguous scenarios that involve unstructured receipts, policy interpretation, and anomaly detection. The study concludes that a hybrid adoption strategy based on task characteristics and data structure is more effective than relying on either technology alone. This research provides empirical guidance for accounting practitioners in technology selection and highlights the importance of developing RPA-GenAI hybrid architecture in future accounting functions.

Keywords: Robotic Process Automation, Generative AI, Accounts Receivable, Expense Reimbursement

1. Introduction

With the rapid iteration of information technology and the surge in data volume, traditional manual processes in financial operations are becoming inadequate in terms of efficiency and accuracy. Robotic Process Automation (RPA) was among the earliest technologies adopted to address these challenges, as it can significantly improve operational efficiency by simulating human interactions with financial systems through scripted robots. This has undoubtedly attracted widespread adoption by practitioners and investment from numerous institutions in this field [1]. In recent years, with the emergence of large language models such as GPT, artificial intelligence has demonstrated its strong

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dominance in the digital field [2]. At the same time, the enormous potential of artificial intelligence also brings the possibility of technological innovation to accounting and related fields. This raises a controversial question: should companies adopt robotic process automation or emerging generative artificial intelligence (GenAI) technologies? Existing literature has examined the performance of RPA and GenAI in single domains, but these studies are still scattered in terms of empirical research on effectiveness and lack a systematic comparison of when and why one technology is superior to the other in specific accounting scenarios. This study employs a literature review approach to fill this gap, focusing on two common yet distinct operational areas: accounts receivable processing and expense reimbursement. AR involves relatively standardized tasks such as invoice verification and cash deposit, while expense reimbursement involves more uncertainty in terms of payment collection and policy compliance. These two scenarios are ideal for differentiated technology applications, which is why we are focusing on these two areas rather than others.

The key research questions of this study are: (1) What are the differences in performance between RPA and GenAI in accounts receivable and expense reimbursement tasks? (2) What specific task factors determine technological advantage? In addition to integrating scattered theoretical research data, this study provides clearer guidance for enterprises to design automation strategies and select technologies. In addition to integrating scattered theoretical research data, this study provides clearer guidance for enterprises in designing automation strategies and selecting technologies. It also provides some theoretical basis for the application of the RPA-GenAI hybrid architecture in future accounting work.

2. Technology overview and theoretical background

2.1. RPA in accounting

Since 2021, driven by unprecedented cost-cutting pressures and digital transformation requirements in fields such as finance and accounting, the application of RPA in finance and accounting has accelerated significantly. As a foundational tool for accounting digitalization, RPA primarily works by simulating human actions in routine and highly standardized tasks. RPA is not a deep system integration but rather operates at the presentation layer by interacting with existing applications through user interfaces, which allows for rapid deployment with minimal coding requirements [3].

Its simplicity and practicality have made RPA a main automation tool for standardized accounting tasks. Examples include ASC 606 for point-in-time revenue recognition and IAS 16 for deterministic depreciation calculation. Its common applications include invoice matching in accounts receivable, bank reconciliation, and basic expense verification. In these applications, RPA can reduce processing time by 50% to 80%, which not only greatly improves the efficiency of routine tasks but also significantly reduces the occurrence of human error [4].

In expense reimbursement processes, RPA is often used for cross-checking of amounts and detecting some common violations, such as missing receipts or exceeding expense limits. However, RPA also has significant limitations. When encountering edge cases that require independent situational judgment or lack clear rules, RPA systems often struggle to operate independently and require manual assistance, resulting in higher error rates. Therefore, while RPA can indeed improve operational efficiency and save costs when faced with certain fixed and standardized tasks, it still has limitations and cannot completely replace human accountants.

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2.2. GenAI in accounting

GenAI represents another major turning point in accounting automation. Compared with RPA, GenAI demonstrates higher accuracy and efficiency in handling unconventional and ambiguous situations, such as handwritten notes, blurry photos, or non-standard forms. GenAI has emerged since 2022 with its GPT series and other models. Its representative model, GPT-4, can efficiently process natural language and multimodal data [5].

In the area of expense reimbursement, GenAI, trained on massive datasets, can generate predictive outputs, such as detecting fraudulent expense reimbursements through scanned receipts, company credit card statements, and employee travel itineraries. For accounts receivable, GenAI can leverage powerful natural language processing and big data analytics to craft personalized collection emails. With its powerful logical reasoning ability, GenAI can also predict cash flow.

However, GenAI also faces limitations. Edeigba argues that although GenAI improves efficiency in scenarios where RPA struggles, its application remains cautious due to barriers to integration with traditional systems [6]. GenAI demonstrates tremendous potential in terms of flexibility and logical reasoning. However, the technology currently requires cautious application and human oversight to ensure that efficiency gains do not come at the expense of compliance or data security.

2.3. Comparison framework

This study adopts the Task-Technology Matching (TTF) framework to compare the performance of RPA and GenAI in accounts receivable and expense reimbursement processes. The TTF framework is widely used theories in "technology adaptability" research, emphasizing that technological effectiveness depends on the degree to which system functions match task requirements [7].

After incorporating TTF theory, RPA is suitable for structured, low-variability tasks, such as invoice matching. GenAI is better suited for handling unstructured and ambiguous tasks, such as interpreting vague fee policies. If the matching is inappropriate, applying RPA to receipts with ambiguous meanings will lead to misunderstandings and difficulties in execution; conversely, over-reliance on GenAI for mechanical matching will not only waste its excellent adaptive reasoning and natural language understanding capabilities but also significantly increase operating costs.

To explain this type of problem more clearly, this research will use a 2x2 matrix to illustrate it. As shown in Table 1, the matrix uses the explicitness of task rules as the vertical axis and the data structure (unstructured-structured) as the horizontal axis. In summary, the TTF theoretical framework helps construct the comparative framework for this study, which will facilitate a systematic comparison of the performance of RPA and generative AI in two accounting scenarios and provide effective justification for decision-making.

Table 1. Task-technology fit matrix for RPA and GenAI in accounting

	Structured Data	Unstructured Data
High Rule Explicitness	RPA Dominant	Hybrid
Low Rule Explicitness	Hybrid	GenAI Dominant

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3. Comparative review in accounts receivable

3.1. RPA performance in AR tasks

The accounts receivable process typically involves highly structured and repetitive tasks like generating invoices, matching accounts receivable with projects and cash deposits. For these projects, its advantages are efficiency and accuracy. Numerous case studies have demonstrated that RPA significantly improves efficiency and accuracy in AR processing. For example, RPA robots can process account matching and cash transfers several times faster than manual operations, reducing cycle time by 50% to 70% [3]. Kaya et al. found that in accounts receivable management, by solidifying the execution logic with RPA, robots can handle every transaction in the same way. Such technologies are particularly suitable for automating the reconciliation process, ensuring the accuracy of data matching through one-way or two-way transaction verification with customers [8]. RPA's high efficiency and accuracy in AR frees employees from repetitive tasks, allowing them to focus on resolving anomalies or customer disputes.

3.2. Generative AI performance in AR tasks

One of GenAI's advantages in the accounts receivable process lies in its powerful language understanding and editing capabilities. It can analyze email content and automate the process of handling a large number of email inquiries, greatly improving operational efficiency [9]. Furthermore, GenAI's powerful reasoning capabilities are also evident in the accounts receivable process. For example, by analyzing historical records and probabilistic models, GenAI can predict cash application risks and payment delays, helping teams process collections and shorten accounts receivable turnover days [6]. However, GenAI currently appears primarily as an auxiliary tool in the accounts receivable process. Existing literature still lacks compelling evidence that it can completely replace traditional automation methods.

3.3. Comparative evaluation: efficiency, accuracy, reliability

Based on the task-technology matching framework and existing literature, this comparative review evaluates the performance of RPA and GenAI in the accounts receivable process from three dimensions: efficiency, accuracy, and reliability (see Table 2).

In terms of efficiency, RPA performs better in core accounts receivable workflows such as invoice matching and cash receipts. GenAI also demonstrates good efficiency in more complex situations, but its overhead costs are higher for standard processes.In terms of accuracy, RPA achieves extremely high accuracy in the invoice matching process with standard input, but its accuracy is far lower than GenAI when dealing with non-standard formats or incomplete messages. In terms of reliability, RPA can execute independently, continuously, and auditably in most cases of handling accounts receivable processes. However, due to its inherent characteristics, GenAI may introduce a large amount of variability and raise privacy issues when processing sensitive payment data, which necessitates strict security measures and makes it less reliable than RPA [10].

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Table 2. Comparative summary in accounts receivable

Dimension	RPA Advantage	GenAI Advantage	Overall Recommendation
Efficiency	Faster in structured volumes	Better for exceptions & predictions	RPA core; GenAI augment
Accuracy	High in rule-based matching	Strong with unstructured data	Context-dependent
Reliability	Consistent & low-maintenance	Adaptive but variable	RPA for critical paths

4. Comparative review in expense reimbursement

4.1. RPA performance and limitations

Expense reimbursement mainly involves tasks such as policy compliance checks and reimbursement verification. Under normal circumstances, RPA technology can still improve the efficiency of expense reimbursement processes. According to Perdana et al., RPA technology can significantly speed up the review process by rapidly classifying fees and identifying violations, which can reduce employee workload by 40% to 60% [3]. However, when RPA technology is faced with non-standard format receipts, traditional RPA systems, due to their reliance on fixed templates, tend to have higher error rates or require frequent manual intervention [11].

4.2. GenAI strengths in handling unstructured receipts

In the expense reimbursement process, GenAI demonstrated its unique advantages in processing unstructured data. Most generative AI currently on the market already possesses optical character recognition capabilities. This capability will help parse various receipt formats, with a success rate of 90% to 95%, and significantly reduce manual review time [5]. Because GenAI can extract semantic information, rather than relying solely on predefined rules, it can more flexibly use contextual reasoning to assess policy compliance or flag potential anomalies. In addition, GenAI can improve the completeness of messages by asking employees questions in a conversational manner or improve the efficiency and smoothness of the entire process by providing relevant information to employees in return.

4.3. Comparative evaluation: flexibility, error handling, user interaction

This study evaluates the performance of RPA and GenAI in expense reimbursement from three dimensions: flexibility & document variability, error handling, and user interaction (see Table 3).

In terms of flexibility and document diversity, RPA can handle standardized content very well, but fixed templates still cannot handle various types of receipts. However, GenAI can process diverse documents through multimodal processing, achieving broader coverage in real-world scenarios compared to RPA [5].

Similar issues exist in error handling; RPA can handle routine checks, but it cannot independently predict and resolve errors and can only report them to manual processing. GenAI can provide repair suggestions and performs better than RPA in this respect.

In terms of user interaction, GenAI supports conversational queries, which not only collect and review messages completely and efficiently but also facilitate clarification or explanation by users. RPA, on the other hand, lacks similar interactive capabilities and performs far worse than GenAI.

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Table 3. Comparative summary in expense reimbursement

Dimension	RPA Advantage	GenAI Advantage	Overall Insight
Flexibility & Document Variability	Stable for uniform inputs	Adapts to diverse/unstructured	GenAI for variable receipts
Error Handling	Consistent in rules	Proactive suggestions	GenAI reduces escalations
User Interaction	Minimal intervention needed	Conversational support	GenAI improves usability

5. Discussion: implications for theory and practice

This study extends the TTF theory to contemporary accounting automation scenarios involving GenAI, particularly by incorporating GenAI as a new variable in accounting automation research. Meanwhile, this study emphasizes that RPA and GenAI are not inherently superior or inferior and should be based on complementary coexistence rather than technological substitution, thus enriching the theoretical discussion on AI-enabled accounting. From a practical perspective, this assessment report provides a clear guide to technology selection. In the accounts receivable field, since the processes are still primarily structured, RPA remains the dominant tool for tasks such as matching and bookkeeping, while GenAI plays a supporting role. Expense reimbursement, on the other hand, makes greater use of GenAI's text ingestion and inference prediction capabilities. Based on this research, practitioners should adopt a hybrid approach, deploying RPA to handle the core processes while simultaneously using GenAI to handle exceptions and interactions.

6. Conclusion

This review systematically compares the application of RPA and GenAI in two core accounting processes: accounts receivable and expense reimbursement. The results show that both technologies have their advantages and disadvantages, and neither technology can completely prevail. Therefore, these two technologies are not replacements for each other but rather complementary. Through the lens of Task-Technology Fit, RPA demonstrates significant advantages in structured and well-defined accounts receivable tasks, exhibiting extremely high efficiency, accuracy, and reliability in invoice matching, cash application, and daily reconciliation. GenAI performs significantly better in expense reimbursement because this area involves unstructured receipts, document discrepancies, and the need for context-based strategy decisions. Its unique text extraction capabilities, error prediction abilities, and interactive capabilities far surpass RPA's fixed templates. These results also highlight the importance of hybrid configurations for accounting automation. Enterprises should retain RPA as the infrastructure for deterministic processes while deploying GenAI to manage anomalies, discrepancies, and user interactions.

However, this study still has some limitations. As a literature review, it lacks specific original empirical data and may not reflect challenges related to long-term maintenance or scalability. Future research should prioritize longitudinal case studies to examine specific hybrid deployments of RPA and GenAI in companies of different sizes and industries. Furthermore, a quantitative study of the cost-effectiveness of these companies, combined with ethical considerations related to the opacity of GenAI's decision-making, will further enrich research in this field.

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