Digital Technologies and Their Impact on the Optimization of Business Processes in the Company: Focus on RPA

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Abstract. Digital technologies are reshaping how companies optimize their business processes. In particular, Robotic Process Automation (RPA) has emerged as a powerful tool for automating repetitive tasks and improving process efficiency. This paper examines the impact of RPA on business process optimization in the context of an order processing workflow at a real company (LLP KazParts) in Kazakhstan. We model and implement an RPA solution that automates the end-to-end order pipeline—from online customer order entry through automatic creation of sales orders and payment postings in the 1C enterprise system to final shipment. A one-week experimental deployment is conducted to compare the RPA-driven process against the manual process in terms of processing speed, error rates, and throughput. The RPA implementation achieved significant performance gains, reducing average order handling time by over 80% and virtually eliminating data entry errors. However, several limitations were observed in handling complex exceptions and dynamic customer requirements. To address these shortcomings, we propose an improved hybrid RPA+AI model that combines rule-based automation with artificial intelligence components for greater flexibility. The results demonstrate the substantial benefits of RPA for business process optimization in the company while highlighting the value of integrating AI to handle process variability.

Keywords: Robotic Process Automation · Business Process Optimization · Digital Transformation · Order Processing · Intelligent Automation · 1C Enterprise

1 Introduction

Digital transformation is driving organizations to leverage advanced technologies for optimizing business processes. Among these technologies, *Robotic Process Automation* (RPA) has gained prominence as a means to automate repetitive, rule-based tasks in information systems. RPA involves software robots that emulate human interactions with user interfaces to perform tasks, effectively acting as a scalable digital workforce [2]. By offloading mundane tasks to software bots, companies can achieve higher operational efficiency, reduced error rates, and improved processing speed [1]. Studies report that RPA implementations lead to significant cost savings and productivity gains across various industries [1,4,5]. For instance, in banking and insurance sectors, RPA has shortened processing times and lowered operational costs by automating high-volume transactions [4]. Real-world case studies further exemplify these benefits: Telefónica O2 deployed over 160 RPA bots to handle about half a million transactions per month, achieving a 650–800% return on investment and reducing some process cycle times from days to minutes [7,6]. Such outcomes have led researchers to identify RPA as a key lever for process transformation in service operations [19] and an enabler of digital transformation initiatives in organizations [3,17].

Despite its potential, successful RPA adoption is not trivial. Organizations must carefully plan which processes to automate and address several implementation challenges [1,5]. One critical factor is selecting suitable candidate tasks for RPA that are rule-based and stable [20]. Poor process selection or attempting to automate highly complex, exception-laden tasks can lead to suboptimal outcomes. Another challenge lies in integrating RPA with legacy enterprise systems; issues such as limited APIs or changing user interfaces can cause reliability problems [8]. Additionally, organizational and human factors play a significant role. Introducing software robots often requires managing employee concerns and change aversion, as well as redesigning workflows to accommodate human–bot collaboration [5,8]. Studies have identified technical barriers and organizational barriers that can hinder RPA projects [5]. Ensuring proper governance and change management is thus essential for realizing the full benefits of RPA [1]. Moreover, RPA should not be viewed as a one-time solution; continuous monitoring and improvement of bots are required to adapt to evolving business processes [16].

In the research community, there is a growing body of work examining RPA applications and outcomes. Recent literature reviews summarize contemporary RPA research themes, benefits, and challenges [10]. These include case studies in domains such as finance, healthcare, and supply chain, which generally report improved efficiency and accuracy from RPA deployments. In the supply chain context, RPA has been used to streamline order fulfillment and inventory management processes [9]. However, there is limited academic literature focusing on RPA implementations in Central Asian companies or on integration with regionspecific enterprise software. This study aims to address this gap by analyzing an RPA deployment at a company in Kazakhstan that uses the local 1C enterprise platform for trading and accounting.

2 Methodology

2.1 RPA Workflow Design

The target process for automation is the customer order processing workflow, which spans multiple systems, namely the web storefront and the internal 1C enterprise applications. We first mapped the *as-is* manual process to identify the sequence of activities and decision points. In the manual workflow, a sales operator periodically checks for new online orders, then logs into the 1C:Trade Management system to input each order's details, including customer information, ordered items, quantities, and prices. Next, the operator switches to the 1C:Accounting module to record the payment associated with the order or mark it as cash on delivery. Finally, an invoice and shipping document are generated in 1C, and the warehouse is notified to pick, pack, and dispatch the items.

Figure 1 illustrates the *to-be* automated workflow after introducing RPA. Instead of a human operator performing data transfer and data entry, an RPA bot executes these actions across the web platform and the 1C systems.

In the automated workflow, the RPA bot monitors the e-commerce platform for newly placed orders by querying the order database or application programming interface. Once a new order is detected, the bot extracts all relevant data such as the order identifier, customer details, shipping address, item codes, quantities, and payment status. Using this information, the bot logs into the 1C:Trade Management system through its graphical user interface and navigates the required menus and forms to create a new sales order. All mandatory fields are populated automatically in the same manner as a human operator would, but significantly faster.

After creating the sales order, the bot proceeds with payment processing. For prepaid orders, the bot switches to the 1C:Accounting system and records the corresponding financial transaction. If the order is marked as cash on delivery or another deferred payment method, the bot skips this step and flags the order accordingly. Subsequently, the bot generates the invoice and shipping documentation in 1C and reserves the required stock for dispatch. As a final step, the warehouse team is notified automatically, for example via email or a shared task list, that the order is ready for shipment.

To ensure reliability, the automation was implemented using stable user interface element selectors and predefined delays to accommodate screen loading times. The bot was developed on a commercial RPA platform compatible with the Windows-based 1C environment. Although direct API or database integration is sometimes possible, user interface automation was selected for this project due to its flexibility and minimal impact on the existing IT infrastructure. Basic exception handling mechanisms were implemented; for example, if a product code was not found in the 1C catalog, the bot logged the incident and skipped the order for manual review.

2.2 Algorithm and Pseudocode

The logical flow of the RPA bot was formalized using pseudocode to guide implementation and ensure reproducibility. Algorithm 1 presents the core logic of the automated order processing procedure.

As shown in Algorithm 1, the bot operates in a continuous loop and processes orders sequentially from start to finish. Each iteration handles a single order, ensuring data consistency across systems. In practice, the bot can be configured

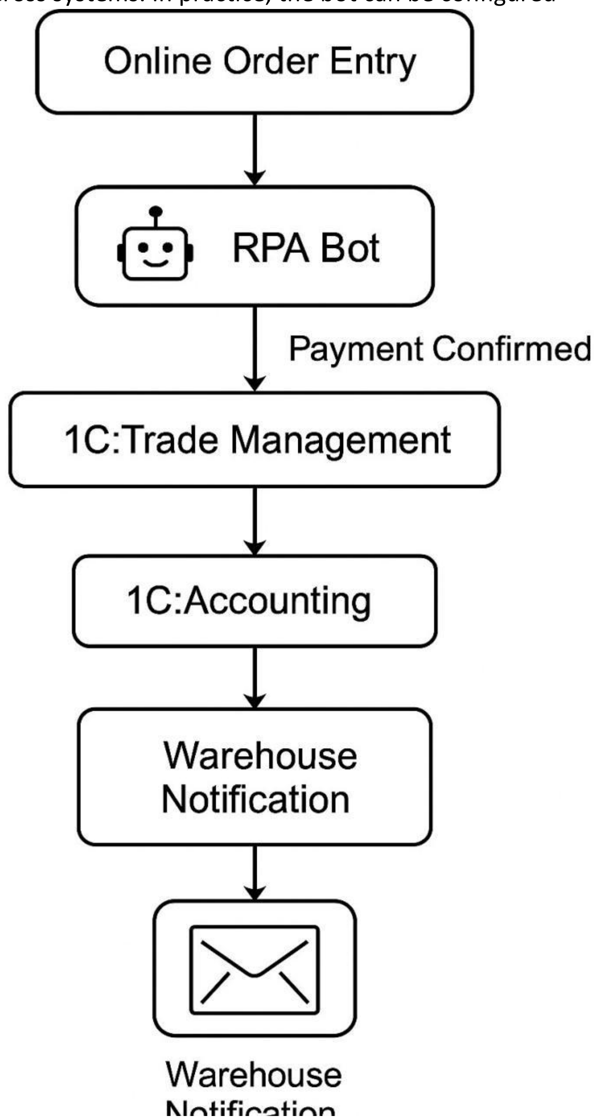

Fig.1. Overview of the RPA-based order processing workflow, from online order entry to update in 1C and warehouse notification.

Algorithm 1 RPA Order Processing Procedure

```
Initialize RPA bot and establish connections to the web order system and 1C applications
while new online orders are available do
    Retrieve order data from the web platform
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        Launch or activate 1C:Trade Management and authenticate
        Create a new sales order using the retrieved order information
        if order payment is confirmed then
            Launch or switch to 1C:Accounting
            Record the payment transaction in the accounting system
        end if
        Generate invoice and shipping documents in 1C
        Notify the warehouse that the order is ready for shipment
        Mark the order as processed in the web system
end while
```

to run at fixed time intervals or be triggered in near real-time when new orders are created.

2.3 Experimental Setup and Metrics

To assess the effectiveness of the RPA implementation, a pilot deployment was conducted and compared against the baseline manual process. The evaluation period lasted seven consecutive days and covered a representative volume of online orders.

For the baseline scenario, performance data were collected from historical records and direct observations of manual processing. The following metrics were measured:

- Processing time per order, defined as the elapsed time from online order placement to completion of data entry and documentation in the 1C system.
- Throughput, measured as the number of orders processed per hour or per working day.
- Data entry error rate, defined as the proportion of orders requiring correction due to incorrect or incomplete information.

During the RPA pilot, the same metrics were captured for the automated process:

- Automated processing time, measured from order creation on the website to completion of all automated actions in 1C.
- Throughput of the RPA bot, expressed as the number of orders processed per hour.
- Exception rate, defined as the percentage of orders that could not be fully processed by the bot and required human intervention.

To quantify the efficiency gain achieved through automation, we used the following metric:

$$\eta = \frac{T_{\text{manual}} - T_{\text{RPA}}}{} \times 100\%, \qquad (1)$$

T_{manual}

where T_{manual} denotes the average processing time per order in the manual scenario, and T_{RPA} denotes the average processing time per order under RPA automation. The resulting value η represents the relative reduction in processing time achieved through automation.

The collected data were aggregated and analyzed to compare the manual and automated processes. The next section presents the experimental results and discusses the observed performance differences.

3 Results and Discussion

During the seven-day pilot deployment, the RPA bot processed a total of 320 online orders, corresponding to an average of approximately 45 orders per day. The evaluation compared the performance of the manual order processing workflow with the RPA-automated workflow. Table 1 summarizes the observed performance differences in terms of processing time, throughput, and error or exception rates.

Processing Time and Throughput In the manual workflow, a sales operator required approximately 8–10 minutes on average to complete the processing of a single order. This corresponds to a throughput of roughly six orders per hour per employee. In contrast, the RPA bot completed the same set of activities in an average of 1.5 minutes per order. Due to its ability to operate continuously and without interruptions, a single bot instance achieved an effective throughput of approximately 40 orders per hour.

Using the efficiency improvement metric defined in Eq. (1), the reduction in average processing time per order reached approximately 80%. This result indicates that the automated process was about five times faster than the manual process. Such performance gains are consistent with findings reported in previous studies, where RPA deployments led to time savings of 70–80% in transactionoriented processes [4,10]. From an operational perspective, the faster processing time enabled near-immediate order confirmation and earlier initiation of shipment activities, which previously could be delayed by several hours or even until the next business day.

Accuracy and Error Rates Manual data entry was found to introduce occasional errors in the baseline process. During the observation period, approximately 3% of manually processed orders required corrections due to incorrect quantities, item codes, or customer information. These errors resulted in additional rework and, in some cases, delayed shipment.

The RPA-based process eliminated manual transcription and achieved zero data entry errors for all orders processed successfully by the bot. Since order data

PERFORMANCEE OF MANUAL PROCESS VS. RPA AUTOMATION OVER 7 DAYS

?erformance Metric	Manual Process	RPA Automati(
Average Processing Time per Order	9.0 minutes	1.5 minut
Daily Throughput	45 orders	320 order
Error/exception Rate	4.7%	0.6%
Error–r(axsed naduction	4.4%	—

Table 1. Performance comparison between the manual process and the RPAautomated process over seven days.

were transferred directly from the web platform to the 1C systems, the risk of human error was effectively removed. This outcome aligns with widely reported benefits of RPA in improving data accuracy and process reliability [1,2]. However, the automated process experienced a small number of exceptions. Specifically, five orders, corresponding to approximately 1.6% of the total, could not be fully processed by the bot and required manual intervention. These exceptions were caused by conditions such as missing product records or unexpected validation requirements in the 1C system. While such cases do not represent errors in the traditional sense, they indicate situations where rule-based automation was insufficient.

Resource Utilization The introduction of RPA significantly altered the allocation of human resources. Prior to automation, two employees were responsible for handling online orders on a daily basis. During the pilot, the RPA bot performed the majority of routine processing tasks, allowing these employees to focus on higher-value activities such as customer communication, exception handling, and coordination with suppliers. One employee remained responsible for monitoring the bot and resolving exceptional cases, but the overall manual workload was substantially reduced.

From a managerial perspective, this shift demonstrates how RPA can improve labor productivity and operational scalability. The company could process a larger volume of orders without increasing staffing levels or could maintain current volumes with reduced overtime. Similar effects have been reported in other RPA case studies, where organizations achieved measurable cost savings and improved utilization of human expertise [5,6].

Challenges and Shortcomings Despite the clear benefits, several limitations of the RPA implementation were identified. The rule-based nature of the bot restricted its ability to handle unstructured or unexpected situations. For example, customer orders containing special instructions or requests outside the predefined process flow were not interpreted by the bot and required later human review. In addition, when items were out of stock, the bot was unable to make contextual decisions such as splitting shipments or proposing alternative products.

These findings reflect a broader limitation of traditional RPA systems, which excel at standardized, repetitive tasks but lack the cognitive capabilities required for judgment-intensive activities [10,16]. Furthermore, the reliance on user interface automation introduced maintainability concerns. Minor changes to the 1C interface, such as updated layouts or renamed fields, could potentially disrupt the bot's operation and require reconfiguration. This issue has been widely recognized in the literature as a key challenge in sustaining RPA solutions over time [8].

Comparison with Existing Literature Overall, the observed results are consistent with prior research on RPA effectiveness. The magnitude of time savings and error reduction aligns with reported outcomes in financial services, procurement, and logistics processes [7,4]. At the same time, the presence of exceptions and the need for ongoing human oversight mirror findings from multiple-case studies, which emphasize that RPA alone does not fully eliminate the need for human involvement [5]. These insights support the growing consensus that RPA should be viewed as a foundational automation technology that benefits from integration with complementary approaches such as artificial intelligence. In the following section, we discuss how a hybrid RPA+AI model can address the identified limitations and further enhance process performance.

4 Conclusion

This study demonstrated how robotic process automation can significantly optimize a company's business process, using the example of order processing at a mid-sized enterprise. By deploying an RPA bot to automate the transfer of online orders into the 1C enterprise system, we achieved major improvements in efficiency (over 80% reduction in processing time per order) and accuracy (elimination of manual entry errors). The practical implication for the company, LLP KazParts, is faster order fulfillment and improved operational scalability. Customers benefit from quicker order confirmations and deliveries, while the company can handle higher order volumes without proportional increases in labor. These results underscore the positive impact of digital technologies like RPA on process performance and support the broader narrative of RPA as a driver of process streamlining and cost savings in organizations [1,5].

At the same time, our findings highlight that RPA, in its traditional form, has limitations when confronted with complex or dynamic scenarios. The pilot revealed that exceptions (such as special customer requests or unforeseen process variations) cannot be effectively managed by a static rule-based bot. This is a known challenge with RPA implementations — bots are only as smart as the rules they are given, and they lack the human ability to adapt or understand context beyond those rules [16,10]. As business processes are rarely 100% stable or predictable, it is important to plan for these exceptions. In the current implementation, we addressed them by having humans handle out-of-scope cases, but this partially reintroduces manual work and slows the end-to-end process for those instances.

To further improve and generalize the solution, we propose moving toward a hybrid RPA+AI model. In such a model, the RPA bot would continue to handle the deterministic, high-volume tasks, while artificial intelligence components are integrated to manage more complex decision points. For example, a natural language processing (NLP) module could be used to read and interpret special instructions or customer notes attached to orders, allowing the system to take appropriate actions or alerts automatically. Machine learning models could predict and flag orders that are likely to face issues (e.g., an item likely out-ofstock or a potentially fraudulent order) so that they can be routed for special handling before errors occur. An intelligent agent could also dynamically decide on fallback actions (like suggesting an alternative item for an out-of-stock product, or automatically contacting the customer for clarification) instead of simply halting as the current bot does. Prior research advocates this kind of intelligent automation approach: blending RPA with AI techniques can overcome the rigidity of standalone RPA and extend automation to semi-structured tasks [4,15]. In the literature, this convergence is sometimes referred to as “hyperautomation,” where RPA, AI, and other digital tools collectively enable end-to-end automation of more complex processes [15,11].

For the company in question, implementing a hybrid RPA+AI solution could mean incorporating an AI-driven decision support system within the order processing pipeline. For instance, an AI module could interface with the inventory system to check for stock levels and automatically decide to split an order shipment if an item is unavailable (something a basic RPA bot would not do on its own). Such integration of AI would require additional development and training data, but it promises to further reduce the need for human intervention and increase the resilience of the automated process. Indeed, early experiments in other contexts have shown that adding AI (such as computer vision or predictive analytics) to RPA can enable automation of tasks that involve unstructured data or complex rules, which were previously beyond RPA’s scope [14,13].

In conclusion, the implementation of RPA at LLP KazParts clearly showcased the power of digital automation in optimizing business processes. The project achieved its immediate goal of accelerating the order-to-shipment cycle and minimizing errors, thus providing value to both the company and its customers. It also offered insights into how RPA needs to be managed — with proper process selection, ongoing maintenance, and complementary strategies for handling what RPA alone cannot. The proposed hybrid RPA+AI model is a logical next step towards more intelligent process automation. Future work will involve developing and testing this hybrid approach, for example by integrating an AI-based exception handler into the current RPA workflow and evaluating its performance over a longer term. We expect that such an enhanced system would further reduce the exception rate and could adapt better to changes in business conditions or customer behavior. The lessons from this case study contribute to the growing knowledge base on how organizations can practically leverage RPA and related digital technologies to achieve process excellence in the era of digital transformation.

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