Vol.**12**, Issue.**9**, pp.**18-24**, September **2024** ISSN: 2347-2693 (Online) Available online at: www.ijcseonline.org



### **Research Article**

## **Transforming ERP Transactions Using SAP And Robotic Process Automation (RPA)**

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Received: 19/Jul/2024; Accepted: 21/Aug/2024; Published: 30/Sept/2024. DOI: https://doi.org/10.26438/ijcse/v12i9.1824

**Abstract:** This research investigates the integration of SAP ERP with Robotic Process Automation (RPA) and Power Apps to address specific challenges in field service operations, particularly in remote areas with unreliable internet connectivity. The solution leverages SAP's ERP capabilities and RPA to enable seamless offline data capture, synchronization, and automated processing of service transactions. Field technicians visiting customer sites use mobile devices to capture data (e.g., repair parts orders) immediately in the system offline, thus reducing errors and improving accuracy. This paper details how data is captured both online and offline and how it synchronizes with SAP ERP upon reconnection, triggering RPA bots to create shipment orders and update inventory, thereby streamlining the workflow.

The study explores concrete implementation strategies like offline-capable SAP interfaces, external database integration, and optimized automated workflow management. SAP ERP and RPA integration significantly enhances efficiency, minimizes manual intervention, and improves service delivery in low-connectivity environments. Evaluations show quantifiable improvements in transaction times, data integrity, and service quality, ultimately leading to increased customer satisfaction.

The findings demonstrate the broad scalability of this approach across industries, optimizing ERP use in remote operations. The framework provides a practical model for organizations seeking to enhance SAP ERP, reduce costs, and overcome connectivity barriers in field service management. Keywords: SAP ERP, Robotic Process Automation (RPA), Offline Data Capture, Data Synchronization, Automated Transaction Processing, Service Delivery Improvement, Operational Efficiency, SAP Integration, Field Service Management.

**Keywords:** SAP ERP, Robotic Process Automation (RPA), Field Service Management, Offline Data Capture, Power Apps, Mobile Devices, BOT, Process Automation

### 1. Introduction

In today's digital age, enterprise resource planning (ERP) systems like SAP are essential for streamlining business processes and enhancing operational efficiency. However, field service operations, especially in remote or connectivitychallenged environments, face particular challenges in managing transactions efficiently due to limited internet access. This often leads to manual data entry in their ERP system after they reach the office space, delaying order processing, increasing ship-to-market lead times, and severely impacting service quality and customer satisfaction. The integration of Robotic Process Automation (RPA) with SAP ERP presents a transformative solution that enables offline data capture, automated transaction processing, and seamless synchronization with the central ERP system [1]. This research investigates leveraging SAP ERP's powerful transaction capabilities alongside RPA to address the specific challenges faced by field service technicians, particularly in industries where reliable internet connectivity is not employing offline-enabled Power Apps interfaces and RPAdriven automation, SAP ERP can not only enhance the accuracy of transaction data but also significantly reduce the manual workload of field personnel [2]. This study emphasizes the importance of combining SAP with RPA to create a cohesive and efficient operational framework, aiming to revolutionize how businesses manage ERP transactions in real-time and offline scenarios [3]. This research also draws parallels with the integration of Microsoft Power Apps and RPA, showcasing how similar concepts can be adapted within SAP environments to optimize workflows and improve service delivery. The approach highlights the scalability and adaptability of SAP ERP combined with RPA, which is crucial for businesses aiming to maintain seamless operations irrespective of internet connectivity. This study aims to provide a roadmap for organizations seeking to leverage SAP ERP and RPA to overcome the unique challenges of field service management in low-connectivity environments.

guaranteed during their customer site service visit. By

### 2. Related Work

## Implementation of a mobile business application built in Microsoft Power Platform [4]

Problem Statement: The authors identify a need for mobile business applications that can leverage the capabilities of Microsoft Power Apps, Power Automate, and Azure.

Objectives: The objective of this thesis is to implement a mobile business application using the Microsoft Power Platform and explore its potential for business use cases.

## Enhancing ERP learning outcomes through Microsoft Dynamics [5]

Problem Statement: The authors recognize that traditional ERP systems can be complex and difficult to learn, limiting their adoption in educational settings.

Objectives: The objective of this study is to explore how Microsoft Power Apps can be used to extend modern ERP systems, enhance learning outcomes, and automate transactions in a more intuitive way.

#### ERP as a business process automation tool [6]

Problem Statement: The authors identify inefficiencies in manual business processes and the potential of ERP systems to automate these processes.

Objectives: The objective of this article is to discuss how ERP systems can assist in designing and automating business processes, ensuring the accuracy of transactions.

#### Using Microsoft PowerApps, Mendix and OutSystems inn two development Scenarios: an experience report [7]

Problem Statement: The authors recognize the growing importance of low-code development platforms like Microsoft Power Apps, Mendix, and OutSystems for rapid application development.

Objectives: The objective of this report is to present an experience of developing the same example application on these three platforms and compare their offline capabilities.

## Learn Microsoft Power Apps: Build customized business applications without writing any code [8]

Problem Statement: The authors identify a need for nontechnical users to build customized business applications without extensive coding knowledge.

Objectives: The objective of this book is to provide guidance on building customized business applications with Power Apps, including enabling offline capabilities.

#### A Web-based, Offline-able, and Personalized Runtime Environment for executing applications on mobile devices [9]

Problem Statement: The authors recognize the limitation of web applications that cannot be executed in offline mode, hindering their use on mobile devices. Objectives: The objective of this study is to propose a webbased platform for executing applications on mobile devices, addressing the offline execution limitation.

## **Robotic** process automation and artificial intelligence in industry 4.0–a literature review [10]

Problem Statement: The authors identify the increasing interest in RPA and AI for automating ERP-related processes in Industry 4.0.

Objectives: The objective of this literature review is to investigate the use of RPA with AI for ERP-related processes and explore their potential in Industry 4.0.

# A study of robotic process automation use cases today for tomorrow's business [11]

Problem Statement: The authors recognize the growing momentum of RPA across industries and the need to understand its current and future applications.

Objectives: The objective of this article is to discuss various use cases of RPA across industries, including migrating information from legacy data sources into ERP systems with high accuracy.

## **Robotic** process automation: An overview and comparison to other technology in industry **4.0** [12]

Problem Statement: The authors identify the need to understand RPA in the context of other technologies in Industry 4.0.

Objectives: The objective of this conference paper is to provide an overview of RPA and compare it to other technologies in Industry 4.0, highlighting its ease of adaptation and integration with business processes and company systems like ERP software.

## Mobile data collection and storing solution for Microsoft environments [13]

Problem Statement: The authors identify a need for efficient mobile data collection and storage solutions within Microsoft environments.

Objectives: The objective of this thesis is to develop a mobile data collection and storage solution for Microsoft environments, leveraging the capabilities of Power Apps.

## Exploring process automation opportunities: Power Platform and Robot Framework [14]

Problem Statement: The authors recognize the increasing interest in process automation and the potential of the Power Platform and Robot Framework to address this interest.

Objectives: The objective of this article is to explore process automation opportunities using the Power Platform and Robot Framework, highlighting how they can be used to automate different steps in workflows.

#### Lean Management Empowerment: Elevating Employee Experience through RPA Implementation with Microsoft Power Automate [15]

Problem Statement: The authors identify the need to empower lean management by elevating employee experience through automation.

Objectives: The objective of this thesis is to discuss the empowerment of lean management by elevating employee experience through RPA implementation using Microsoft Power Automate.

### 3. Theory/Calculation

#### 3.1Theory

**Technological Context:** The compatibility of RPA/Power Apps with your existing SAP system is a critical factor in the successful implementation of service order automation. Any integration issues or data mapping problems could hinder the smooth flow of information between systems and negatively impact automation efficiency [16]. Furthermore, having robust IT infrastructure and dedicated support are essential for handling any technical issues that arise during implementation and ongoing operation of the RPA/Power Apps solution. The quality of data within the SAP system also plays a role, as inaccurate or inconsistent data can lead to errors in automated service orders and require additional manual review.

**Organizational Context:** The size and structure of your organization can influence the adoption and implementation process of RPA/Power Apps. Larger firms may have more complex processes that could benefit from automation, but they also may face greater challenges in coordinating implementation across different departments. Conversely, smaller firms may be more agile in adopting new technologies but may have fewer resources dedicated to implementation for innovation is a key factor, as well as having a dedicated team or champion to drive the RPA/Power Apps project and overcome any resistance to change. Top management support and clear communication of the benefits and expectations of RPA/Power Apps can also foster a positive environment for adoption.

**Environmental Context:** The competitive pressures in your industry play a significant role in the decision to adopt RPA/Power Apps for service order automation. Firms in more competitive environments may be more likely to adopt automation technologies to gain efficiency advantages and stay ahead of rivals. For example, if competitors are already using automation to provide rapid service order fulfillment, there may be pressure to implement similar solutions to meet customer expectations [18]. Additionally, there may be regulatory requirements in your industry that RPA/Power Apps can assist with complying, such as maintaining audit trails of service orders or ensuring accurate processing of customer information.

#### **3.2 Calculations**

**Technical Feasibility Metrics:** These metrics provide quantitative insights into the effectiveness of the RPA/Power Apps solution in automating service orders. An automation rate of 80% indicates that the solution is capable of handling the majority of service orders without need for manual intervention, suggesting strong technical feasibility. An error rate of 2% shows a high degree of accuracy in the automated orders, with only a small percentage requiring manual review and correction. A low sync failure rate of 5% demonstrates the reliable syncing of service requests when technicians move from offline to online modes, ensuring minimal disruption to the automation process [21, 22, 23].

**Business Impact Metrics:** These metrics quantify the benefits of the RPA/Power Apps solution in terms of efficiency gains, cost savings, and service level improvement. A time savings of 12 minutes per service order represents a significant reduction in processing time and allows staff to focus on more value-added activities. The reduction of 2 FTEs dedicated to manual service order creation translates into substantial cost savings for the organization. An order fulfillment rate of 95% within the target timeframe of 2 hours greatly enhances the speed and reliability of service delivery, likely leading to increased customer satisfaction [24, 25, 26].

### 4. Design

#### **Power Apps Offline and Online Modes:**

**Offline Mode:** Power Apps allows users to continue working in offline mode even when internet connectivity is lost [30]. In this mode, any entered data is stored locally on the user's device. This is particularly important for service technicians who may be in the field with unreliable internet access. They can still enter service requests within the Power Apps application, and the data will be stored temporarily on their device until connectivity is regained.

**Online Mode:** When the user's device regains internet connectivity, the Power Apps platform synchronizes the locally stored offline data with the SharePoint database [31]. This ensures no data is lost and that the automation workflow can proceed seamlessly. The syncing process is typically automatic, but Power Apps also provides features for users to manually initiate syncing if needed.

#### Data Storage in SharePoint:

Lists: Power Apps stores the service request data in SharePoint lists, which provide a structured repository for the information [32]. Each field in the Power Apps form corresponds to a column in the SharePoint list. For example, there may be columns for service request date, customer name, equipment#, Functional location, service type, and description of issue.

Items: Each submitted service request becomes a list item in SharePoint, with the entered field values stored as item attributes [33]. These list items serve as the data source for triggering the automation workflow.

**RPA Bot and SAP Integration:** Trigger: The RPA bot is triggered when new list items are created in the SharePoint list, indicating the presence of service requests that need to be automated [34].

Data Retrieval: The bot retrieves the relevant data from the SharePoint list item, such as customer name, service type, and issue description.

SAP Integration: The bot uses SAP APIs to create a new service order in the SAP system, populating the required fields with the data retrieved from SharePoint [35]. The bot may need to perform some data mapping or transformation to align with the SAP field requirements.

Order Creation: Once the service order is created in SAP, the bot can update the status of the SharePoint list item to reflect that automation is complete [36]. The service order is then routed through the usual SAP workflows for scheduling and fulfillment.

#### **Design Architecture:**

Power Apps: The Power Apps application runs on the user's device (mobile or desktop), providing the interface for entering service requests. The app connects to the SharePoint list for storing and retrieving data [37]. SharePoint: SharePoint service request data in lists and items [38]. SharePoint provides APIs for Power Apps to read and write data.

RPA Bot: The RPA bot runs on a server or cloud platform, monitoring the SharePoint list for new items [39]. The bot connects to both SharePoint for data retrieval and SAP for service order creation.

SAP: SAP is the backend ERP system where the automated service orders are created and processed [40]. SAP provides APIs for the bot to interact with the service order creation functionality. This design architecture enables a seamless flow of data from the initial service request entry in Power Apps, to the temporary storage and syncing in SharePoint, to the automated creation of service orders in SAP by the RPA bot [41].



Figure1: Architectural Diagram

#### 4.1Experimental Method

To evaluate the effectiveness of the SAP ERP, RPA, and Power Apps integration, a pilot study was conducted with a field service organization that frequently encounters unreliable internet connectivity. The organization had previously relied on manual data entry of service requests upon returning to the office, leading to delays and potential errors.

The experimental design involved the following steps:

**Solution Implementation:** The Power Apps application was customized to enable offline data capture of service requests,

**Pilot Group Selection:** A group of 20 field service technicians were selected to use the new offline-enabled Power Apps application for a period of 6 weeks. These technicians served as the treatment group.

**Control Group:** A separate group of 20 technicians continued to use the existing manual process of recording service requests offline and entering them into the SAP system upon returning to the office. This group served as the control.

**Data Collection:** Metrics were collected on the technical feasibility of the solution (automation rate, error rate, sync failure rate) and the business impact (time savings per service order, reduction in full-time equivalents, order fulfillment rate).

### 5. Results and Discussion

The results of the pilot study are presented below: **Technical Feasibility Metrics:** 

- Automation Rate: 82% of service orders were automated from start to finish without need for manual intervention.
- Error Rate: 1.8% of automated orders contained errors requiring manual review and correction.
- Sync Failure Rate: 4.2% of service requests failed to sync when moving from offline to online mode.

#### **Business Impact Metrics:**

- Time Savings per Service Order: On average, 13.4 minutes were saved in processing each service order compared to the manual process.
- Reduction in Full-Time Equivalents (FTEs): The organization estimated a reduction of 2.5 FTEs dedicated to manual service order entry.
- Order Fulfillment Rate: 96.5% of service orders were fulfilled within the target timeframe of 2 hours.

#### Analysis

The results of the pilot study demonstrate the technical feasibility and business benefits of integrating SAP ERP with RPA and Power Apps for field service management in low-connectivity environments.

The high automation rate and low error rate indicate that the RPA bots effectively created service orders in the SAP system based on the data captured offline in Power Apps. The reliable syncing of service requests minimizes disruption to the automation workflow.

The significant time savings per service order and reduction in FTEs highlight the efficiency gains from automating the service order creation process. By reducing manual intervention, technicians can focus on more value-added activities.

The high order fulfillment rate within the target timeframe showcases the ability of the solution to enhance service delivery speed and reliability, likely leading to increased customer satisfaction.

Overall, the pilot study validates the potential of leveraging SAP ERP, RPA, and Power Apps to transform field service operations in industries where reliable internet connectivity is not always available. The solution provides a roadmap for organizations seeking to optimize their ERP use, reduce costs, and improve service quality in low-connectivity environments.

#### Figure 1.1: Technical Feasibility Metrics

This figure presents the technical feasibility metrics for the RPA and Power Apps solution. The automation rate was 82%, indicating that the majority of service orders were automated from start to finish without need for manual intervention. The error rate was 1.8%, showing a high degree of accuracy in the automated orders. The sync failure rate was 4.2%, demonstrating the reliable syncing of service requests when moving from offline to online mode.



#### **Business Impact Metrics**

This figure displays the business impact metrics for the RPA and Power Apps solution. On average, 13.4 minutes were saved in processing each service order compared to the manual process. It is estimated a reduction of 2.5 full-time equivalents (FTEs) dedicated to manual service order entry. Impressively, 96.5% of service orders were fulfilled within the target timeframe of 2 hours.



Figure 1.2. Business Feasibility Metrics

#### **Order Fulfillment Rate Comparison**

This figure compares the order fulfillment rates between the treatment group (RPA/Power Apps) and the control group (manual process). The treatment group achieved a 96.5% order fulfillment rate within the target timeframe of 2 hours, significantly outperforming the control group's 80% rate. This showcases the ability of the RPA and Power Apps solution to enhance service delivery speed and reliability.



Figure 1.3. Order Fulfillment Rate comparison

**Table 1:** Comparison of Treatment and Control Groups This table compares the key metrics between the treatment group (using the RPA/Power Apps solution) and the control group (using the manual process). The treatment group achieved an 82% automation rate, 1.8% error rate, and 4.2% sync failure rate, demonstrating strong technical feasibility. In terms of business impact, the treatment group saved 13.4 minutes per order, reduced FTEs by 2.5, and achieved a 96.5% order fulfillment rate within the target timeframe. The control group served as the baseline for comparison, with 0 minutes saved, 0 FTEs reduced, and an 80% order fulfillment rate.

Metric	Treatment Group (RPA/Power Apps)	Control Group (Manual Process)
Automation Rate	82%	N/A (manual)
Error Rate	1.80%	N/A (manual)
Sync Failure Rate	4.20%	N/A (no syncing)
Time Savings/Order	13.4 min	0 min (baseline)
Reduction in FTEs	2.5 FTEs	0 FTEs (baseline)
Order Fulfillment	96.50%	80% (baseline)
Rate		

Table 1: Comparison of Power App users and Manual process users

### 6. Conclusion and Future Scope

#### Conclusion

This research has demonstrated the potential of integrating SAP ERP with RPA and Power Apps to transform field service operations in low-connectivity environments. The pilot study showcased strong technical feasibility, with a high automation rate, low error rate, and reliable syncing of service requests. The solution also delivered significant business benefits, including time savings, reduction in manual labor, and improved order fulfillment rates. These findings validate the approach as a viable solution for organizations seeking to optimize their ERP use and enhance service delivery in challenging connectivity conditions. The results

provide a roadmap for implementing similar integrations, highlighting key considerations for successful adoption.

#### **Future Scope**

While the pilot study yields promising results, there are opportunities for future research to further explore and expand upon the findings:

**Larger Scale Implementation:** Replicate the study with larger samples across multiple organizations and industries to further validate the solution's effectiveness and identify potential variations in implementation and impact.

**Longitudinal Study:** Conduct a longitudinal study to assess the solution's performance over an extended timeframe, evaluating long-term technical reliability, maintenance needs, and potential issues that may arise with prolonged use.

Additional Use Cases: Explore other field service processes that could be optimized with RPA and Power Apps, such as automating parts ordering, service scheduling, or customer communications.

**Integration with Other Technologies:** Investigate the potential for integrating the RPA and Power Apps solution with other technologies like IoT devices, AI, or augmented reality to further enhance field service operations.

**Change Management:** Examine the organizational change management aspects of adopting such a solution, including training needs, user acceptance, and strategies for overcoming resistance to automation.

By pursuing these avenues, future research can continue to advance the knowledge on leveraging SAP ERP, RPA, and Power Apps to revolutionize field service management in low-connectivity environments.

#### **Conflict of Interest**

No Conflict of Interest

#### Funding Source

None

#### **Authors' Contributions**

Research, Study, Analysis, Original Draft, Reviewed, Edited.

#### Acknowledgements

I acknowledge my professors and Advisor who inspired me for this research, and I acknowledge my Organization & collogues who provided me this opportunity to handle SAP-RPA automation process.

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