



(RESEARCH ARTICLE)



Implementing RPA to optimize supply chain and inventory management in the pharmaceutical industry

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World Journal of Advanced Engineering Technology and Sciences, 2024, 11(02), 281–288

Publication history: Received on 20 February 2024; revised on 30 March 2024; accepted on 01 April 2024

Article DOI: <https://doi.org/10.30574/wjaets.2024.11.2.0108>

Abstract

This paper examines the implementation of Robotic Process Automation (RPA) in the pharmaceutical industry's supply chain and inventory management. The aim is to enhance efficiency, accuracy, and cost savings. The pharmaceutical industry heavily relies on effective supply chain and inventory management to ensure the availability of vital medications while adhering to regulations. RPA, a technology that automates repetitive and rule-based tasks, holds immense potential in optimizing these processes.

The paper starts by providing an outlook on the complex pharmaceutical supply chain and its associated challenges. It then introduces RPA as a transformative solution and explores its benefits in the pharmaceutical industry, including improved inventory tracking, demand forecasting, order processing, and regulatory compliance.

Various use cases for RPA in supply chain and inventory management are presented, encompassing inventory optimization, demand forecasting, automated order processing, and regulatory compliance through streamlined documentation and reporting.

The paper addresses important considerations for successful RPA implementation, such as assessing readiness, selecting suitable tools and technologies, and ensuring data security and compliance. It also discusses the challenges encountered and provides best practices for effective adoption.

Real-world case studies and success stories are highlighted to demonstrate the tangible advantages of RPA implementation in the pharmaceutical industry.

The paper concludes by discussing future opportunities in RPA, such as advancements in machine learning and artificial intelligence. It encourages further exploration and adoption of RPA to unlock its full potential in revolutionizing supply chain and inventory management in the pharmaceutical sector.

Keywords: Robotic Process Automation (RPA); Pharmaceutical Industry; Supply Chain Management; Inventory Management; Efficiency

1. Introduction

Efficient management of the pharmaceutical industry's supply chain and inventory is critical for ensuring the timely availability of life-saving medications while controlling costs and adhering to regulatory requirements. However, the

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intricacies and challenges of the pharmaceutical supply chain demand innovative solutions. One such solution with significant potential is Robotic Process Automation (RPA). RPA is an innovative technology designed to automate repetitive tasks governed by predefined rules, offering an opportunity to optimize supply chain and inventory management processes within the pharmaceutical industry.

In this paper, we explore the implementation of RPA in supply chain and inventory management for the pharmaceutical industry, focusing on its potential benefits. By automating routine tasks, RPA can improve efficiency, accuracy, and cost-effectiveness, ultimately enhancing overall supply chain performance.

To set the context, we provide an overview of the pharmaceutical supply chain, encompassing procurement, manufacturing, distribution, and retail. We examine the industry's specific challenges, such as stringent quality control, expiration date management, and regulatory compliance.

Next, we introduce RPA as a transformative technology revolutionizing supply chain and inventory management processes. RPA's ability to automate repetitive tasks, handle large data volumes, and integrate with existing systems offers significant advantages for the pharmaceutical industry.

We then delve into the specific benefits of RPA implementation in the pharmaceutical supply chain. These include improved inventory tracking and management, enhanced demand forecasting and replenishment, streamlined order processing and fulfillment, and increased regulatory compliance through automated documentation and reporting.

The paper presents various use cases and real-world examples of successful RPA implementation in the pharmaceutical industry. These case studies illustrate tangible benefits such as reduced errors, improved inventory accuracy, shorter order-to-cash cycles, and enhanced regulatory compliance.

Furthermore, we address crucial factors to consider when implementing RPA in the pharmaceutical supply chain. These factors encompass readiness assessment, selecting suitable RPA tools and technologies, and ensuring data security and compliance.

Lastly, we discuss future trends and opportunities related to RPA in the pharmaceutical industry. With the advancement of technology, new possibilities for optimizing supply chain and inventory management processes are opened up through the development of machine learning and AI.

This paper explores the potential of RPA in supply chain and inventory management within the pharmaceutical industry. It aims to offer valuable insights and direction for organizations seeking to enhance operational efficiency, accuracy, and compliance while meeting the industry's unique demands.

2. Overview of the Pharmaceutical Supply Chain



Figure 2 Overview of the Pharmaceutical Supply Chain

The healthcare and pharmaceutical industry supply chain encompasses the planning, execution, and control of all activities involved in the movement of materials and information, beginning from the procurement of raw materials and extending to the final delivery of products to customers. This includes various entities such as manufacturers, suppliers, warehouses, transportation companies, distribution centers, and retailers.

While similar to the value chain, the supply chain in the pharmaceutical industry differs in its focus. The value chain enables companies to create distinctive customer products and experiences, employing strategies to deliver unique added value and gain a competitive edge.

Consequently, the pharmaceutical supply chain aims to enhance profitability and provide a superior customer experience by ensuring the timely manufacturing and availability of products in pharmacies, hospitals, and other healthcare facilities as required. In essence, the supply chain encompasses functions such as product development, marketing, operations, distribution, finance, and customer service.

Currently, the pharmaceutical supply chain faces escalating complexities across various levels. Furthermore, there have been significant changes in business models, with a shift towards outcome-based approaches that prioritize integrated diagnostic and treatment solutions. This underscores the criticality of effective supply chain management in establishing a flow of supplies that guarantees the proper delivery of medications and devices to the appropriate locations, at the right time, and to the correct individuals.

3. Critical components of the pharmaceutical supply chain

Managing the pharmaceutical supply chain involves strategically coordinating the complete value-added process of a product, encompassing the pharmaceutical value chain and logistics. This entails fostering collaboration among manufacturers, suppliers, distributors, business partners, and consumers, from procurement to the ultimate product delivery.

Traditional supply chain management systems typically comprise five core components

3.1. Planning

This stage involves developing a comprehensive plan encompassing the product journey, from raw materials to the end consumer. It consists in determining the necessary resources to meet customer demands and ensuring that the supply chain operates efficiently and effectively. Metrics are established to assess and measure the performance of various aspects within the supply chain management system and align with business objectives.

3.2. Procurement

The procurement process entails selecting suppliers who can provide the required goods and services for product manufacturing. It involves establishing robust supplier relationships and implementing processes for monitoring and managing these relationships. Critical activities in procurement include ordering, receiving materials, inventory management, and managing supplier payments.

3.3. Production

The production phase involves coordinating and executing various activities involved in transforming crude materials into finished products that are restructured to enhance efficiency and optimize the supply chain. These activities include receiving and inspecting raw materials, manufacturing the product, conducting quality inspections, packaging for shipment, and scheduling delivery.

3.4. Delivery and Logistics

Delivery and logistics encompass coordinating customer orders, scheduling deliveries, executing shipments, generating invoices for customers, and processing payments. This component focuses on ensuring timely and accurate product delivery while maintaining effective communication with customers.

3.5. Returns and Recalls

Returns and recalls involve establishing processes and networks to handle defective, excess, or unwanted products. This includes implementing procedures for receiving and processing returned items, addressing customer complaints, managing product recalls, and ensuring appropriate disposal or refurbishment of returned products.

By effectively managing these components, organizations can optimize their supply chain operations, enhance customer satisfaction, and achieve greater efficiency and profitability.

The pharmaceutical and biotech supply chain is characterized by its criticality in preserving life and health and the need for speed and accuracy. Consequently, customer expectations in this industry are exceptionally high. However, medicines or biological products that require specialized cold chains, potential bottlenecks, and quality concerns can quickly introduce vulnerabilities into a company's supply chain.

4. Pharmaceutical Supply Chain Risks



Source: Adobe Stock

Figure 2 Supply Chain

Supply chain risks can be classified into various categories, including financial, environmental, technological, operational, regulatory, and sociopolitical risks.

Several standard and significant supply chain risks deserve attention:

4.1. Regional Concentration of Suppliers

The concentration of drug component manufacturing, production, and packaging in the Asia-Pacific region poses a considerable risk for companies elsewhere. China and India, for example, contribute approximately 20-40% of Active Pharmaceutical Ingredients (API) and small molecule compounds sold globally. Only 28% of API manufacturers supplying the U.S. market are within the country, while 72% are overseas. This heavy reliance on a single region increases the risk of supply chain distortions due to severe delivery failures, weather conditions, delays, and geopolitical factors.

4.2. Regulatory Requirements

Government agencies, regulators, and industry associations tightly oversee the supply chain by regulating all drugs and biotech products produced. However, counterfeit medicines remain a persistent threat. Lack of awareness regarding these regulatory requirements can lead to delays and delivery failures, while counterfeit medicines endanger lives and harm a company's reputation.

4.3. Complex Supply Networks

The supply chain serves millions, connecting manufacturers with hospitals, pharmacies, doctors, and consumers. Technological advancements and diverse therapies have heightened demands on the manufacturing and distribution of medicines, resulting in growing complexity at various levels. Introducing new products with innovative dosage forms may necessitate the development of new delivery models and improved product protection during the distribution phase.

Managing a supply chain and mitigating its risks presents significant challenges. While numerous logistics providers and technologies are utilized worldwide to assist companies with their supply chain issues, accessing the right partners and technologies is crucial for the success of operations.

5. Overview of RPA

Robotic Process Automation (RPA) involves employing software robots or "bots" to automate mundane and rule-based tasks within business processes. These bots are specifically programmed to emulate human interactions with computer systems, enabling them to excel in data entry, extraction, and processing. By leveraging RPA, organizations can streamline their operations, reduce human error, and enhance efficiency in handling routine tasks.

5.1. The Impact of RPA on Supply Chain Processes

Efficiency and precision are crucial in the ever-changing realm of supply chain management. Robotic Process Automation (RPA) emerges as a transformative solution, revolutionizing supply chain functions by automating repetitive tasks within software systems.

5.2. The Influence of RPA on Supply Chain Processes

- Streamlined Order Processing and Payments: RPA simplifies order processing by automatically extracting data from various order types, minimizing errors, and streamlining order entry and fulfillment. This automation ensures a more efficient and error-free process.
- Efficient Onboarding of Partners: RPA enhances the onboarding process for new goods and services. Intelligent bots automate and synchronize the onboarding procedure, enhancing the speed and accuracy of integrating new partners.
- Automated Shipment Scheduling and Tracking: RPA automates shipment data entry, schedules them based on specific conditions, and tracks them using unique identifiers. This automation results in more efficient and accurate shipment management.
- Automated Invoicing: RPA automates data entry, extraction, and calculation in the invoicing process, ensuring accuracy and efficiency in billing.
- Automated Procurement and Inventory Management: RPA automates data entry for inventory management, ensuring that goods are stored and prepared for sale with minimal errors.
- Enhanced Supply and Demand Planning: RPA assists in forecasting demand, updating data on required goods, and planning new inventory entries, leading to more efficient production and delivery.
- Improved Customer Services: RPA enhances customer service by automating responses to customer requests and changes, directly updating the organization's database.

By leveraging the power of RPA, supply chain processes can experience significant improvements in efficiency, accuracy, and overall performance, ultimately driving enhanced customer satisfaction and organizational success.

5.3. Implementing RPA in Supply Chain Management

Implementing Robotic Process Automation (RPA) in supply chain management involves a series of essential steps:

When utilizing RPA applications in supply chain management, it is important to follow a series of steps:

5.3.1. Define the objectives and scope of RPA implementation

Identify the goals and objectives that RPA will help achieve in your business. Determine how these objectives will be measured and aligned with overall business success. For example, if RPA is used to streamline the order placement process, you may measure success by improved productivity or reduced processing time.

5.3.2. Select the supply chain processes for automation

Not all supply chain processes are equally suitable for RPA. Identify the procedures that would benefit the most from automation while considering the balance between cost and efficiency. Prioritize inventory management, order fulfillment, and transportation management for automation.

5.3.3. Choose the most appropriate RPA solution

Research and select an RPA solution that best fits your specific needs. Look for scalability, integration capabilities, and security features in the RPA software. Consider solutions that align with your goals and objectives to make an informed investment decision.

5.3.4. Establish change management processes

Managing changes associated with RPA implementation is crucial. Develop effective change management processes that involve documenting changes, responding quickly, communicating with stakeholders, and focusing on desired outcomes. These steps will help the project team make informed and accurate decisions and enhance the quality of services and products.

5.3.5. Establish an RPA center of excellence

Create an RPA center of excellence within your organization. This center should foster a collaborative and supportive environment that promotes growth, innovation, and continuous improvement. It should provide expertise, strategic thinking, and guidance for successful RPA implementation. Establishing an excellence center will help standardize processes and serve as a reference point for RPA-related matters.

By utilizing these steps, you can successfully implement RPA in supply chain management, improving efficiency, productivity, and overall operational excellence.

Challenges in Implementing RPA in Supply Chain Management

Implementing RPA in supply chain management can come with its own set of challenges. Here are some key challenges to consider:

- **Complexity of Multi-Step Processes:** Supply chain processes often involve multiple steps and dependencies. Automating these processes can be challenging, primarily if the automation is implemented partially or inconsistently. This complexity can lead to increased errors and inefficiencies if not adequately addressed.
- **Integration with Existing Systems:** Integrating RPA with existing software processes and machinery can be complex. It entails thoughtful planning and execution to ensure seamless integration and compatibility. RPA's capabilities need to be aligned with the existing systems to optimize efficiency and effectiveness.
- **Continuous Management and Updating:** RPA systems require ongoing management and updates to keep them effective and aligned with changing business needs. Regular monitoring is necessary to identify any issues or areas for improvement. Additionally, as the business evolves, the RPA implementation may need to be updated or modified to accommodate new processes or requirements.

Overcoming these challenges requires thorough planning, effective change management, and continuous evaluation of the RPA implementation. By addressing these challenges proactively, businesses can maximize the benefits of RPA in supply chain management and achieve improved efficiency and operational excellence.

6. Use Cases and Benefits

5 RPA Applications in Supply Chain Management

6.1. Streamlining purchase order processing

Generating and processing purchase orders can be time-consuming and prone to errors. RPA can automate this process, from document generation to order submission and data entry. By implementing RPA, companies can save time, reduce errors, increase productivity, and improve cost-effectiveness.

6.2. Efficient order management

RPA can greatly enhance order processing and management in the supply chain. By leveraging a cloud platform with RPA capabilities, businesses can automate order processing, data management, and tracking before shipment or invoicing. This is particularly beneficial for B2B companies dealing with high volumes of orders.

6.3. Automated support requests and after-sales services

RPA can automate ticket management and after-sales service processes, eliminating the need for human intervention. By leveraging RPA technology, the support department can minimize errors in ticket processing and save valuable time for representatives. This improves efficiency and competitiveness.

6.4. Enhancing supply and demand planning

Relying solely on human labor for supply and demand planning can be challenging. RPA can analyze reports and data from various business sources, enabling accurate and efficient planning without errors or time wastage.

6.5. Reliable data transmission

Smooth and reliable data transmission is crucial for efficient supply chain management. RPA ensures accurate data analytics by eliminating clerical obstacles like incorrect data formatting. This allows businesses to make informed decisions and avoid losses caused by acting on incorrect information.

By leveraging RPA in these various applications, supply chain management can become more streamlined, accurate, and efficient, ultimately improving overall business performance.

Advantages for Businesses

Implementing RPA in supply chain management offers numerous benefits that can significantly improve online and offline businesses. Those who have adopted RPA can testify to the advantages it brings. Here are some key benefits:

6.6. Enhanced productivity across departments:

Managing various activities in the supply chain can be time-consuming. RPA software and applications work efficiently, reducing the workload by half and increasing overall business productivity. By streamlining processes, RPA enables teams to accomplish tasks more quickly and effectively.

6.7. Cost reduction and savings

RPA systems execute tasks accurately, reducing the likelihood of errors and eliminating the need for repetitive human work. This is a pathway to improved efficiency and faster work delivery, ultimately reducing costs. By leveraging RPA, businesses can avoid hiring additional team members to perform manual tasks.

6.8. Improved customer and user experience

Customers play a critical role in any business's success or failure. It is crucial to provide them with exceptional user experiences. By leveraging RPA systems to automate repetitive and time-consuming tasks, employees can dedicate more time and attention to customers' needs, improving customer satisfaction and loyalty.

6.9. Flexibility and speed in scaling operations

Businesses often experience fluctuations in customer orders, requiring additional resources for increased production. Instead of hiring temporary workers and incurring extra costs, RPA systems offer flexibility in scaling operations up and down instantly. RPA can handle a large volume of work efficiently, allowing businesses to adapt quickly to changing demands.

By utilizing RPA in supply chain management, businesses can achieve higher productivity, cost savings, improved customer experiences, and agility in scaling operations. These advantages all add up to overall business success and competitiveness.

6.10. Future of RPA

The outlook for RPA in supply chain management is highly optimistic. As reported, 73% of organizations intend to incorporate RPA into their operations, particularly for automating repetitive manual tasks. The advantages of RPA implementation are evident, encompassing improved accuracy, cost reduction, enhanced return on investment, and augmented customer value. RPA is not merely a technological advancement but a strategic tool reshaping the entire supply chain landscape.

7. Conclusion

In summary, the future of supply chain management with RPA appears promising. With most organizations planning to implement RPA for automating repetitive manual tasks, the benefits are evident: increased accuracy, cost reduction, improved return on investment, and enhanced customer value. RPA is not just a technological development; it represents a strategic tool that reshapes and revolutionizes the supply chain landscape, enabling businesses to achieve

greater efficiency and competitive advantage. By proactively addressing implementation challenges and strategically leveraging RPA, companies can unveil the full potential of this transformative technology and become a pathway to an optimized and agile supply chain in the future.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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