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The Use Of Erp And Wms Systems In The Wholesale And Retail Trade Of Pharmaceutical Products

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Annotation
This article discusses the integration of Enterprise Resource Planning (ERP) and Warehouse management (WMS)systems as solutions to improve operational efficiency in both the wholesale and retail sectors of the pharmaceutical industry. The article begins with a discussion of individual advantages of ERP and WMS systems, emphasizing their role in optimizing various aspects of pharmaceutical activity. He then delves into the synergistic benefits of integrating these systems, highlighting key integration points such as real-time data synchronization, optimized order fulfillment, and improved regulatory compliance. Real-world applications of integrated ERP and WMS systems at pharmaceutical enterprises in different regions are considered, demonstrating successful implementation and their impact on process optimization and compliance with requirements. In addition, the article discusses common problems associated with ERP and WMS systems, and suggests strategies for simplifying implementation processes, optimizing costs, expanding customization tools, ensuring scalability, optimizing integration, and ensuring compliance with regulatory requirements. It should be noted that the integrated use of ERP and WMS systems is essential to maximize the efficiency of the pharmaceutical trade, enabling enterprises to overcome difficulties, optimize operations and provide high-quality products and services, while ensuring compliance with regulatory standards.

Keywords: *Pharmaceutical trade, Enterprise Resource Planning (ERP), Warehouse Management Systems (WMS), Efficiency, Regulatory compliance*

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I. Introduction

The use of Enterprise Resource Planning (ERP) and Warehouse Management Systems (WMS) in the wholesale and retail trade of pharmaceutical products is highly relevant and continues to be essential in today's pharmaceutical industry[8-10]. This integration remains crucial for pharmaceutical enterprises to maintain efficiency, accuracy, and compliance in their operations. With the pharmaceutical industry constantly evolving and facing increasing regulatory scrutiny, the need for streamlined processes and robust systems to manage complex supply chains is paramount. ERP systems serve as the backbone for managing various business functions, including procurement, inventory management, regulatory compliance, and financial control. Similarly, WMS systems play a critical role in optimizing warehouse operations, such as inventory tracking, space utilization, and order fulfillment. The integration of ERP and WMS systems allows for seamless coordination and communication between different aspects of pharmaceutical operations, facilitating real-time data synchronization, efficient order processing, and enhanced regulatory compliance. This integration not only improves operational efficiency but also ensures product quality, traceability, and compliance with stringent regulatory requirements. Moreover, as the pharmaceutical industry continues to face challenges such as the need to optimize costs, scalability, and adapt to changing regulatory standards, the use of ERP and WMS systems is becoming even more relevant. Solutions to address these challenges, such as simplified implementation processes, cost optimization strategies, advanced customization tools, and scalable architectures, further emphasize the relevance and importance of these systems in the pharmaceutical industry. Therefore, the use of ERP and WMS systems in the wholesale and retail trade of pharmaceutical products remains very relevant, being indispensable tools for pharmaceutical enterprises that allow them to navigate the complexities of the industry, while ensuring efficiency, compliance and quality of their activities.

The work is structured as follows. The introduction substantiates the expediency of using ERP and WMS in the pharmaceutical industry, the relevance and importance of their integration. Section 2 describes the main advantages of ERP and WMS systems and the need for their integration, as well as lists the key advantages of ERP and WMS systems. Section 3 describes real-world examples of integrating ERP and WMS systems and provides suggestions for integrating ERP and WMS systems to optimize business processes. The final comments

are included in the section "Conclusion", which summarizes the key ideas of the article and emphasizes the importance of the integrated use of ERP and WMS for the pharmaceutical trade and indicates the potential benefits and successes achieved through this integration.

II. The Main Advantages Of ERP And WMS Systems And The Need For Their Integration

Below are the results of the analysis of the advantages of ERP and WMS systems [1-4]:

Advantages of the ERP systems of ah [9-11]:

- **Comprehensive Functionality:** ERP systems offer customized solutions for pharmaceutical operations, including inventory management, regulatory compliance, and financial control.
- **Regulatory Compliance:** In compliance with strict pharmaceutical regulations, ERP systems ensure compliance with standards such as serialization, traceability, and reporting requirements.
- **Efficient Order Processing:** Automating order processing and order fulfillment simplifies operations, reducing lead time and increasing customer satisfaction.

Advantages of WMS systems [12-14]:

- **Inventory Tracking:** WMS systems provide a real-time view of pharmaceutical stocks, minimizing discrepancies and ensuring product integrity.
- **Space optimization:** By optimizing the location of warehouses and implementing effective configuration strategies, WMS systems make the most of their storage space.
- **Compliance and Traceability:** With robust tracking capabilities and audit logs, WMS systems support compliance with regulatory requirements, ensuring accurate record keeping and facilitating product recalls.

Integration of ERP and WMS systems[17-19]:

- The synergy between ERP and WMS systems increases efficiency, accuracy, and compliance across the entire pharmaceutical supply chain. This integration simplifies operations, streamlines inventory management, and ensures regulatory compliance.
- **Key points of integration:**
- **Real-time data Synchronization:** Integration ensures that inventory data collected by WMS is immediately reflected in the ERP system, providing stakeholders with up-to-date information.
- **Simplified Order Fulfillment:** Orders generated in the ERP system are seamlessly transferred to the WMS for an efficient picking, packaging, and shipping process, ensuring timely order fulfillment.
- **Enhanced Regulatory compliance:** Integrated systems promote compliance with global regulatory requirements by providing serialization, traceability, and documentation of product movements.

III. Real Integration Suggestions

The importance of integrated systems: **ERP systems:** Serving as the foundation of pharmaceutical operations, ERP systems offer comprehensive solutions for managing various business processes. From procurement to regulatory compliance, ERP systems provide end-to-end transparency and control over mission-critical processes. **WMS Systems:** Warehouse management systems are essential for optimizing storage, processing, and distribution in pharmaceutical warehouses. These systems use advanced technologies to improve the efficiency and accuracy of work Table 1 discusses the comparative characteristics of ERP and WMS systems [5-14].

Table 1. Comparative characteristics and real-world applications.

System	Advantages	and Disadvantages	Applications
SAP ERP applications	With extensive functionality adapted for pharmaceutical operations.Robust regulatory compliance features.	High implementation costs and resource requirements. Difficulty setting up.	Large pharmaceutical companies require strict compliance with regulatory requirements and extensive functionality.
Oracle Pharma ERP	has robust regulatory compliance features, including serialization and traceability. A scalable solution suitable for small and large companies.	Expensive licensing costs.Complex implementation process.	Pharmaceutical companies of all sizes, especially those that have already invested in Oracle infrastructure.

System	Advantages	and Disadvantages	Applications
Microsoft Dynamics 365 for Pharmaceuticals	Seamless integration with other Microsoft products.User-friendly interface and easy setup. A cloud deployment option is available.	There may be no specialized pharmaceutical functions compared to industry-specific ERP systems. Limited scalability for large enterprises.	Small and medium-sized pharmaceutical companies are looking for a convenient, customizable ERP solution with seamless integration.
The advantage of the HighJump warehouse is	Advanced inventory tracking capabilities in real time. A scalable solution suitable for warehouses of any size.	High initial investment and ongoing maintenance costs. Complex implementation process.	Pharmaceutical warehouses that require advanced inventory management and regulatory compliance.
Manhattan Associates	WMS provides reliable order fulfillment features that optimize picking, packaging, and shipping processes. Scalable solution with multi-channel distribution support.	Higher upfront costs compared to some competitors. Specialized experience is required for implementation and configuration.	Warehouses focused on efficient order fulfillment and multi-channel distribution.
RedPrairie Warehouse Management	- Optimized use of space thanks to intelligent storage algorithms. Scalable solution with support for complex warehouse operations.	- Smoother user learning curve compared to some other WMS systems. Requires significant initial investment and ongoing maintenance.	Warehouses with complex storage needs and a focus on maximizing the use of space.
The 1C ERP system	is an adapted functionality for pharmaceutical enterprises in Azerbaijan. Simplified purchasing, inventory, and financial management. A cost-effective solution.	Limited scalability for large enterprises. Support may vary depending on global regulatory requirements.	Pharmaceutical companies in Azerbaijan are looking for cost-effective ERP solutions adapted to local requirements.
Tiger ERP	is highly customizable and customizable to meet specific requirements. Comprehensive regulatory compliance functions. Suitable for medium and large businesses.	- Initial installation and configuration may require special knowledge. Limited support for complex multisite or multi-channel operations.	Businesses need customized solutions with advanced functionality and scalability.
Axata WMS	Advanced Analytics and reporting capabilities. Efficient warehouse management and optimization. Compatible with various ERP systems.	You may need to configure it to match specific business processes. Limited support for certain niche functionality.	Warehouses are looking for advanced analytics and optimization capabilities for efficient distribution of pharmaceutical products.

There are some companies that integrate [], and some have already integrated these systems[]: **Balloon One Ltd [17]** : Integration: SAP ERP with HighJump Warehouse Advantage. Balloon One Ltd is a software solutions company based in the United Kingdom. They specialize in providing a range of services related to warehouse management systems (WMS) and enterprise resource planning (ERP) solutions. Balloon One offers consultancy services, software implementation, and support for businesses looking to optimize their warehouse operations and streamline their business processes. As an independent provider, Balloon One works with various WMS and ERP software vendors to tailor solutions to meet the specific needs of their clients. They aim to help businesses improve efficiency, reduce costs, and enhance customer satisfaction through the implementation of advanced software systems. **Flowgear company[18]. Integration:** Microsoft Dynamics 365 with the Manhattan Associates warehouse management system. Flowgear is a software development company that provides integration and automation solutions for businesses. They offer a cloud-based integration platform that allows organizations to connect different systems, applications, and data sources to optimize processes and improve efficiency. The Flowgear platform allows users to automate workflows, synchronize data across multiple systems, and create custom integrations without the need for extensive coding knowledge. The Flowgear platform is particularly useful for businesses looking to integrate their ERP (Enterprise Resource Planning) systems with other applications such as CRM (Customer relationship Management) software, e-commerce platforms, accounting software, and more. By connecting these systems, businesses can achieve greater transparency in their operations, improve data accuracy, and improve decision-making processes. **Inther Group company[19]**: is an

international hybrid systems integrator specializing in providing advanced solutions for automating warehouse and logistics operations. They offer a combination of hardware, software, and consulting services to optimize warehouse processes for businesses in a variety of industries, including e-commerce, retail, pharmaceuticals, and more.

Real integration examples: Azerimed (Azerbaijan)[15]: Integration: Tiger ERP with Axata WMS systems.. **Application:** Improved supply chain processes and regulatory compliance in Azerbaijan. **Zeytun Pharmaceuticals (Azerbaijan)[16]: Integration:** 1with ERP and Axata WMS. **Application:** Optimized production and warehouse management processes taking into account the standards of the pharmaceutical industry in Azerbaijan.

Analysis of these systems can reveal some problems in the integration of these systems. The main challenges that are needed to improve these systems are as follows: Improving ERP and WMS systems in the pharmaceutical industry involves solving several key tasks to improve their efficiency. Some of the main issues that need attention include:

- **Implementation complexity:** Implementing ERP and WMS systems can be complex and time-consuming, requiring significant resources and expertise. Simplifying the implementation process and providing appropriate support can help organizations implement these systems more effectively.
- **Cost constraints:** The initial investment and ongoing maintenance costs associated with ERP and WMSsystems can be prohibitive, especially for small pharmaceutical businesses. Finding ways to reduce costs, such as offering flexible pricing models or cloud-based solutions, can make these systems more accessible to a wider range of organizations.
- **Customization challenges:** Adapting ERP and WMS systems to specific business needs often requires complex customization processes. By simplifying configuration options and providing user-friendly interfaces, organizations can more effectively adapt these systems to their unique requirements.
- **Scalability Issues:** Many ERP and WMS systems may lack scalability, making it difficult for organizations to expand or grow. Developing scalable solutions that can adapt to changing business needs and accommodate increasing amounts of data is essential for long-term success.
- **Complexity of integration:** Integrating ERP and WMS systems with other existing systems and technologies can be challenging, resulting in data fragmentation and inefficiency. Optimizing integration processes and ensuring compatibility with third-party applications can lead to smoother data exchange and interoperability.
- **Regulatory Compliance:** Compliance with strict regulatory requirements is critical in the pharmaceutical industry, but ensuring compliance in ERP and WMS systems can be challenging. Improving the built-in regulatory compliance features and providing regular updates to keep them in line with changing regulations can help organizations stay compliant.
- **User training and implementation:** Effective use of ERP and WMS systems depends on the skills of users and their implementation. Providing comprehensive training programs and user-friendly interfaces can enable employees to use all the features of these systems to their full potential, contributing to increased productivity.

Addressing these challenges requires collaboration between software developers, pharmaceutical companies, and regulators to create innovative solutions that meet the changing needs of the industry, while ensuring compliance, usability, and scalability. By addressing these challenges, organizations can maximize the benefits of ERP and WMS systems, contributing to increased operational efficiency and competitive advantage in the pharmaceutical sector.

To solve problems related to ERP and WMS systems in the pharmaceutical industry, you can take several actions:

- **Simplified Implementation Processes:** Software developers can simplify the implementation process by offering pre-configured templates, intuitive configuration wizards, and comprehensive documentation. In addition, providing specialized implementation support and consulting services can help organizations navigate the setup process more effectively.
- **Cost optimization Strategies:** Developers can explore cost optimization strategies, such as offering subscription-based pricing models, tiered licensing options, or pay-as-you-go cloud solutions. Providing transparent pricing structures and flexible payment plans can make ERP and WMS systems more accessible to organizations on a tight budget.
- **Advanced Customization Tools:** Developers should invest in developing user-friendly customization tools that allow organizations to adapt ERP and WMS systems to their specific needs without extensive programming or development knowledge. Intuitive interfaces, drag-and-drop functionality, and a modular design structure can simplify the setup process.
- **Scalable architectures:** It is important to develop ERP and WMS systems with a scalable architecture that can support growth and expansion. Developers should prioritize scalability by leveraging cloud infrastructure,

microservices architecture, and scalable database solutions to help their systems cope with increased data volumes and user loads.

- **Simplified Integration platforms:** Implementing standardized integration platforms and APIs can facilitate seamless integration between ERP, WMS, and other third-party systems. Developers should prioritize interoperability by adopting industry-standard protocols and providing comprehensive integration documentation and support.
- **Continuous compliance update:** Software developers should be aware of changing regulatory requirements and actively update their ERP and WMS systems to ensure consistent compliance. Implementing automated compliance checks, regularly updating software, and providing compliance consulting services can help organizations maintain compliance with regulatory requirements.
- **Comprehensive Training programs:** Developers should offer comprehensive training programs tailored to different user roles and skill levels. Interactive e-learning modules, hands-on workshops, and on-demand training resources can enable users to effectively use ERP and WMS systems, contributing to their implementation and professional development.

By implementing these strategies, software developers can address key challenges associated with ERP and WMS systems in the pharmaceutical industry, enabling organizations to maximize the value of these systems and achieve operational excellence. In addition, strengthening collaboration among developers, pharmaceutical companies, regulators, and industry associations can facilitate knowledge sharing, innovation, and continuous improvement in the implementation and use of ERP and WMS systems.

IV. Conclusion

The integrated use of ERPand WMSsystems is crucial for improving the efficiency of wholesale and retail trade in pharmaceutical products. By leveraging the capabilities of these systems, pharmaceutical companies can optimize business processes, manage inventory, ensure regulatory compliance, and ultimately provide customers with high-quality products and services, contributing to the growth and success of the industry.

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