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Resolving SAP ERP Warehouse Management Module Implementation Issues in a Consumer Goods Company

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Abstract

This study analyzes the challenges associated with the implementation of the Warehouse Management (WM) module in SAP ERP at PT XYZ, a leading FMCG company in Indonesia, and proposes solutions to address them. The implementation of the WM module aims to reduce manual processes and enhance warehouse efficiency, thereby supporting operational success by improving stock data accuracy and integrating business processes. However, the current implementation has not fully met the company's operational needs. The research adopts a qualitative approach using the Soft Systems Methodology (SSM). Data were collected through interviews with six respondents and operational observations. The analysis focuses on system quality, data quality, organizational culture, and user support to identify existing gaps. The findings reveal several issues, including non-real-time information, stock inaccuracies, reliance on manual processes, and the absence of knowledge management. Recommendations include integrating IoT, developing real-time applications for picking and stock counting, automating replenishment using AI, implementing SAP Analytics Cloud (SAC), and creating a knowledge management system. This study provides practical solutions for similar companies to enhance ERP implementation success, particularly in the Warehouse Management module.

A. Introduction

In the era of digitalization and increasingly intense business competition, operational efficiency has become a key factor for companies to maintain their competitiveness. One strategic step taken by companies is the implementation of integrated information systems, such as Enterprise Resource Planning (ERP). ERP systems enable workflow automation, data integration, and real-time information access to support strategic decision-making [1]. The fast-moving consumer goods (FMCG) industry in Indonesia is a significant sector that contributes to economic development. PT XYZ is an FMCG company producing basic food products and consumer goods. To support its business processes, PT XYZ requires a system capable of integrating data and business processes across all departments [2]. PT XYZ relies on an ERP system to integrate business processes across various departments, including warehouse management. Warehousing not only serves as a storage facility but also plays a crucial role in managing the flow of goods, inventory control, and providing accurate data to support strategic decision-making. Warehouse management is essential in the supply chain, from storage to goods distribution, directly impacting operational efficiency and effectiveness [3].

To optimize warehouse activities, PT XYZ has implemented the Warehouse Management (WM) module within its SAP ERP system. This module helps organize warehouse operations and resources to effectively meet customer demands, thereby improving warehouse performance and customer satisfaction [4]. The module supports activities such as goods receipt, goods issue, and cycle counting inventory. However, since its implementation, the SAP WM module at PT XYZ has faced challenges such as inventory data errors, prolonged processing times, and limited user understanding of system features. Additionally, an analysis of helpdesk ticket trends revealed that the SAP WM category ranked second in the number of reported incidents, following other modules such as SD, PP, FI, and CO during the period of January to October 2024. This indicates challenges in the implementation of the SAP WM module that require a deeper analysis to identify root causes. This study aims to analyze the implementation challenges of the SAP WM module at PT XYZ and provide improvement recommendations to enhance the company's operational efficiency and competitive advantage in the FMCG industry.

Following this introduction, the paper is structured as follows: Section 2 discusses relevant literature to support the study; Section 3 outlines the research methodology used; Section 4 presents detailed findings and an in-depth discussion of the results. Finally, Section 5 concludes the study by summarizing the key findings, discussing their implications, and offering suggestions for future research.

B. Literature Study

I. Enterprise Resource Planning (ERP)

Enterprise Resource Planning (ERP) is a software system designed to integrate various business activities across functional areas within an organization [5]. The core idea behind ERP development is to meet the needs of companies in managing business operations efficiently and cohesively [6]. ERP facilitates the exchange of information between departments within a company, promoting better collaboration, accelerating decision-making, and improving productivity.

The implementation of ERP offers significant benefits, especially in developing countries. These benefits include improved accuracy in financial reporting, enhanced performance of business units, better customer service, and reduced operational costs. In general, ERP benefits can be categorized into financial, accounting, sales, marketing, operations, logistics, and human resources domains [7].

Leading ERP vendors, such as SAP, Oracle, and Microsoft, provide a variety of core modules to support business functions. These modules include accounting, production, financial management, human resources (HR), sales order processing, and procurement [8]. In addition to core modules, several vendors have started offering supporting modules, such as Business Intelligence, Project Management, Self-Service, and E-commerce, to foster more innovative and technology-driven business practices.

Despite the numerous benefits ERP adoption offers, its implementation process carries a high risk of failure, which can significantly impact a company's core operations [7]. Common user complaints about ERP systems typically include complex and user-unfriendly interfaces, difficulty in obtaining support when issues arise, and challenges in locating necessary information due to the large volume of data and complex menus [8]. Comprehensive support is therefore essential to ensure successful ERP implementation. Several critical success factors include top management support, alignment of workflows, stakeholder participation, adequate training and socialization, vendor support, and the organization's ability to adapt to change [6].

II. SAP ERP

SAP is one of the world's leading ERP market players, holding the largest market share in ERP system sales [8]. Established in 1972 in Germany, SAP has grown to serve over 12 million users, with 88,700 implementations and more than 1,500 partners across more than 50 countries. SAP provides ERP solutions such as mySAP Business Suite, SAP Business One, and SAP All-in-One, catering to a wide range of businesses, from large enterprises to small and medium-sized companies. SAP offers various modules that support key business processes, including sales, production, procurement, accounting, and human resource management. Additionally, SAP developed SAP NetWeaver, a platform that simplifies integration with external applications using technology standards such as .NET, WebSphere, and Java.

SAP is also actively involved in international organizations such as OASIS and the Java Community Process (JCP), which promote the adoption of global technology standards. The main modules provided by SAP are summarized in Table 1.

Table 1. SAP Module

No	Functions	SAP Moduls
1	Sales	Sales and distribution, sales opportunity
2	Procurement	Purchasing, supplier relationship management
3	Production	MRP, product life cycle management

4	Accounting	Financial accounting
5	Distribution	Warehouse management
6	Customer services	CRM
7	Corporate performance and governance	Governance, risk, and compliance management
8	Human resources	Human capital management
9	Miscellaneous	Banking

III. Module Warehouse Management

The Warehouse Management (WM) module in the SAP system is designed to optimize warehouse management by supporting flexible and automated processes [9]. Warehouse Management involves organizing warehouse operations and available resources to effectively meet customer demands. Its primary objectives are to ensure accurate stock management, efficient resource utilization, and improved warehouse performance, ultimately contributing to enhanced customer satisfaction.

This module encompasses key activities essential to warehouse operations, such as goods receipt, goods issue, and periodic inventory counting (cycle counting). With the support of this technology, companies can manage the flow of goods more systematically, reduce errors in stock management, and improve data visibility to support strategic decision-making. Through its integration and automation capabilities, the Warehouse Management module becomes a critical component in driving warehouse operational efficiency and ensuring the overall success of the supply chain.

IV. Critical Success Factors ERP Implementation

The successful implementation of ERP systems does not occur by chance but requires careful attention to Critical Success Factors (CSFs), which are essential elements that ensure the achievement of ERP project goals. There are three primary factors influencing the success of ERP implementation: technology, people, and organization [10]. These three factors serve as important benchmarks for measuring the success of an ERP system implementation. One key factor is system quality, which ensures smooth operations and enhances user satisfaction and trust in the ERP system [11]. Additionally, data quality, characterized by accurate, consistent, and easily accessible data, is crucial for supporting informed decision-making. High-quality data maximizes the benefits of ERP systems [12].

Beyond technology and data, organizational culture plays a significant role in supporting the success of ERP implementation. An organizational culture that is open to change facilitates ERP adoption across various business units [13]. Another critical factor is user support. User involvement and adequate support during the implementation process significantly impact the success of ERP systems [14]. By addressing these factors, organizations can improve the likelihood of a successful ERP implementation and maximize the benefits for their business. Based on these studies, the authors have identified factors influencing ERP implementation success.

These factors will be utilized to evaluate the current state of the ERP Warehouse Management module implementation at PT XYZ, as summarized in Table 2.

Table 2. Indicators for Evaluating the Success of SAP WM Implementation

No	Category	Indicator	Source
1	System Quality	Software package functions	[15]
		Appropriate technologies	[15]
		System support	[6]
		System reliablity and stability	[16]
		Network capacity	[13]
		Server perfomance	[13]
		Integration Capabilities	[13]
2	Data Quality	Faster and accurate data	[6]
		Facilities decision making	[17]
		Integrated data	[18]
		Data integrity	[19]
		Real time Data	[20]
		Data synchronization across system	[21]
3	Organizational Culture	User motivation	[14]
		Work culture	[14]
		Leadership Support and Commitment	[12]
		Top Management Support	[12]
		Team composition	[22]
		Change management	[23]
4	User Support	User training	[24]
		Continuous supervision and the improvement	[25]
		Sharing Knowledge	[26]
		Developed knowledge base	[27]
		Help desk effectiveness	[28]
		Post-implementation evaluation	[29]

C. Research Method

I. Soft System Methodology (SSM)

Soft System Methodology (SSM) is a holistic approach used to analyze and resolve complex problems that are ambiguous and unstructured [30]. SSM provides a framework that enables a comprehensive examination of various real-world aspects to understand and address situations that cannot be easily explained [31]. SSM allows users to compare real-world situations with relevant models to achieve predefined objectives. This comparison yields systematic answers to research questions, ensuring that the developed model aligns with reality and facilitates the identification of effective solutions. Generally, the methodology comprises seven stages of analysis, as illustrated in Figure 1 [32].

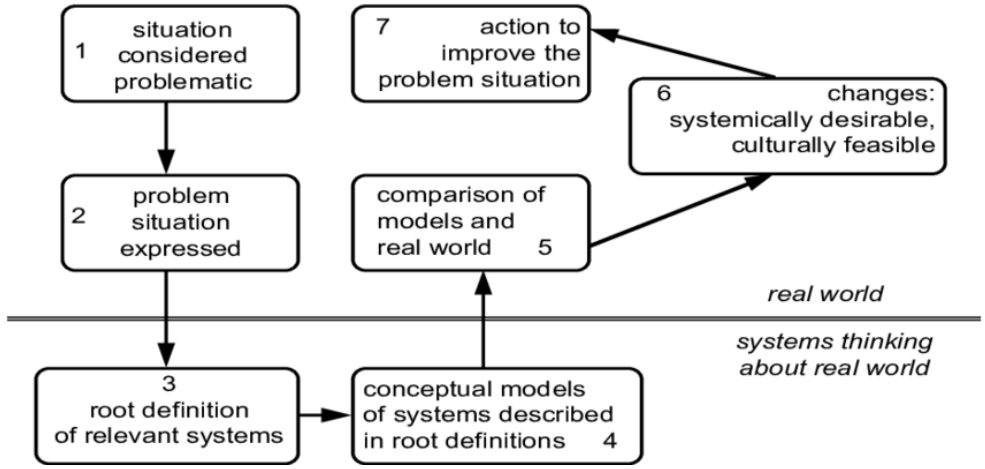

Figure 1. The Seven Stages of Soft System Methodology

II. Data Collection

This study utilizes both primary and secondary data. Primary data were collected through semi-structured interviews with selected respondents who meet the criteria representing management and active end-users of the SAP ERP Warehouse Management module at PT XYZ (see Table 3). The interviews were conducted using open-ended questions to gain in-depth insights into the business processes and current conditions within the company. Secondary data were obtained from official documents of PT XYZ and relevant literature studies. The list of interview questions was designed based on the critical success factors for ERP system implementation identified in the theoretical framework.

Table 3. Respondent Demographics

No	Job Title	Work Experiences
1	IT Manager	> 18 years
2	ERP Solutions Manager	> 10 years
3	Inbound Logistics Manager	> 13 years
4	Warehouse Manager	> 5 years
5	Warehouse Supervisor	> 15 years
6	Warehouse Staff	5 years

D. Result and Discussion

The data obtained from interviews and observations were processed using the Soft System Methodology (SSM). This approach resulted in the identification of issues faced by the company in the implementation of the ERP system, particularly the Warehouse Management module. These issues were then analyzed to generate recommendations for improvements in addressing the identified challenges.

I. Stage 1 - Problem Situation Unstructured

The main objective of implementing SAP Warehouse Management (WM) is to enhance the efficiency, accuracy, and operational management of the warehouse. SAP WM is a module within the SAP ERP system that integrates automatically with

other modules. At PT XYZ, SAP WM has not only improved warehouse operational productivity but also provided better visibility of goods movement, minimized errors, and enhanced the performance of the warehouse team. Below are several issues related to the implementation of SAP WM at PT XYZ:

1. Standard features of SAP WM do not fully meet the business process needs of PT XYZ, necessitating in-house system development.
2. The use of satellite applications to support features unavailable in SAP WM poses a risk of data inconsistency.
3. The online-based SAP WM system is highly dependent on Wi-Fi networks and internet service providers, and the server performance may degrade if there are transactions that consume significant resources.
4. Integrating SAP WM with satellite applications still requires development to support the paperless concept, which reduces paper usage costs and minimizes human errors in manual input processes.
5. SAP WM cannot generate standard reports for large-scale data analysis, requiring data to be transferred outside the system for report generation.
6. The work culture in the warehouse department, which tends to resist change, slows down the adoption of SAP WM.
7. SAP WM users rely on the IT department to resolve issues as there is no accessible knowledge base for users.
8. Responses to helpdesk tickets sometimes hinder problem resolution due to priority issues and a queue for other ticket issues.

Overall, the challenges faced by PT XYZ in implementing SAP WM involve system, infrastructure, data, organizational culture, and user support issues that affect the system's effectiveness.

II. Stage 2 - Problem Situation Expressed

The issues identified related to the implementation of the SAP ERP Warehouse Management module are depicted in the form of a rich picture to better understand the real-world situation in the warehouse at PT XYZ (Figure 2). This depiction is free, creative, and flexible, aiming to illustrate the complexity of the problems faced.

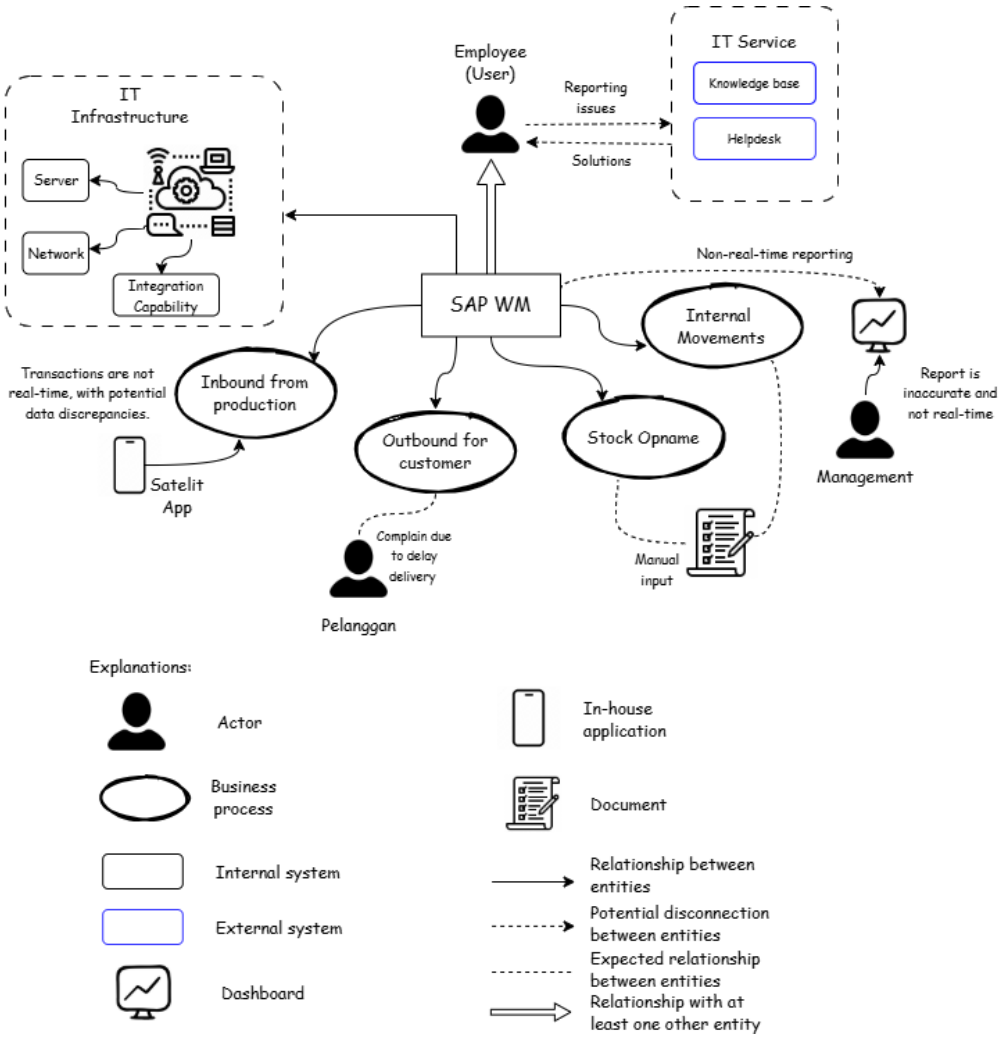

Figure 2. Rich Picture Implementation Situation SAP WM

III. Stage 3 - Root Definitions

Root definitions serve as a mechanism to define the critical processes and activities that need to be transformed, starting from inputs, through processes, to the final outcomes [32]. In this study, the root definition is used to analyze the issues related to the implementation of the SAP ERP Warehouse Management module at PT XYZ, with the aim of identifying barriers, challenges, and causes of inefficiency in the use of the system, as well as formulating corrective solutions to ensure the system is implemented effectively and efficiently in managing the company's warehouse activities. The CATWOE approach is employed to validate the root definitions outlined (Table 4). The root definition for this study can be written as follows:

"The SAP Warehouse Management (WM) module at PT XYZ is implemented to improve warehouse operational efficiency, stock accuracy, and integrate warehouse processes with other modules such as SD and PP. The system also aims to provide accurate and real-time information for decision-making. As a standard, SAP WM needs to be developed and integrated with other systems, such as IoT-based developments, to support the goods receipt process from the production warehouse

to the finished goods warehouse. Additionally, data from SAP WM is integrated with other systems to create analytical dashboard reports for management. The goal of implementing SAP WM is to support more efficient, accurate, and integrated warehouse operations, thereby increasing productivity and reducing operational costs through optimal warehouse management."

Table 4. CATWOE - Root Definitions

No	Key Elements	Key elements applied in practice
1	C (Customer)	End-users, such as warehouse staff, warehouse managers, warehouse supervisors, and company management, require warehouse information, along with external customers who rely on the warehouse processes.
2	A (Actor)	End users interact directly with the system, along with the SAP WM implementation team (both internal and external), as well as PT XYZ management.
3	T (Transformation)	The analysis focuses on issues such as the system's capabilities not being sufficient to meet business processes and developing recommendations for improvements so that the system can be optimally adopted to enhance warehouse management efficiency.
4	W (Weltanschauung)	The perspective is that a well-implemented SAP ERP Warehouse Management module will improve warehouse management efficiency, reduce operational errors, increase stock accuracy, and support the company in terms of warehouse activity efficiency.
5	O (Owner)	Management, the IT department, and the warehouse team at PT XYZ.
6	E (Environmental Constraints)	The challenges include human resource resistance in using the system, the full integration of technology, and external dependencies, such as reliance on network service providers.

IV. Stage 4 - Building Conceptual Model

This conceptual model is built based on the activities identified from the root definitions and is used to compare with reality to identify gaps or existing issues [32]. The depiction of the conceptual model, based on the root definition of the ideal SAP ERP Warehouse Management module implementation situation at PT XYZ, can be seen in Figure 3.

V. Stage 5 - Comparison of conceptual model with the real-world situation

The reality of the issues identified in the implementation of the SAP ERP Warehouse Management module, as obtained from the previous analysis stage, is documented to provide recommendations for addressing the problems found. Any comparisons between reality and the conceptual model will be systematically drawn to define the desired changes needed to address the gaps or resolve the issues that have been identified [33].

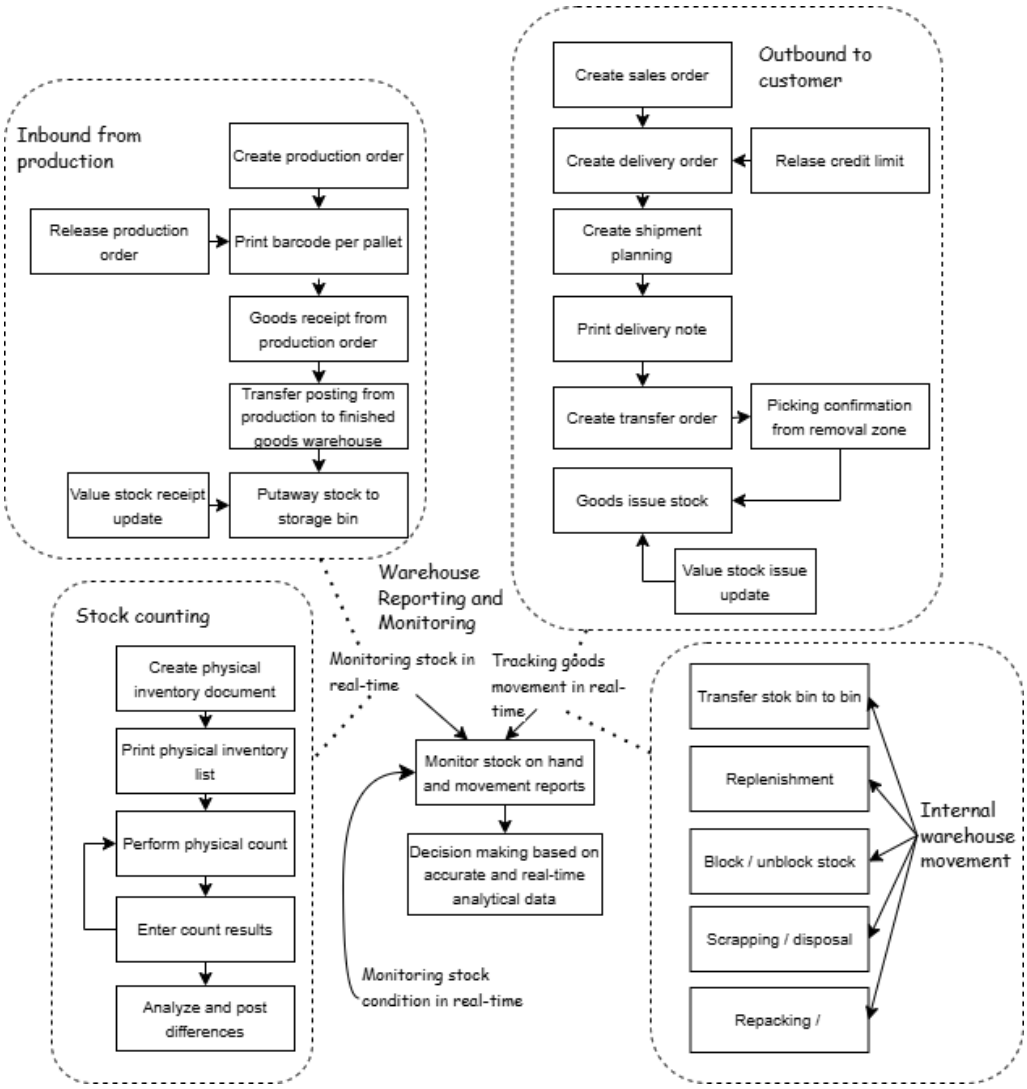

Figure 3. The Conceptual Model of The Ideal Situation

The comparison between the issues and the ideal situation can be seen in Table 5.

Table 5. Problem Exploration

No	Process	Current Situation	Identified Gaps
1	Finished Goods Receiving	Information integration fails, resulting in inaccurate stock data and impacting the PP and SD modules.	Real-time integration via API/web services or upgrading to SAP EWM with IoT support is required for greater flexibility.
2	Sales Process	Stock inaccuracies cause picking errors and customer complaints.	Development of IoT-based applications to accelerate the picking process for outbound deliveries and enable real-time SAP WM integration is needed.
3	Warehouse Stock Counting	Manual stock counting risks human error and inefficiencies.	Development of mobile applications integrated with SAP WM and IoT (e.g., barcode scanning) is needed to enhance accuracy and operational efficiency.

No	Process	Current Situation	Identified Gaps
4	Internal Inventory Management	Internal stock transactions, such as stock transfers and replenishment, are still manual, leading to overstock risks.	Development of warehouse applications with features like stock transfer, picking, putaway, and AI-based optimization for stock fulfillment is required.
5	Business Report Analysis	Reports are not real-time and only cover data from the previous day.	Implementation of SAP Analytics Cloud (SAC) for real-time dashboards and advanced visualizations to support decision-making is needed.
6	Helpdesk Ticketing for Issue Resolution	There is no centralized knowledge base, making users heavily reliant on IT services for operational issues.	A cloud-based knowledge management system is needed to document issue resolution information, enabling users to access solutions independently and reducing helpdesk dependency.

VI. Stage 6 & 7 - Identify changes that are systematically desirable and taking actions

Based on the recommendations proposal that have been formulated and the comparisons made in the previous stage, the recommendations for solutions that can be implemented by PT XYZ to address the issues in the SAP Warehouse Management module implementation are summarized in Table 6.

Table 6. Feasible Changes and Recommendations

No	Feasible Change	Recommendation
1	Development of a satellite application for inbound processes from production.	Optimize IoT applications to facilitate the receipt of goods from production warehouses to finished goods warehouses by implementing real-time data exchange via APIs.
2	Utilization of IoT technology for the picking process in sales support.	Build an integrated system between SAP Warehouse Management and IoT (e.g., RFID barcode scanners) for real-time confirmation and validation of picking processes, reducing human error and improving operational efficiency.
3	Development of mobile applications integrated with SAP WM for stock counting.	Create mobile applications using IoT (e.g., barcode scanners) to validate data in stock counting activities in real-time, directly connected to SAP WM.
4	Implementation of AI for automatic stock replenishment calculations.	Use a combination of SAP Warehouse Management data and AI algorithms for automated replenishment calculations, considering available stock, delivery plans, and sales data to prevent stockouts or overstocking.
5	Implementation of SAP Analytics Cloud (SAC).	Implement SAP Analytics Cloud to support real-time, data-driven decision-making through interactive dashboards with advanced visualizations, directly integrated with SAP via live connections.
6	Development of a knowledge management system to support IT services.	Develop a digital knowledge management platform containing documentation, guidelines, SOPs, and solutions related to SAP Warehouse Management, enabling users to access information directly and independently.

E. Research Implications

On the theoretical implication, the application of the Soft Systems Methodology (SSM) approach in this research demonstrates its ability to explore the issues at PT XYZ, particularly the gap between operational realities and the company's expectations of the SAP system, especially the Warehouse Management (WM) module. Using SSM, this study analyzes the challenges in SAP WM usage from technical, social, and organizational perspectives. The key factors for ERP implementation success—system quality, data quality, organizational culture, and user support—can be utilized to propose solutions to the issues related to ERP module warehouse management implementation in a consumer goods company, adjusting the theory to the context of the case study.

For the practical implication, this research provides solutions to improve the implementation of SAP ERP, particularly the Warehouse Management (WM) module. Real-time data integration with APIs and IoT addresses issues of inaccurate stock, supports other modules such as PP and SD, and enhances warehouse productivity and the company's competitiveness. IoT technologies like barcode scanners and RFID facilitate the picking process, support paperless operations, and improve operational efficiency. Mobile applications for real-time stock counting reduce manual methods, human errors, and operational costs. AI algorithms for automatic stock counting prevent stockouts and overstocking, ensuring more accurate and efficient stock management. SAP Analytics Cloud (SAC) simplifies data-driven decision-making through interactive dashboards, enhancing decision speed and accuracy. A digital knowledge management platform enables employees to solve problems independently without relying on IT services, improving operational efficiency and team capability. These solutions not only address technical issues but also strengthen the company's competitive position in the market.

F. Conclusion

This research aims to analyze the issues in the implementation of the SAP ERP Warehouse Management (WM) module at PT XYZ and provide improvement recommendations. Based on interviews with management and users, the findings show that the success of ERP implementation is influenced by factors such as system quality, data quality, organizational support, and user support. The problems identified include limitations in the standard SAP WM functions, which require the development of satellite applications. However, this leads to issues with real-time data exchange. Additionally, the lack of stock accuracy results in picking errors, dependence on manual input, paper usage, and reports that are not in real-time. The absence of a knowledge management system also leads to users being heavily reliant on the IT team. The recommendations provided include: first, enhancing IoT applications and implementing APIs for real-time data exchange; second, integrating SAP WM with IoT technologies such as RFID and barcode scanners to accelerate and validate the picking process; third, developing a mobile application for stock counting directly connected to SAP WM; fourth, using SAP WM data and AI algorithms to automatically calculate replenishment needs; fifth, implementing SAP Analytics Cloud for real-time data processing; and finally, creating a digital knowledge management platform to help users resolve issues independently.

This research has several limitations that need to be considered for future studies to improve the results. First, this research focuses only on the Warehouse Management (WM) module within SAP ERP and does not address issues in other modules. It is recommended to extend the research to other modules such as Sales and Distribution (SD), Production Planning (PP), and Finance (FI) to obtain a more comprehensive picture of ERP implementation issues. Second, this research only analyzes internal factors such as system quality, data quality, organizational culture, and user support. Future research should explore external factors such as the role of vendors, market conditions, and government regulations, which can also impact ERP implementation success. Third, considering the limitations of the ERP system, it is advised to integrate ERP with other applications such as IoT and cloud-based systems. Further research on this integration could help improve ERP system performance. Finally, this research uses a qualitative approach. For more measurable results, it is suggested to use quantitative methods, such as surveys of ERP users, which can provide clearer data on the success factors and obstacles of ERP implementation.

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