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FUNCTIONAL ANALYSIS OF ERP SYSTEMS AND THEIR INFLUENCE ON THE DECISION-MAKING PROCESS WITHIN A WAREHOUSE

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Abstract: *The paper analyzes the impact of ERP systems on the decision-making process and operational efficiency in a medium-sized warehouse. Theoretical aspects regarding the functionalities and benefits of these systems are presented, as well as the need to implement an ERP/WMS solution in the context of the problems identified in the logistics flows. By using the DMAIC methodology and an analysis of performance indicators, it is demonstrated that the implemented system reduced picking time, increased data accuracy and improved collaboration between departments.*
Keywords: *logistics flow, ERP/WMS, warehouse, automation.*

1. INTRODUCTION

In the global economic landscape, information has become one of an organization's most valuable assets, and the way it is collected, processed, analyzed and used has a direct impact on overall performance.

The importance of ERP (Enterprise Resource Planning) systems in modern business management is therefore a topic of undeniable relevance. Implementing an ERP system can fundamentally transform the way a company operates, leading to significant improvements in various areas, such as reducing operational costs, optimizing inventory levels, shortening production and delivery cycles, increasing customer satisfaction, improving the accuracy of financial reporting and better compliance with regulations. Companies, regardless of size or sector of activity, are faced with the challenge of coordinating a multitude of interdependent processes – from procurement and production, to sales, distribution, finance and human resources. In such an environment, the need for an integrated information system, capable of providing a unified and real-time vision of the entire organization, has become urgent.

The answer to this need has crystallized in what we know today as enterprise resource planning systems.

The definition of ERP systems has evolved as their functionalities and scope have expanded, thus allowing information sharing between different departments and functions, in real time [1]. Unlike traditional IT systems, ERP systems centralize data in a single database, ensuring the coherence and accuracy of information [2].

This integrated approach facilitates better coordination of activities, optimization of resource allocation and significant improvement of the decision-making process, based on complete and updated information [3]. Implementing an ERP system involves significant investments of financial, human and time resources. Analysis of the specialized literature and case studies reveal a wide range of potential advantages, including increased operational efficiency, improved data quality, optimization of the decision-making process, cost reduction and increased agility. One of the most frequently cited benefits of ERP

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implementation is increased operational efficiency and productivity [4, 5].

Although the potential benefits of implementing an ERP system are considerable and well documented, the process of adopting and integrating such a solution across an organization is, by its nature, complex and challenging [5]. The history of ERP implementations includes numerous examples of projects that either significantly exceeded the initial budget and deadline, or, in extreme cases, failed to deliver the expected value or even led to major operational disruptions [6]. Recognizing and proactively managing these challenges is essential to maximize the chances of success. In parallel with identifying challenges, information systems research has outlined a set of critical success factors (CSFs) – those elements or conditions that, if properly managed, positively influence the outcome of the implementation [2].

Implementing an ERP system is a transformational journey that presents significant challenges, but which, if managed correctly, can bring major benefits. Success depends largely on early recognition of risks and strategic focus on critical success factors.

Currently, major trends in the evolution of ERP systems are dominated by the migration to cloud-based architectures, the use of artificial intelligence (AI) and machine learning for predictive analytics and advanced process automation, as well as integration with the Internet of Things (IoT) for better visibility into physical operations [6].

Thus, ERP systems are becoming increasingly flexible, modular and scalable platforms, adaptable to the specifics of each industry and company. They are no longer just transaction recording systems, but essential strategic tools for data analysis, decision support and innovation.

2. IDENTIFYING THE NEED TO IMPLEMENT A SYSTEM (ERP/WMS) TO IMPROVE PROCESSES

2.1. Theoretical foundation

ERP systems are integrated IT platforms that ensure the management of all enterprise resources (human, material, financial, logistical), through common databases and standardized information flows [7]. Within these, the Warehouse Management System (WMS) constitutes a subsystem dedicated to warehouse operations – from reception and storage, to picking, packaging and shipping – offering traceability and real-time control over logistics flows [8].

The literature highlights that the use of WMS solutions leads to an increase in inventory accuracy by up to 20–30%, a reduction in picking errors, and an improvement in operational performance indicators [9]. At the same time, the integration of WMS with the ERP system allows for extensive visibility into the supply chain and facilitates data-driven decision-making.

2.2. Case study context

To illustrate the concrete impact of ERP systems, this paper focuses on a company in the Sibiu area, which operates a medium-sized warehouse, with approximately 35 employees and over 15 years of experience in the local market. Although the warehouse plays a central role in the company's activity, the preliminary analysis highlighted numerous operational inefficiencies, generated by the lack of a unified information platform and the use of non-integrated tools, such as Excel files and manual processes.

Inventory management is currently carried out through manual records, without real-time synchronization between physical and IT operations. This leads to significant discrepancies between scripted and physical stocks, errors in the picking process and delays in deliveries to customers.

Order planning is done on paper, which makes it difficult to prioritize and control tasks, while traceability of goods movements is limited. As a result, logistics processes are characterized by delays, lack of visibility and low accuracy of operational data.

The main problems identified include:

- delays in processing orders and receipts;
- picking and packing errors caused by inaccurate information;
- lack of real-time visibility over order status;

- overuse of storage space with inactive products;
- difficulties in planning transport routes and logistical resources;

These deficiencies indicate a fundamental information integration problem, which limits the organization's ability to operate efficiently and react quickly to market demands.

2.3. Methodology

To substantiate the need for an ERP/WMS system, a mixed research method was applied, based on:

- direct observation of internal processes in the warehouse;
- quantitative analysis of performance indicators;
- audit of logistics flows;
- the DMAIC (Define – Measure – Analyze – Improve – Control) methodology specific to the Lean Six Sigma approach and used to structure the process improvement stages.

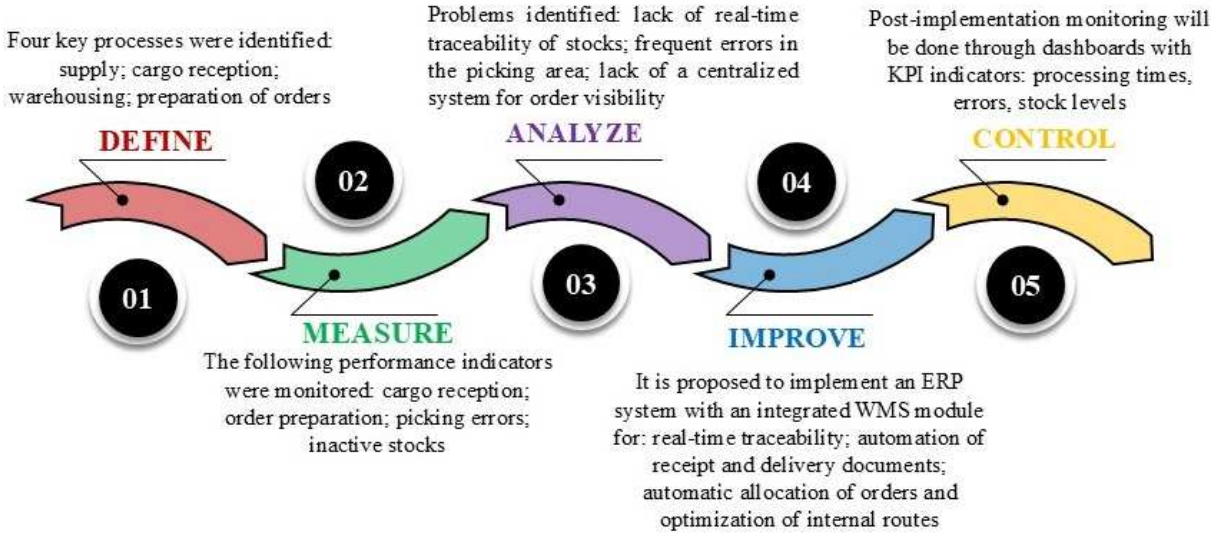

Fig. 1. Application of the DMAIC methodology

The data collected (table 1) represent the main performance indicators measured in the initial stage (AS-IS).

Table 1

Measured performance indicators

Processor	Tracked indicator	Average value
Goods reception	Reception time /batch	2 – 3.5 hours
Preparing orders	Average time/order	3.2 hours
Picking errors	Error rate in delivered orders	4.8%
Inactive stocks	Percentage of warehouse area occupied by inactive products	12%

The results obtained highlight reduced productivity and support the implementation of an ERP/WMS system as a strategic optimization measure, aiming to:

- increasing operational efficiency and data accuracy;
- reducing hidden costs associated with errors and downtime;
- ensuring complete traceability of material and information flows.

2.4. Associated risks and challenges

Despite the anticipated benefits, implementing an ERP/WMS system also involves a series of risks and challenges, which must be assessed and managed appropriately, such as:

- costs related to licenses, customization, hardware;
- resistance to change from staff unfamiliar with digital solutions;
- estimated implementation time: 6–12 months;
- risk of errors in the initial data migration, if it is not well planned;

Managing these risks requires careful project planning, staff training, and active management involvement in the organizational change process.

3. IMPLEMENTATION OF AN ERP/WMS SOLUTION TO IMPROVE THE ANALYZED PROCESSES

Following the identified problems, the decision was made to implement a comprehensive ERP/WMS system that would fix the problems, automate workflows, and provide real-time visibility. In the literature, such projects are frequently managed according to the project management standards defined by the PMBOK (Project Management Body of Knowledge), which include planning, design, implementation, testing, and control [10].

The implementation structure in this study was organized into three stages (Table 2) corresponding to the incremental implementation model frequently used for ERP/WMS systems.

This approach allows for effective risk management, alignment with organizational requirements, and progressive employee adaptation to new processes (Table 3), the allocated budget, and a detailed plan of activities and resources.

Table 2

Stages of the WMS implementation process

Stage	Main activities	Estimated duration
Planning & Analysis	Project team formation, AS-IS process analysis, TO-BE objectives & requirements definition	3 weeks
Design & Configuration	Configure WMS rules, warehouse structure, users, interfaces	4 weeks
Development & Testing	Interface development, unit, integrated and UAT testing	5 weeks

Each stage was designed to minimize data migration risks and maximize efficient system adoption. To evaluate the system performance, key performance indicators were taken into account, according to the principles of operational performance management [11], to reflect (table 3):

- operational efficiency (processing time, average picking time),
- inventory accuracy (difference between physical and written stock),
- operational quality (delivery error rate),
- resource and space utilization (warehouse occupancy rate).

And, the target values (TO-BE) were established based on good practices from other warehouses in Romania and benchmarks published in the specialized literature [9, 12,13].

Table 3

Key KPIs and targets post-WMS implementation

Key performance indicator (KPI)	Current value	Target by WMS	Observations
Inventory accuracy	78%	≥ 95%	Based on cyclical inventories
Average picking time per order	17 minutes	≤ 10m	Routing optimization & automatic lists
Delivery error rate	5.2%	≤ 2%	Automatic validation in WMS
Reception processing time	2.5 hours / transport	≤ 1.5 hours	With guided put-away
Efficient storage space utilization rate	~60%	≥ 90%	Through zone storage & WMS slotting
Orders fulfilled completely and on time	87%	≥ 95%	Increased customer satisfaction

Thus, the implementation of the WMS system will lead to significant improvements in operational performance, reflected by increasing inventory accuracy by 15%, reducing the average picking time per order to under 10 minutes, decreasing the delivery error rate from 5.2% to under 2%, reducing the processing time of receipts to a maximum of 1.5 hours, and implicitly, an improvement in the rate of orders fulfilled completely and on time by at least 95%, thus contributing to increasing customer satisfaction.

4. INTERPRETATION OF RESULTS AFTER IMPLEMENTATION

To see the efficiency of warehouse operations after implementation, its activity was monitored over 5 working days, according to Table 4.

After implementing the WMS system, the warehouse processes are fully digitalized and integrated.

Table 4

Warehouse Performance Evaluation

Day	Orders processed	Orders with errors	Total picking time	Error rate (%)	Average picking

			(minutes)		time (min)
Mon.	150	12	1350	8	1.8
Tue.	162	9	1224	5.55	1.5
Wed.	158	8	1170	5.06	1.48
Thu.	170	9	1088	5.29	1.28
Fri.	165	4	990	2.43	1.19

All cargo movements are recorded in real time by scanning barcodes, and the system automatically generates the optimal tasks and routes for picking. An improvement in operational performance is observed, highlighted by the progressive decrease in the error rate from 8% on the first day to only 2.43% on the last day, as well as the reduction in the average picking time to 1.19 minutes. At the same time, the number of orders processed daily has increased, indicating increased efficiency of workflows and a rapid adaptation of staff to the new automated processes in the WMS system.

Also, the on-time shipping rate, which measures the percentage of orders shipped to the customer, is also improved, as the inventory accuracy and speed of order preparation facilitated by the WMS have allowed for more accurate delivery confirmations.

The picking process was also optimized by the WMS generating picking lists in the order of deliveries and guiding operators on the most efficient route through the warehouse.

In addition to KPIs directly related to warehouse operations, the intensive use of merchandise scanning reduced the number of manual data entry errors associated with stock movements.

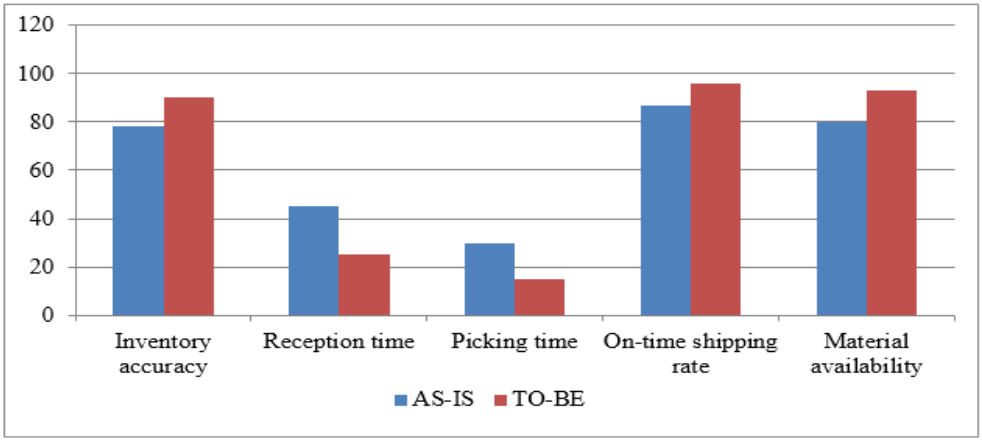

Fig.2. Comparison between AS-IS and TO-BE performance indicators

Figure 2 illustrates the comparison between the current (AS-IS) and the post-implementation (TO-BE) values, highlighting the significant improvements obtained following the implementation of the WMS system. A considerable increase in inventory accuracy and efficient storage space occupancy, a reduction in operational times for picking and receiving, as well as a considerable decrease in the delivery error rate are noted. So, a clear increase in the productivity and operational performance level of the warehouse. One of the most significant expected benefits is increased operational efficiency.

The implementation of WMS has transformed warehouse workflows – from receiving and storing, to picking and shipping – into guided and monitored processes in real time. Reducing cycle times for these operations (according to KPIs), eliminating repetitive manual tasks and minimizing human errors (through the use of scanning) have led to an increased fluidity of the entire flow of materials through the warehouse.

This efficiency will directly reflect in the warehouse's ability to process a higher volume of orders in a shorter time frame.

5. CONCLUSION

This paper aims to analyze the importance of ERP systems in modern warehouse management, addressing both the theoretical

foundations of these systems and their practical applications in a specific business context.

By exploring the concepts, functionalities and impact of ERP systems, as well as through a targeted case study on operational processes, the role that integrated information technology plays in increasing efficiency, reducing costs and improving decision-making within an organization was demonstrated.

The implementation of the WMS module generated a series of concrete positive results on the analyzed processes. Increasing inventory accuracy, streamlining warehouse operations (reception, storage, picking, and shipping), improving the interaction of the warehouse with production and purchasing by providing accurate information, reducing order fulfillment times and increasing operational visibility are the main expected impacts.

These improvements contributed to reducing operational costs, increasing productivity, improving customer service and consolidating a solid operational base for the company's future.

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Analiza funcțională a sistemelor ERP și influența lor asupra procesului decizional în cadrul unui depozit

Lucrarea analizează impactul sistemelor ERP asupra procesului decizional și al eficienței operaționale intr-un depozit de dimensiune medie. Sunt prezentate aspecte teoretice privind funcționalitățile și beneficiile acestor sisteme, precum și nevoia implementării unei soluții ERP/WMS în contextul problemelor identificate în fluxurile logistice. Prin utilizarea metodologiei DMAIC si a unei analize a indicatorilor de performanta, se demonstreaza ca sistemul implementat a redus timpul de picking, a crescut acuratețea datelor și a îmbunătățit colaborarea între departamente.

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