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CRITICAL SUCCESS FACTORS FOR ERP IMPLEMENTATION – THE PERSPECTIVE OF IMPLEMENTATION CONSULTANTS

ERP (Enterprise Resource Planning) systems are essential for the management of resources in enterprises functioning on the local as well as the global market. Yet, their implementation consumes considerable resources and frequently ends in failure.

The goal of this article is to present an empirical assessment of the critical success factors for ERP implementation as defined in the literature, which was undertaken by experienced implementation consultants from multiple countries. A ranking of the importance of these factors will also be presented.

First, a literature review around the critical success factors for ERP implementation was conducted. Next, using a survey, research was conducted among respondents working for an IT consulting company delivering ERP implementation services with subsidiaries in nine countries.

The empirical study confirmed the significance of the critical success factors for ERP implementation as defined in the literature. It also pointed out differences in the perception of the importance of these factors between the employees of the companies where the system had been implemented and the experienced implementation consultants.

It was found that the critical success factors as defined in the literature brought value to the industry practice, in the opinion of the respondents, thereby confirming that these should be taken into account when working on ERP system implementation. It was also demonstrated that in certain cases, the opinions of the consultants differed from the opinions of the employees of the organizations where an ERP system had been implemented.

Keywords: critical success factors, Enterprise Resource Planning, ERP system implementation

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1. INTRODUCTION

Regardless of the type of enterprise, its management varies in complexity depending on its size. Strictly following defined processes, data management in a 10-person company is feasible using commonly available tools, such as Microsoft Office or Google Docs. Given the small scale, extracting the data necessary to make a business decision is also achievable. In an enterprise with 1,000 employees, achieving the same goal using these tools would require highly qualified human resources to make a much greater effort. The variety of data sources and the number of employees processing them could also lead to various inconsistencies. The time needed to extract data would be extended, and the continuity and consistency of business processes would be more prone to errors due to the human factor. ERP (*Enterprise Resource Planning*) systems are the solution to these challenges. However, their implementation is not a simple process and in many cases does not end successfully.

The goal of this article is to present an empirical assessment of the critical success factors for ERP implementation as defined in the literature, which was undertaken by experienced implementation consultants from multiple countries. A ranking of the importance of these factors in the opinion of the practitioners will also be presented.

2. CHARACTERISTICS OF ERP SYSTEMS

The term *Enterprise Resource Planning* (ERP) has been in common use since the 1990s. The term was created by the analytical and consulting group Gartner. It was used to refer to the evolutionary successor of *Material Requirement Planning* (MRP) systems – covering a much smaller scope of an organization's operations (Mugahed, Marathwada, 2017, p. 1). However, other IT solutions supporting individual aspects of business management had existed much earlier, and their capabilities evolved gradually over time.

As pointed out by Chmielarz (2013), the history of IT solutions supporting the work of enterprises dates back to the 1960s. At that time, their functionalities were mainly covered by *Inventory Control Packages* (IC). Although the assumptions of these systems had been developed since the 1950s (Chmielarz, 2013, p. 119), it was not until the early 1970s that the first MRP systems emerged. The scope of their functionality was extended to include production scheduling and inventory control (Elragal, Haddara, 2012, p. 23). With the advent of the 1980s, MRP systems evolved into *Manufacturing Resources Planning* (MRPII) systems which, in addition to managing production planning and materials management, could also handle finance and human capital management (Mrini et al., 2015, p. 2). However, these systems were not yet fully integrated. It was only in the 1990s that the integration of data flow within these systems began the age of ERP (Chmielarz, 2013,

p. 120). The evolution of ERP systems is shown in Figure 1. These systems use their functionalities to cover such areas as finance, sales, warehouse and human resource management. Integrating them gives organizations more control over their business processes, a better insight into operations and data consistency. ERP systems are available in the *on-premises* version, where the infrastructure supporting them rests within the responsibility of an organization (Vera et al., 2019, p. 2), and in the cloud (Ahn, Ahn, 2020, p. 2). Cloud and mobile solutions are currently the main trend in the development of ERP systems (Abramek et al., 2014, p. 123). Nevertheless, their use on the market is still a novelty (Kiełtyka, 2016, p. 210). As indicated by the Gartner Group, *Extended ERP* (ERPII) systems should have appeared on the market in the 2000s. However, research conducted by Haddar & Constantini (2017, p. 958) indicated that this evolutionary step has not yet been taken.
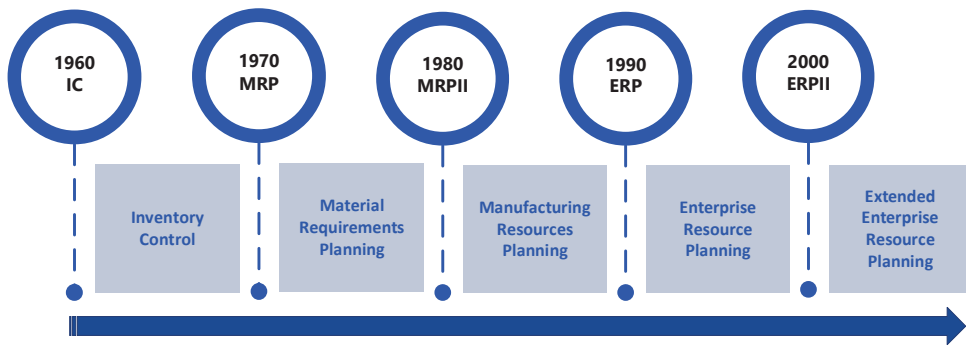

Fig. 1. Evolution of ERP (authors' own development based on Elragal, Haddara, 2012)

As indicated by Monk and Wagner (2013), the operation of enterprises in many cases orbits around four main axes called functional areas of operation. These areas consist of finance and accounting, supply chain management, human resource management, and sales and marketing – which in turn are divided into business functions focused on performing tasks within their areas (Monk, Wagner, 2013, p. 2). From a historical point of view, individual functional areas developed and used their own IT systems to support their business functions. They communicated with each other through interactions between employees, often still based on the circulation of documents in paper form. This required considerable time and resource expenditure. In Table 1, Monk and Wagner present an example of business functions that fit into individual functional areas. To illustrate the complexity of information and data flows between business functions and functional areas, the table presents an example of the simple process of referring employees from the area of marketing to training. This process consists of the following steps: 1. registering the need to purchase training, 2. allocating a budget, 3. creating a purchase requisition,

4. creating a purchase order, 5. conducting training, 6. creating a receipt to confirm the service, 7. receiving the invoice, 8. making payment. Performing this process in an ERP system makes it possible to shorten its duration, reduce the workload of an enterprise's employees, as well as reporting on data crossing many functional areas. However, the value of having an ERP system is not only limited to this.

Table 1. Example of functional areas along with business functions

Functional area	Marketing and sales	Supply chain management	Accounting and finance	Human resources
Business functions	Introduction of new products to the market	Purchase of goods and raw materials 4	Settling customer and supplier payments 7 & 8	Recruitment and employment
	Taking sales orders	Receipt of goods and raw materials	Cost allocation	Training sessions 3 6
	After-sale support 1 5	Transport and logistics	Planning and budgeting 2	Calculation of remuneration
	Customer relationship management	Production planning	Cash flow management	Benefits
	Sales forecasting	Manufacturing of goods		Compliance with legal requirements
	Advertising	Equipment maintenance		

Source: Monk, Wagner, 2013, p. 2. Authors' own translation.

According to Nestell and Olson (2017), the benefits of implementing an ERP system in an enterprise can also be observed in other areas. One of them is a reduction in the stock of raw materials collected to ensure continuity of production. Thanks to the functionality of production planning integrated with other functional modules such as supply chain management, it is possible to reduce the costs incurred from maintaining extensive stock levels of finished products. However, these systems are not intended exclusively for manufacturing companies. An enterprise from any sector can benefit from the integration of the work of individual functional areas. They can do this by implementing business processes designed on the basis of the best practices elaborated by vendors of ERP systems thanks to cooperation with many customers.

Another benefit is the standardization of business processes, facilitating cooperation with suppliers and customers. Thanks to the fact that all the data is stored in one database, inconsistencies are eliminated, and it becomes possible to make this information available online (Nestell, Olson, 2017, pp. 2-3). Noticeable benefits of implementing ERP systems can also be noticed by large enterprises in which other

business-supporting IT solutions already exist. An ERP system, through the possibility of building interfaces, allows for communication with many other systems. This makes it possible to achieve greater operational efficiency by minimizing the need to repeatedly enter data as well as the risk of information inconsistency associated with it. The implementation of an ERP system also benefits small and medium-sized enterprises (SMEs). However, its characteristics carry three types of risk: complexity, a significant scale of changes, and a tight project schedule. Enterprises from the SME sector have limited resources (Xie et al., 2022, p. 1), which often determines the choice of IT solution architecture (Alsqour et al., 2012, p. 6).

In modern enterprises, every functional area requires a work-supporting IT solution. Due to the complexity of business operations and internal and external factors, IT tools are necessary for effective company management (Kisielnicki, Markowski, 2021, p. 17). These solutions differ significantly from each other due to the diversity of the characteristics of the operations in individual areas. In ERP systems, the adaptation to this specificity is ensured by modules dedicated to individual functional areas, gathering data in one integrated database. In Table 2, Summer presents examples of functional modules included in systems recognizable in 2013 by ERP manufacturers: SAP, Oracle and PeopleSoft (Summer, 2013, p. 8).

Table 2. Modules supported by vendors

Function	SAP	Oracle	PeopleSoft
Sales Order Processing	Sales and Distribution (SD)	Marekting Sales Syooky Chain	Supply Chain Management
Purchasing	Materials Management (MM)	Procurement	Supplier Relationship Management
Production Planning	Production Planning (PP)	Manufacturing	---
Financial Accounting	Financial Accounting (FA)	Financials	Financial Management Systems
Management Accounting	Controlling (CO)	---	---
Human Resources	Human Resources (HR)	Human Resources	Human Capital Management

Source: Summer, 2013, p. 8.

The modularization of ERP systems brings two additional benefits. The first one is the possibility of combining the implementation of functional modules from different software vendors. This method works when the standard functionalities of a given module of one of the vendors better reflect the processes taking place in one of the functional areas, and in another one in the next area. The second benefit is the possibility of a gradual implementation of the system, starting with the im-

plementation of basic modules. This approach is called "progressive" in the literature. Unlike the implementation of all the required modules at once, called the "Big-Bang" approach, which makes it possible to shorten the implementation time (Marciniak et al., 2014, p. 873).

Designing, analyzing and implementing ERP systems are complex tasks which come within the purview of both business units and IT. Implementations of ERP systems that achieve the goals set by business are more often successful. However, those focusing on the goals set by IT professionals bring a greater return on investment (Haddara, Elragal, 2013, p. 4). Over the years, many methodologies have been developed to support the implementation of ERP systems. Existing methodologies can be divided into those which are "tailor-made", those "developed by software vendors" and those "developed by consultants" (Nagpal et al., 2015, p. 4). Many "tailor-made" methodologies were developed as a result of research work in 1998–2003 (Domagała et al., 2021, pp. 3-4) when ERP systems were still a novelty. The methodologies "developed by consultants" were based on the experience of implementation specialists. To a large extent, they are an agile equivalent of methodologies "developed by software vendors", such as Accelerated SAP, Oracle Unified Method or Microsoft Sure Step. However, the latter ones are most often used in industry practice (Nagpal et al., 2015, p. 4).

Software vendors are constantly refining their methodologies. Since the publication by Nagpal et al. (2015), the Accelerated SAP methodology has been replaced by SAP Activate (Denecken et al., 2020); Oracle Unified Method, although updated, has remained unchanged (Oracle Corporation, 2016); Microsoft Sure Step has evolved into Microsoft Success by Design (Microsoft Corporation, 2022). These methodologies define, for each of the planned phases, the activities which need to be performed to effectively implement their own system. A summary of the phases planned by recognizable ERP software developers is shown in Figure 2.

Methodology	Analysis	Implementation					Post impl.
SAP Activate	Discover	Prepare	Explore	Realize	Deploy	Productive start	Run
Oracle Unified Method	Inception	Elaboration	Construction	Transition		Productive start	Production
Success by Design	Initiate	Implement		Prepare		Productive start	Operate

Fig. 2. Methodologies for implementing ERP systems developed by recognizable vendors (authors' own development)

Source: authors' own development

3. LITERATURE REVIEW

In December 2022, a literature review was conducted on the Web of Science, an online database of peer-reviewed scientific journals. Keywords such as *ERP implementation* and *Critical Success Factors* were used. Then the review was deepened using the Google Scholar search engine, using the keywords *ERP implementation*. The results of the review made it possible to conceptualize the terms and shape the structure of the part of the article concerning the critical success factors for ERP system implementation. They also made it possible to identify a research gap in this area.

In order to establish the current list of critical success factors, 15 systematic literature reviews identified during the Web of Science review were studied. The article by Mahmood et al. (2020) was chosen because it presented the most up-to-date summary of the literature published in the period 1999-2018 relating to the critical factors for ERP system implementation. He also indicated 10 of these, which appeared most often in scientific articles. Their list (presented in Tab. 4) made it possible to conceptualize the terms (presented in Tab. 5) and shape their description. The characteristics of these factors were developed on the basis of national and international literature selected by means of the snowball method.

During the review, 13 quantitative studies carried out relating to the critical success factors for ERP system implementation (presented in Tab. 3) were also identified. In all the indicated surveys, the respondents came from organizations in which an ERP system had been implemented. It was only in a study conducted by Garg & Garg (2014) among 35 respondents working in a hospital where an ERP system had been implemented, that 12 implementation consultants from India were included who specialized in the system. However, their area of specialization was not indicated.

No research was found just among consultants professionally involved in ERP system implementation and specialized in their various aspects. The perspective of implementation consultants may not be the same as that of employees of organizations in which this system has been implemented. Their experience comes from various organizations for which they provided such a service. In addition, on an international scale, the only studies conducted were those to verify the existence of a link between the critical success factors and the success of implementation in small, large and global organizations (Saini et al., 2013). No articles were identified that presented the ranking of the significance of these factors and, at the same time, were developed on the basis of an international study.

Table 3. Quantitative research identified relating to the critical factors for ERP system implementation

Year	Region	Number of respondents	Research area	Source
2012	Not indicated	223	Strength of the relationship between the critical success factors and the success of ERP system implementation in production companies	Annamalai, Ramayah, 2012
2012	Iran	384	Existence of a relationship between the critical success factors and the success of ERP system implementation in Iran	Dezdar, 2012
2013	India and USA	9	Ranking of the significance of the critical success factors for the success of ERP system implementation	Kini, Basaviah, 2013
2013	17 countries	164	Existence of a relationship between the critical success factors and the success of ERP system implementation in small, large and global enterprises	Saini et al., 2013
2013	Australia	209	Existence of a relationship between the critical success factors and the success of ERP system implementation and the operational efficiency of an enterprise after implementation in Australia	Ram et al., 2013
2014	India	35	Existence of a relationship between the critical success factors and the success of implementation in healthcare institutions in India	Garg, Garg, 2014
2015	India	106	Relationship between intervening variables and the success of implementation in small and medium-sized enterprises in India	Bansal, Agarwal, 2015
2016	Greece	159	Existence of a relationship between the critical success factors and the success of implementation in small and medium-sized enterprises in Greece	Chatzoglou et al., 2016
2017	Brazil	70	Ranking of the significance of the critical success factors for the success of ERP system implementation before, during and after system implementation in educational institutions in Brazil	Campos Fernandes Leandro et al., 2017
2018	Iran and China	37	Existence of a relationship between the critical success factors and the success of ERP system implementation in China and Iran	Dezdar, 2017
2018	Pakistan	101	Significance of the critical success factors for ERP system implementation in Pakistan from the point of view of systems' users	Reitsma, Hilletofth, 2018
2019	Bangladesz	66	Existence of a relationship between the critical success factors while implementing ERP systems in Bangladesh	Hasan et al., 2019
2021	Pakistan	197	Existence of a relationship between the critical success factors and the success of ERP system implementation in developing countries such as Pakistan	Malik, Khan, 2021

Source: authors' own development.

4. CRITICAL SUCCESS FACTORS FOR ERP SYSTEM IMPLEMENTATION

Despite being present on the market for decades, over 70% of ERP implementations do not meet the intended objectives (Kraljic et al., 2014, p. 309). These projects cannot be seen as purely technical ones (Haddara, Elragal, 2013, p. 4). A study conducted by the Gartner Group showed that in the case of large-scale IT projects, which include ERP system implementation, none of them end ahead of scheduled, 13.67% end as scheduled, 21.33% end with a delay, and 65% are cancelled during the course of operation (Parys, 2015, p. 4).

International and national literature provides an extensive description of the critical success factors for ERP system implementation. Having conducted a systematic review of the literature, Mahmood indicated 10 most frequently repeated ones in an order determined by the frequency of occurrence. They are presented in Table 4.

The identification of potential business problems should take place at the stage of implementation planning. This helps to define areas that require special attention and to better understand the benefits arising from the system's implementation. Choosing a supplier is also important. An implementation partner should be selected on the basis of experience and the availability of the resources necessary for project success. Nowadays, there are many solutions to facilitate the planning and implementation of an ERP system depending on internal and external factors, industries, customer characteristics and market requirements (Hrischev, 2022, p. 1).

Table 4. Critical success factors

1	Senior management approach
2	Organizational change management
3	User training
4	Effective communication
5	System integration
6	Business process reengineering
7	Right implementation partner/consultants
8	Project management
9	Building business process experts team
10	Project team empowerment

Source: own elaboration based on Mahmood et al., 2020, p. 11.

When implementing an ERP system in an organization, it is not limited to providing a new tool for only one business unit. The implementation is followed by a change in the working method that crosses many areas. Hence, a clear vision of

the goal and constant senior management support, not limited to IT department management, are indispensable for achieving success (Elbanna, Newman, 2022, p. 12). This factor assumes the greatest importance in the event of a conflict of interest between individuals. For example, when the IT department seeks to minimize the cost of maintaining the system after implementation by maximizing the share of its standard functionalities, and the business unit expects a "tailor-made" solution that optimizes its work as much as possible. In the event of a dispute of this kind, the decision must be taken by the management in charge of both units. At the same time, it must be consistent with the strategy adopted before implementation (Kanicki, 2013, p. 805). This is especially important if the decision will significantly affect the way the unit works. It is also necessary for the management to continuously monitor that the objectives adopted are adhered to before system implementation (Wojciechowski, 2021, p. 22). These objectives should be a guide in resolving conflicts and decision-making.

A change in the way an organization operates, inevitably related to the ERP system implementation, may be perceived by employees as a threat to the *status quo*. As a result, it may encounter cynical, passive resistance (Selander, Henfridsson, 2012, p. 311). Failure to adopt a structured approach to managing organizational change and not including it in the project management plan may lead to the extended duration of the project, an increase in its cost or even its cancellation. Managing organizational change should take into account two key elements: improving employees' competencies and the effective communication of upcoming changes.

The uncertainty of an organization's employees as to their own IT competencies occurs frequently when an ERP system is implemented. Preparing and conducting comprehensive training demonstrating to employees the full potential of the implemented solution and ensuring the freedom of use of the system for its future users will have a positive impact on their attitude (Al-Jabri, 2015, p. 12). This is a key factor in the success of the implementation, because satisfaction of the end user with the implemented solution will ensure its effective execution. Making it possible for employees to participate in transversal training is also a remedial action for dealing with an important reason for user resistance: uncertainty and anxiety (Nah, Tan, 2015, p. 55).

The aforementioned uncertainty related to organizational change may also lead to the spread of speculation in an organization as to the reason for implementation of the system. Communicating to employees the real reasons for this change prevents the dissemination of such information (Garg, Chauhan, 2015, pp. 1330-1331). Particular attention should be paid to communication at lower organizational levels, where the belief that the purpose of implementation is to automate tasks and reduce employment may spread. This information, although untrue, may lead to a negative attitude among employees towards the project, thus hindering its implementation. Effective communication can prevent such cases, being at the same time a key factor counteracting employees' resistance to change (Annamalai, Ramayah, 2012, p. 189).

ERP systems are one of the tools that significantly optimize the functioning of an enterprise, but even the most popular solutions on the market are not able to fully cover all needs. Hence, an important aspect of the implementation is the integration of an ERP system with the other applications functioning in an organization, including other ERP systems (Bokovec et al., 2015, p. 98). This aspect is particularly important in the case of companies sharing databases with others. An example is a database of insolvent debtors. In this case, the system must be extended to include an interface enabling the exchange of this data between organizations. However, the expansion of ERP systems with additional functionalities should be limited to an absolute minimum.

Having decided to implement an ERP system, a company should be ready to change its current way of working. It is a mistake to prefer an approach that assumes an extension of the system with dedicated programs covering functionalities not included in the standard to reflect the way the organization worked before. This approach significantly increases the cost of implementation and post-implementation maintenance of the system (Ali et al., 2017, p. 237). The approach that maximizes the benefits stemming from implementation for an enterprise is the reengineering of business processes. It aims to match them with those existing in a standard form, developed by software vendors over years of cooperation with many customers. Enterprises are not left alone in this task. They can hire a specialized consulting company to benefit from their experience in this area.

Choosing the right implementation partner and consultants is also an important aspect of implementing an ERP system. There are two risk areas to consider: the first one is *an adverse selection*, especially visible in connection with ERP implementation, where the level of knowledge of a partner/consultant is not symmetrical in relation to the customer's level of knowledge; the second one is *temptation for abuse*, where a partner/consultant, driven by a desire to maximize his/her profit, can achieve his/her own goals, putting them above the customer's (Basu, Lederer, 2011, p. 15). An improper selection of partner/consultant may lead to the generation of "tailor-made" programs in areas covered by a standard ERP system solution. This happens due to lack of knowledge or abuse.

The implementation of an ERP system cannot succeed without structured project management. It is particularly important in the areas of scope, risk, human resource communication, procurement and project integrity management (Chmielarz, 2013, pp. 16-24). A project with a scale of ERP implementation, regardless of whether it is managed by a customer or an implementation partner, is exposed to many threats. This is influenced by the number of stakeholders whose goals and expectations are not always consistent. Therefore, the use of project management tools and techniques deserves special attention. Appointing a project manager on a full-time basis with appropriate soft and hard competencies is therefore required (Wojciechowski, 2021, pp. 20–21).

The key element of ERP system implementation is also the team appointed for this task. It must not consist exclusively of consultants. One of the basic pillars of

implementation is a team of experts in the field of business processes operating in the organization in which the system will be implemented. Their role is to provide knowledge about how the organization operates before implementation to facilitate its adaptation to the standard functionalities of the implemented system. In this case, the number of team members does not play such a key role as their communication skills and acquaintance with processes (Yang, 2016, p. 673). The selection of appropriate team members and providing them with a suitable amount of time and resources should be taken into account at the project planning stage.

However, the competencies of the team are not the only aspect that should receive appropriate attention. It is also necessary to empower the team to modify the way an organization operates. Team members should be empowered to make decisions based on their own judgment, without having to consult with their supervisors (Mahmood et al., 2020, p. 15). ERP implementations are delivered by large teams. Waiting for a superior's decision in this case would cause downtime in the workflow. At the same time, it would make it impossible to plan the work of the team even in the short term, thus leading to an inefficient use of resources. Decisions taken are followed by responsibility for their consequences. It is therefore important to ensure that the individuals authorized to take them are not exposed to too much pressure from the various stakeholders. From the very beginning, it should be clearly explained to both authorizing and authorized persons that implementation success depends on many factors and on the stakeholders, too (Wojciechowski, 2021, p. 31). In order to reduce pressure that is inevitable in the case of large-scale projects, this relationship must be clearly communicated to both parties.

Table 5. Conceptualization of the critical success factors for ERP system implementation

Critical success factor	Summary
Senior management approach	Resolving conflicts related to using standard functionalities or the individualization of a system and monitoring the achievement of a goal.
Organizational change management	Ensuring the controlled introduction of organizational changes, bearing in mind user reluctance. Their identification, adjustment and communication.
User training	Providing users with the knowledge and skills indispensable for operating the new system in such a way as to prepare them for the comfortable use of it.
Effective communication	Ensuring dissemination of information about system implementation and the benefits provided.
System integration	Ensuring that the new system can communicate with IT solutions already existing in and outside the organization.
Business process reengineering	Adapting business processes existing in an organization to reflect those defined in the ERP system

cont. tab. 5

Critical success factor	Summary
Right implementation partner/consultants	Engaging a consulting firm or consultants possessing appropriate competencies and following the principles of ethics in case the organization's goals are not identical to their particular interest.
Project management	Using best practices connected with managing the scope, risk and integrity of a project.
Building business process experts team	Identifying among company employees a team of experts responsible for the functioning of business processes.
Project team empowerment	Granting authority to the process team to introduce changes in how the company functions based on its own judgement.

Source: authors' own development.

The review of scientific texts in national and international sources led to the following research questions:

Q1: Does the significance of the critical success factors for ERP system implementation determined on the basis of the frequency of records in the literature coincide with their significance in the perception of practitioners specializing in ERP system implementation, and working for an international consulting company providing the service of implementing these systems?

Q2: How would the critical success factors for ERP implementation, which are the most common in the literature, be ranked according to significance by experienced practitioners specializing in ERP system implementation, and working for an international consulting company providing the service of implementing these systems?

5. METHODOLOGY

In order to answer the research questions, a survey method was chosen using an online survey technique conducted by means of a survey questionnaire in the Microsoft Forms application. This choice was made on the basis of a similar study of the critical success factors for ERP system implementation carried out in the public education sector (Campos Fernandes Leandro et al., 2017, p. 530).

The list of critical success factors for ERP system implementation used in the study was selected during the literature review and is presented in Table 4. In their study, Mahmood et al. (2020) analyzed in the literature the frequency of occurrence of individual factors, indicating that it testifies to their significance from the point of view of ERP system implementation.

The study was conducted among consultants specializing in ERP system implementation. The chosen criterion for selecting respondents were typical cases indicated by "informants", then extended by means of the snowball method (Glin-

ka, Czakon, 2021, p. 80). The role of the informants was played by representatives of the management staff of Atos Poland Global Services, specializing, among others, in ERP system implementation. These consultants were further asked to send the survey questionnaire to other consultants with whom they had the opportunity to cooperate in ERP system implementation. Since the research sample was selected by a non-random method, it is impossible to statistically generalize the results on the basis of probability (Chybalski, 2017, p. 9). Therefore, validation according to the analytical model was chosen (Glinka, Czakon, 2021, p. 78).

The survey questionnaire, in English, was sent to 40 people on 4 January 2023. On 1 February 2023, the number of the respondents reached 60. Questions 1 to 5 concerned control variables aimed at determining whether respondents were specialists in the area of ERP system implementation. Question 6 allowed the respondents to express their own opinion on the important criteria for the success of implementing an ERP system. Question 7 was based on the seven-point Likert scale (Campos Fernandes Leandro et al., 2017, p. 530), on which respondents could express their opinion on the critical factors for ERP implementation success defined in the literature. In question 8, the respondents were asked to rank the success factors according to their significance. In question 9, the respondents were asked to develop a list of success factors, as in similar studies on this topic, where the question is open (Kini, Basaviah, 2013, p. 117). Questions 10 and 11 concerned the questionnaire itself.

It contained the following questions:

1. How many years of experience do you have in implementing ERP systems (numerical values)?
2. In which branch of the market do you have the most extensive experience? Variants: Financial and Insurance Services; Financial Services & Insurance, Healthcare & Life Sciences, Manufacturing, Public Sector & Defense, Resources & Services, Telecom, Media & Entertainment, Other (with the possibility of indicating which one). The respondents were able to choose more than one option.
3. What ERP system do you specialize in? Variants: SAP, Oracle, Microsoft Dynamics, Other (with the possibility of indicating which one).
4. What is your area of expertise? Variants: Functional Consultant, Technical Consultant – Basic Component, Programmer, Team Manager/Leader.
5. What is your nationality? (text field) An additional hint was the indication of nationality featured in the passport, which the respondent used when traveling abroad.
6. In your opinion, what makes the implementation of an ERP system successful? (text field)

7. In your opinion, how important are the following success factors for ERP system implementation?
   1. Senior management approach, 2. Organizational change management, 3. User training, 4. Effective communication, 5. System integration, 6. Business process reengineering, 7. Right implementation partner/consultants, 8. Project management, 9. Building business process experts team, 10. Project team empowerment (seven-point Likert scale: Completely unimportant, Unimportant, Rather unimportant, Neutral, Rather important, Important, Extremely important)
8. How would you rank the importance of the following factors?
   1. Senior management approach, 2. Organizational change management, 3. User training, 4. Effective communication, 5. System integration, 6. Business process reengineering, 7. Right implementation partner/consultants, 8. Project management, 9. Building business process experts team, 10. Project team empowerment. (ranking according to the importance criterion from 1 to 10)
9. Are there any aspects of ERP implementation that you would consider more important than those mentioned above? (text field)
10. If you are interested in receiving the results of the above survey, please provide your e-mail address. (text field)
11. How would you improve this questionnaire? (text field)

Moreover, in questions 7 and 8, based on the literature review, the following annotation was added synthetically to explain the importance of the indicated success factors in order to conceptualize them.

1. Senior management approach – resolving conflict of interest in reengineering of business processes: go standard or custom.
2. Organizational change management – identifying, adjusting and communicating the organizational changes triggered by the ERP implementation.
3. User training – preparation and execution of training covering all functionalities of the new system so that users feel comfortable using it.
4. Effective communication – informing the users about the reasons for implementation and its benefits.
5. System integration – ensuring that the system can integrate with other applications.
6. Business process reengineering – adjusting them in the target company to reflect the ERP standard.
7. Right implementation partner/consultants – consulting company or consultants with adequate level of experience and work ethics.
8. Project management – managing scope, risk, human resources, communications, procurement and project integration.
9. Building business process experts team – experts in process currently functioning in the company dedicated to the project.

Project team empowerment – the ability of the project team to take decisions based on their own judgment without waiting for the decision of their management Results

Among 60 respondents, the average amount of experience in implementing ERP systems was 14.1 years, with a median of 13.5 years and a mode of 10 years. The oldest respondent declared 50 years of experience, and the youngest 0.5 years. The standard deviation was rounded to 9.4 years. The number of years of experience among the respondents was distributed asymmetrically, skewed the right. Figure 3 shows the frequency of occurrence in the sample of respondents in the class ranges
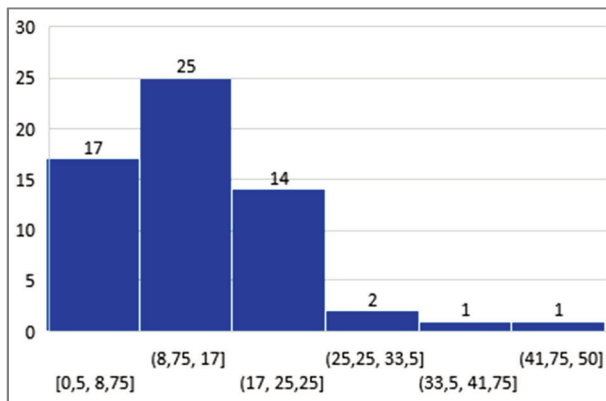

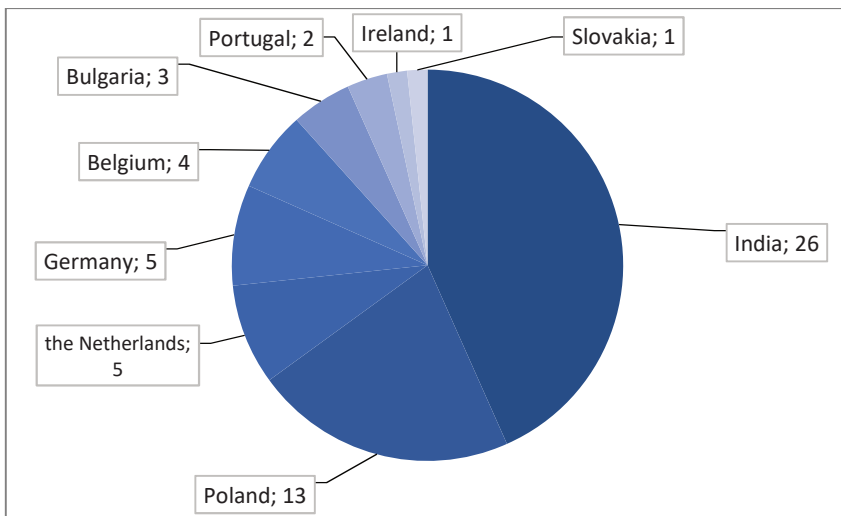Fig. 3. Number of years of respondents' experience – compartmental approach

Fig. 4. Respondents' country of origin

of experience, showing that 56 out of 60 respondents declared a number of years of experience ranging from 0.5 to 25.25 years.

The respondents came from different geographical regions. Figure 4 shows the number of respondents by country of origin. 26 respondents, constituting 43% of the sample, came from India, while 34 respondents, constituting 57%, came from the European Union.

The respondents' experience came mostly from the manufacturing sector (41) and the public sector and defense (22). A smaller proportion of the respondents had the opportunity to work on ERP system implementation in the healthcare and life science sector (13), telecommunications, media and entertainment (11), the resources and services sector (10) and financial services and insurance (8). Some of the respondents also indicated other sectors (11), such as: aviation, IT, brewing, construction, education, automotive, textile or energy. The number of respondents and the sector in which they had the most experience are shown in Figure 5.
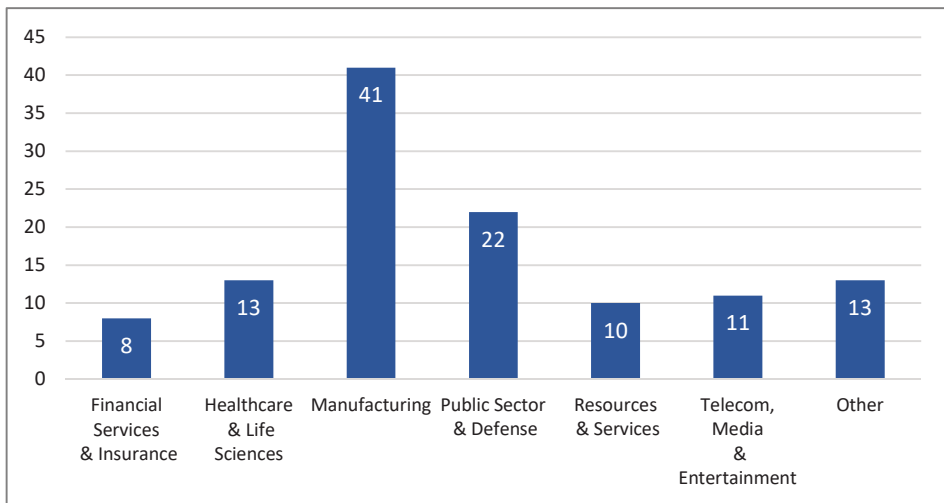

Fig. 5. Respondents' experience in individual market sectors

Financial services, Health Service, Production, Public and Defensive Sector, Resources and Services, Telecommunications, Media, Other

All the respondents declared experience in working on SAP system implementation. Individual respondents declared work on the implementation of Oracle and Microsoft Dynamics systems. One of the respondents declared experience in implementing QAD ERP and MFG/PRO ERP systems. Two declared experience in working with SAP products, such as HANA – a database enabling quick extraction, and Success Factors, a cloud-based personnel management solution, which, as of 1 March 2023, is not part of the SAP S/4HANA package. This division is shown in Figure 6.
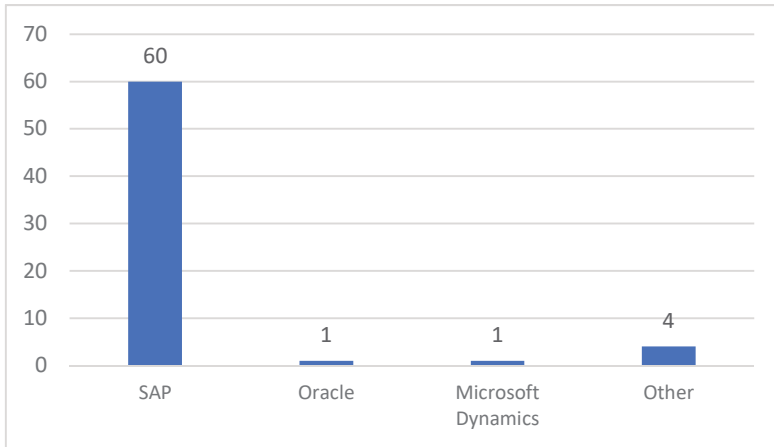
Fig. 6. Respondents' experience with ERP systems of various vendors

The largest number of respondents declared that they worked on the implementation of ERP systems as functional consultants (28). Slightly fewer worked as a manager or team lead (15). Fewer respondents declared experience in the role of a programmer (9) and a technical consultant (8). Experience per role is presented in Figure 7.
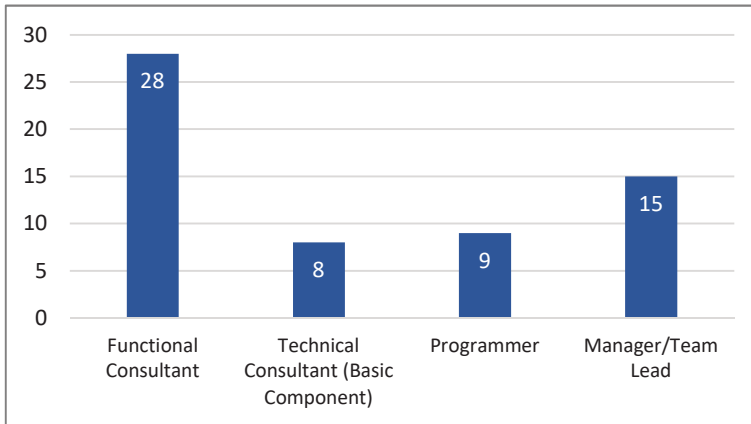

Fig. 7. Respondents' experience in particular implementation roles

As for determining the significance of individual critical success factors for ERP system implementation, the respondents confirmed the results indicated in the literature, the vast majority considering them to be very important or important.

Among the factors considered to be very important, in first place came effective communication (40), followed immediately by the selection of appropriate consultants or an implementation partner (36). Subsequently, factors such as building business process experts team (32), project management (31), senior management approach (30), user training (30), system integration (25), project team empowerment (23), organizational change management (21) and business process reengineering (19) appeared as very important. A significant minority of the respondents considered the importance of any of the factors to be neutral, and a marginal number considered any of them to be rather unimportant or unimportant. None of the respondents considered any of the factors to be completely unimportant. Detailed results are presented in Table 6.

Table 6. Significance of critical success factors for the ERP system implementation

	Extremely important	Important	Rather important	Neutral	Rather unimportant	Unimportant	Completely unimportant
Senior management approach	30	21	4	4	1	0	0
Organizational change management	21	25	8	5	1	0	0
User training	30	23	5	1	1	0	0
Effective communication	40	14	3	2	1	0	0
System integration	25	26	6	2	1	0	0
Reengineering of the business processes	19	27	8	2	1	1	0
Right implementation partner/ consultants	36	18	2	3	1	0	0
Project management	31	21	5	3	0	0	0
Building business process experts team	32	21	6	0	1	0	0
Project team empowerment	23	22	10	5	0	0	0

By ranking the critical success factors of ERP system implementation indicated in the literature according to significance, the majority of the respondents put senior management apprach (22) in first place. Effective communication came second (9), and organizational change management came third (10). In fourth position, with the dominant number of votes among the respondents, was senior management apprach (9), in fifth position was project management (12), organizational change management was in sixth place (12), and business process reengineering was ranked seventh (12). In eighth place, 10 respondents assigned both business process reengineering and user training and system integration. The ninth place was dominated by the building business process experts team (10). In last place, the vast majority of the respondents chose empowerment of the project team to make decisions (21). Detailed results are shown in Table 3.

Table 7. Ranking of the significance of the critical success factors for ERP implementation

	1st place	2nd place	3rd place	4th place	5th place	6th place	7th place	8th place	9th place	10th place
Reengineering of the business processes	3	2	6	1	5	11	12	10	4	6
Effective communication	8	11	6	5	5	4	9	5	5	2
Building business process experts team	4	9	8	6	5	6	5	2	10	5
Organizational change management	3	6	10	8	8	12	4	2	4	3
Project management	3	9	8	6	12	6	3	8	5	0
Project team empowerment	1	3	2	7	5	3	7	3	8	21
Right implementation partner/ consultants	12	6	6	8	5	3	4	8	5	3
Senior management approach	22	7	8	9	2	2	3	2	2	3
System integration with external applications	1	2	3	5	8	8	10	10	9	4
User training	3	5	3	5	5	5	3	10	8	13

In the questionnaire section on success factors not included in the previous questions, 25 respondents decided to add factors which they viewed as relevant. As many as five respondents indicated the importance of the attitude towards implementation not only of the management, but of all levels of the organization in which the system is implemented. Four respondents clarified the significance of thoroughly collecting the requirements before starting to reengineer business processes. Three indicated the significance of the effective management of the scope of a project in order to prevent its expansion. Two respondents drew attention to the importance of planning a sufficient budget and a realistic schedule, with a particular emphasis on data migration.

Other factors mentioned by the respondents included, among others:
− the possibility of working in hybrid mode with an indication of the inefficiency of work when performing implementation only in remote mode,
− obtaining efficient support from the software vendor,
− the possibility of direct cooperation between consultants and the people responsible for business processes on behalf of the organization adopting the ERP system.

6. CONCLUSIONS AND DISCUSSION

The results of the survey clearly showed that the critical success factors defined during the literature study were perceived by the vast majority of the respondents – experienced consultants specializing in ERP system implementation from many countries – as extremely important or important. The results in most cases were consistent with previous research conducted among respondents from organizations where an ERP system was implemented, but who were not professional implementation consultants (Annamalai, Ramayah, 2012; Chatzoglou et al., 2016; Garg, Garg, 2014; Hasan et al., 2019; Kini, Basaviah, 2013; Malik, Khan, 2021; Saini et al., 2013). However, some of the results contradicted them.

A study by Reitsma & Hilletofth (2018) showed that in the opinion of ERP system users, the factors relating to senior management apprach and organizational change management were not important. This revealed the different perspectives of users and implementation consultants.

A study by Annamalai & Ramayah (2012) indicated a weak correlation coefficient between user training and the success of system implementation. However, a study by Malik & Khan (2021) found no connection between this factor and the success of implementation. This factor, although placed last in the significance ranking by the implementation consultants, was considered extremely important or important by 53 out of 60.

Studies by Dezdar (2017) and Ram et al. (2013) showed no relationship between business process reengineering and implementation success. Meanwhile, a study by Dezdar & Sulaiman (2012) showed the lack of such a relationship in implementations in Iran and its presence in implementations in China. 46 of the surveyed implementation consultants considered it to be extremely important or important, and eight considered it to be rather important.

A study by Chatzoglou et al. (2016) rejected the hypothesis that there is a relationship between project management and the success of system implementation. This factor, although ranked fifth by the consultants in terms of significance, was considered to be extremely important or important by 51 out of 60.

These differences show a divergence of opinion between the employees of an organization where an ERP system has been implemented and professional implementation consultants. These became apparent in the case of the critical success factors of senior management approach, organizational change management, user training, business process reengineering and project management.

While ranking the factors, the vast majority of the respondents – practitioners – considered senior management approach to be the most important of them all, similar to a study conducted by Mahmood et al. (2020). Similarly, the empowerment of the project team to make autonomous decisions was also considered to be the least important among the above-mentioned factors.

This study is valuable for business practice, indicating to both managers and implementation consultants what aspects should be given special attention at each stage of the ERP system implementation project. This is in line with Warren's claim (2016, p. 20) that the use of these critical success factors is of value to practitioners.

It is also an initiator for further qualitative research in this area, deepening the understanding of the critical success factors in terms of their application in projects both from the point of view of an organization adopting an ERP system and consulting companies supporting these projects.

The present study was not free of limitations. Although the respondents came from different countries and worked for many different customers, most of them were employees of the same capital group at the time of the survey. Moreover, the conclusions of the study cannot be generalized on the basis of probability because the research sample was not selected randomly (Chybalski, 2017, p. 9).

Confirmation

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KRYTYCZNE CZYNNIKI SUKCESU WDROŻEŃ ERP, PERSP – PERSPEKTYWA

Systemy ERP (*Enterprise Resource Planning*) w wielu przedsiębiorstwach funkcjonu-jących zarówno na rynku rodzimym, jak i globalnym stanowią fundament zarządzania ich zasobami. Wdrożenia tych systemów pochłaniają jednak znaczne środki finansowe i często kończą się niepowodzeniem.

Celem artykułu jest przedstawienie empirycznej oceny zdefiniowanych w literaturze krytycznych czynników sukcesu wdrożeń systemów ERP, dokonanej przez doświadczonych, pochodzących z wielu krajów konsultantów wdrożeniowych. Przedstawiony zostanie także ranking istotności tych czynników w opinii praktyków.

W pierwszej kolejności przeprowadzono badania literaturowe w obszarze krytycznych czynników sukcesu wdrażania systemów ERP. Następnie przeprowadzono badanie ankietowe z użyciem ankiety internetowej wśród respondentów pracujących dla firmy konsultingowej IT, świadczącej usługi wdrażania systemów ERP, w jej oddziałach w dziewięciu krajach.

Badanie empirycznie potwierdziło istotność zdefiniowanych w literaturze krytycznych czynników sukcesu wdrażania systemów ERP. Wykazało ono również różnice w postrzeganiu ich istotności przez pracowników organizacji, w których system był wdrażany, a doświadczonych konsultantów wdrożeniowych.

Wskazano, że zdefiniowane w literaturze krytyczne czynniki sukcesu w opinii respondentów stanowią wartość z punktu widzenia praktyki gospodarczej. Potwierdzono też, że czynniki te powinny być brane pod uwagę przy pracy nad wdrożeniem systemu ERP. Wykazano też, że w niektórych przypadkach opinia konsultantów różni się od opinii pracowników organizacji, w których wdrożono system ERP.

Słowa kluczowe: krytyczne czynniki sukcesu, Enterprise Resource Planning, wdrożenie systemu ERP