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ASSESSING THE FINANCIAL LANDSCAPE: ESTIMATING ERP IMPLEMENTATION COSTS IN POLAND

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Purpose: The article analyzes estimated costs associated with implementing onsite ERP systems in Polish companies, particularly medium-sized enterprises.
Methodology: The study is based on a survey of 56 respondents directly involved in ERP implementations in medium and large Polish companies. The research focuses exclusively on on-premise (onsite) implementations, excluding cloud solutions due to prevalent cybersecurity concerns among respondents.
Findings: The average cost per user for ERP implementation (including licensing, implementation, and five-year maintenance) is estimated at PLN 50,000-60,000, with possible outliers up to PLN 70,000-80,000 depending on project scope and customization. Data migration is a major cost driver, accounting for 20-40% (sometimes up to half) of the total budget. Pre-implementation analysis was conducted in over 92% of cases, with costs ranging from PLN 20,000 to PLN 1 million. Decision-making is driven more by system functionality and the experience of the implementation partner than by price alone.
Research limitations/implications: The sample includes only medium and large companies with successful implementations, potentially limiting generalizability. Companies that abandoned ERP projects or adopted cloud solutions were not represented. Future research should include these groups for a more comprehensive view.
Practical implications: The findings offer practical guidance for companies planning ERP projects, highlighting the need to prepare for significant data migration and pre-implementation analysis costs. The results can help businesses negotiate more effectively with vendors and implementation partners, and set more realistic budgets and timelines.
Social implications: Improved cost transparency and planning may enhance the competitiveness and efficiency of Polish enterprises, reduce the risk of failed implementations, and positively influence the broader economy and labor market.
Originality/value: This paper provides rare empirical data on the real costs and cost structure of ERP implementations in Poland, filling a significant gap in the literature. It is valuable for managers, consultants, and researchers in the fields of IT project management and enterprise systems.
Keywords: ERP implementation costs, data migration, pre-implementation analysis, Poland, enterprise IT.
Category of the paper: Research paper.

1. Introduction

Implementing an Enterprise Resource Planning (ERP) system entails substantial financial outlay for organizations, prompting entrepreneurs to seek a comprehensive understanding of the anticipated costs. Regrettably, the plethora of online calculators often fails to fulfill this need. More often than not, these tools serve merely as conduits for system providers to gather client data for subsequent outreach, offering scant insight into projected expenses as initially promised. Alternatively, some calculators necessitate inputting the expenses associated with discrete stages of ERP implementation, subsequently aggregating these figures to furnish a cumulative cost estimate.

For the above reasons, the aim of the following research was to collect information on the costs of implementing an ERP system - the actual costs that the company should expect. We assumed that a company would implement all of the core modules of the ERP system (financial, accounting, reporting, inventory management, invoices, production, documents, orders, fixed assets, analysis, cost planning and control of all the main modules of the ERP system, together with a document circulation system, a full financial and accounting system, human resources and payroll, warehouse management, invoice and sales processing, business analytics, etc. In our opinion, most larger enterprises implement most of the offered ERP functionalities.

When consulting practitioners regarding the cost of a comprehensive ERP implementation, responses typically span a wide spectrum, ranging from several tens of thousands of dollars to several million dollars. However, with regards to Polish companies, excluding large enterprises, the typical range for implementation costs rarely exceeded PLN 5 million. While exceptions do exist, a thorough analysis of respondent interviews and publicly announced tenders for ERP systems indicates that this budgetary threshold generally proved adequate. Notably, f or medium-sized enterprises, the feasibility of ERP implementation within a total budget of PLN 1 million was frequently observed, contingent upon factors such as the volume of monthly invoices and other documents slated for processing within the system.

To gain a deeper understanding of the costs associated with implementing an ERP system, a research survey was crafted specifically focusing on onsite implementations rather than cloud solutions. This distinction was made due to prevalent concerns among respondents regarding the perceived cybersecurity vulnerabilities associated with cloud-based solutions. While it's worth noting that smaller companies favoring cloud solutions have reported positive experiences, the research concentrated on full implementations utilizing proprietary infrastructure, as this approach resonated more strongly with larger entities.

2. Review of previous studies

The analysis of literature and online sources pertaining to ERP implementation endeavors or associated costs reveals a predominant focus on license and software expenses. Additionally, numerous publications offer insights into the proposed percentage breakdown of individual costs within the overall implementation budget. Moreover, there is a wealth of information detailing the percentage of implementations deemed unsuccessful or the extent to which ERP implementations, on average, surpass the initially projected budget.

The literature presents a diverse array of models for estimating the costs associated with IT projects, each with its own set of requirements and methodologies. Notably, Kemerer's publication (Kemerer, 1987) enumerates several such models, including SDC, Wolverton, SLIM, Doty, PRICE, IBM-FSD, Boeing, and COCOMO. For instance, SLIM (Putnam, 1978) necessitates an estimate of the number of lines of code, while COCOMO (Boehm, 1981) calculates the required man-months (where one month equals 152 man-hours) based on the product of a constant (C) and a variable denoting the thousands of "delivered source instructions" raised to a power (k). However, further refinement of these models is often required to accurately ascertain the constants C and k.

Function points, as developed by Allan Albrecht from IBM (Albrecht, Gaffney, 1983), offer a more generalized approach compared to DSI (Delivered Source Instructions) and are contingent upon factors such as the number of input transaction types and unique reports. This method entails counting user functions and adjusting for processing complexity, necessitating thorough planning of the implementation process.

Similarly, other methods cited by Kemerer, such as the Desharnais method (Desharnais, 1988), impose prerequisites including delineating code-writing stages, assessing complexity levels, and estimating man-hours. In essence, these methodologies underscore the importance of comprehensive pre-implementation analysis to facilitate accurate cost estimation.

Some models, like Chou's model (Chou et al., 2012), offer a broader perspective on cost estimation but lack explicit parameterization. Accessing and utilizing such models typically necessitates direct communication with the authors to obtain the requisite parameters. For instance, Chou's model mandates the determination of various factors, including whether financial and accounting modules, reporting systems, database modules, query modules, or internal document circulation modules have been implemented, alongside considerations like the number of implemented programs, Zoom stations, interface columns, program functionalities, deliveries to foreign clients or suppliers, inter-unit transactions within the capital group, cancellations to external systems, annual invoice processing volumes, inventory counting operations, customer complaint processing frequencies, annual signature and authorization counts, and the number of entities within the capital group.

Similarly, Koch and Mitlohner (Koch, Mitlöhner, 2010) or Myrtveit and Stensrud (Myrtveit, Stensrud, 1999) propose analogous approaches, albeit with fewer factors to consider. These models underscore the importance of meticulously delineating various operational aspects to facilitate accurate cost estimation, albeit with the necessity of engaging directly with the authors to operationalize the model effectively. A concept that allows for a fairly simple implementation estimate effort (i.e. man-hours needed to implement the system) for implementing the SAP system is proposed by Francalanci (Francalanci, 2001) according to which the cost of implementing the SAP system can be estimated using regression based on the size of packages, turnover or number of employees in the company, and the total number of users. Taking into account that the cost of one hour of consultant's work can be quite easily determined on the market, this model ultimately allows us to estimate the costs of implementing the SAP system.

Haddara (Haddara, 2011) presents a distinctive approach by delineating the average budget structure of an ERP system. With knowledge of several elements within this framework, it becomes feasible to extrapolate the total cost. According to Haddara, the breakdown of costs typically comprises 13.6% for ERP licensing (inclusive of hardware), 8.6% for customization, 2.5% for data migration, 11.9% for annual maintenance, 7.9% for upgrades, 19.8% for hardware, 16.8% for software, and 12.9% for human resources. Moreover, ancillary costs such as planning and temporary hosting must also be factored in.

Shepperd, Schofield, and Kitchenham (Shepperd, Schofield, 1997) advocate for employing an analogy-based approach using the ANGEL program. This method estimates implementation costs by drawing parallels with selected features of the implemented software.

In summary, the literature offers a plethora of methodologies for estimating the costs of on-site ERP system implementation. However, most necessitate some degree of familiarity with the system being implemented and at least partial knowledge of the associated costs (Lang, Vukovac, 2009).

A significant group of publications address the issue of unexpected, additional expenses that SMEs did not anticipate and try to create a list of unexpected expenses that should be taken into account when implementing ERP (e.g. Haddara, Elragal, 2013; Klychova et al., 2021) and risk factors during implementation (e.g. Svensson, Thoss, 2021; Mirhosseini et al., 2022, Biolcheva, Molhova, 2022; Zendehdel et al., 2020).

All of these publications are of great importance to companies planning to implement an ERP system, but they are very detailed. What's difficult to find in the literature is an answer to a fundamental question for management of small or medium-sized businesses: how much an ERP system implementation will cost. Implementation companies can answer this question, but they typically need to conduct a preliminary audit to provide a quote. An audit, however, can be quite expensive. Therefore, the aim of this publication was to fill this research gap and present estimated costs and cost components related to ERP system implementation in an SME.

3. Insights from empirical research

The research survey, summarized below, was administered to 56 respondents directly involved in the ERP system implementation process. Participants were selected based on their direct involvement to ensure their ability to provide informed answers. In instances of uncertainty, respondents were encouraged to offer estimates or personal opinions on the queried topics. The survey questions were derived from prior interviews with respondents, focusing primarily on the practical aspects of ERP system implementation, including associated costs and potential challenges.

Notably, the survey exclusively targeted respondents whose system implementations were deemed successful. Approximately 25% of the invited respondents declined to participate, citing their respective companies' withdrawal from ERP system implementation endeavors primarily due to exorbitant costs and subsequent maintenance expenses.

Figure 1 illustrates the size distribution of companies represented by the respondents. As can be seen from the figure, the ERP system was implemented only by medium-sized and large companies, with the majority of large companies in the surveyed sample. This was not the intended result of the research, but respondents who agreed to complete the survey and answer the questions came from such entities. Collecting the surveys was challenging because it turned out that relatively few people working even in a large corporation had the appropriate knowledge (and remembered the information) to answer the questions.

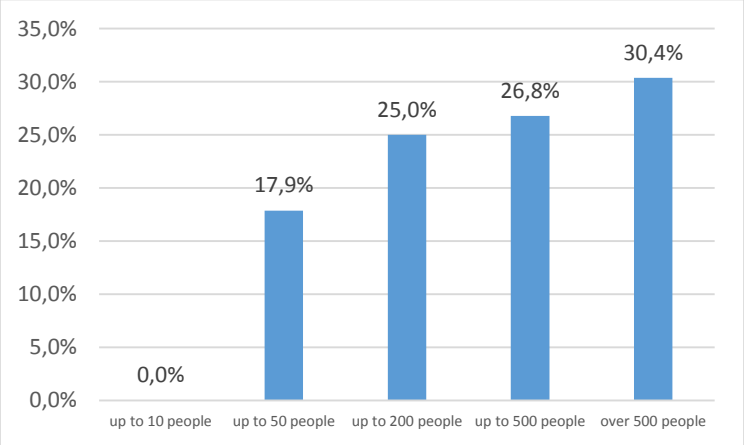

Figure 1. Employment range in a respondent's company.

Source: own research.

Figure 2 depicts the distribution of pre-implementation analysis costs. Notably, pre-implementation analysis was conducted in 92.8% of surveyed entities. Remarkably, respondents indicated that despite subsequent decisions not to proceed with system implementation, entities were still obligated to bear the costs of this analysis. The expense associated with pre-implementation analysis varied significantly, ranging from PLN 20,000 to PLN 1 million for the simplest and most straightforward implementations, to the largest,

respectively. The primary reason cited for discontinuing ERP system implementation subsequent to the initial analysis was the exorbitant implementation and maintenance costs, which the entity commissioning the analysis had not adequately prepared for.

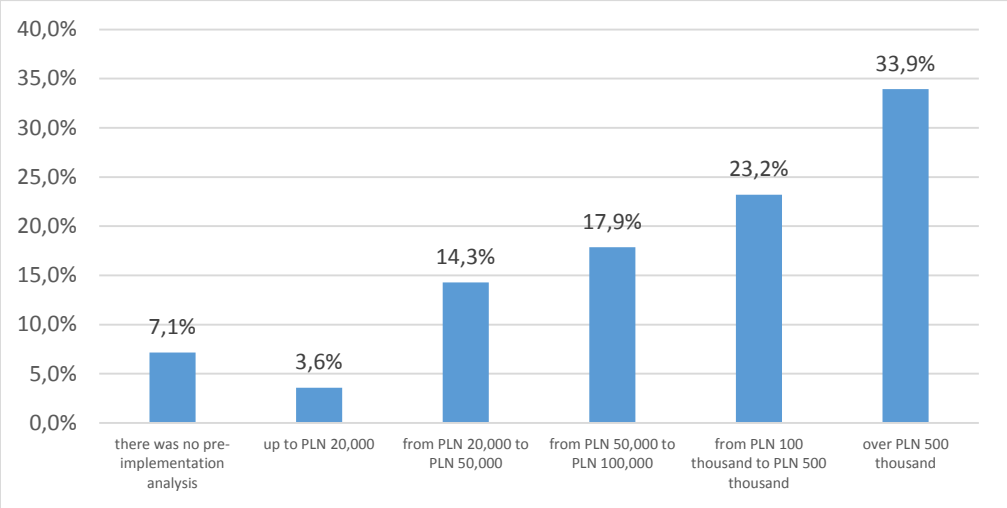

Figure 2. What were the pre-implementation analysis costs of an ERP system.

Source: own research.

Figure 3 shows the frequency of data migration when implementing an ERP system. As the figure shows, in 92.9% of cases there was a need for expensive data migration. Information obtained from respondents showed that data migration sometimes cost half of the entire budget allocated to the ERP system. Typically, the amount ranged between 20% and 40% of the entire budget (including hardware). According to respondents, it was a very difficult process and took much longer than initially planned. More than half of the delays related to the implementation of the ERP system resulted from data migration problems.

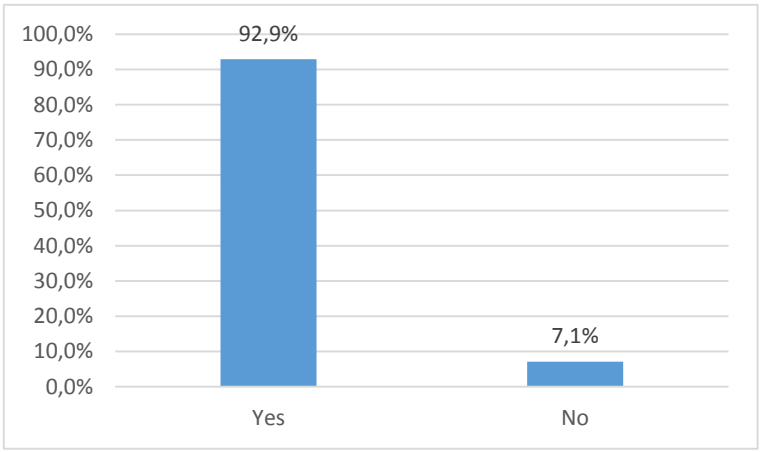

Figure 3. Data migration as a part of the ERP implementation.

Source: own research.

Figure 4 illustrates the duration of ERP system implementation as reported by respondents. The data reveals that in the majority of cases (83.9%), implementation duration spanned approximately one year. A smaller proportion of implementations (8.9%) were completed in a period shorter than a year, while a minority (7.1%) extended beyond the one-year mark.

After implementation, the implementing company serviced the system and solved any problems that occurred on an ongoing basis, as well as performed training and updating the system. However, it is worth mentioning that this was the originally planned implementation time. In the case of the survey, as many as 65% of respondents believed that the implementation took longer than initially planned. 49% of respondents also stated that the originally planned budget was exceeded.

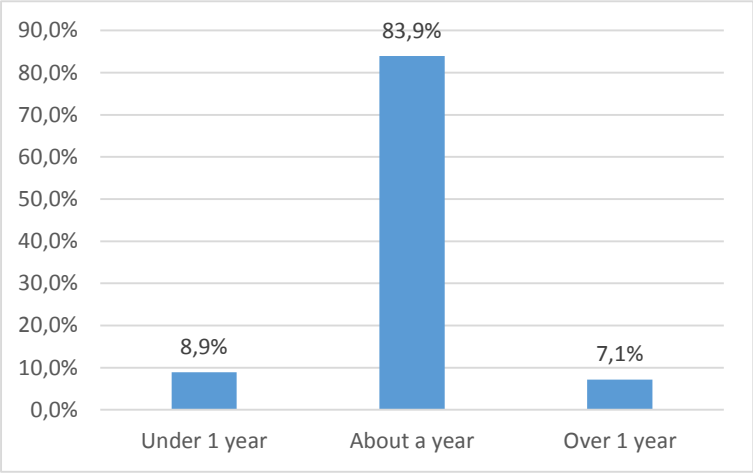

Figure 4. Duration of the ERP implementation period.

Source: own research.

Figure 5 presents the initial budget allocated by companies for ERP system implementation. Notably, a mere 1.8% of enterprises earmarked a budget lower than PLN 250,000. In 5.4% of cases, budgets fell within the range of PLN 250,000 to PLN 500,000, while the majority (53.6%) allocated budgets ranging from PLN 0.5 million to PLN 1 million. 39.3% of companies initially budgeted over PLN 1 million for implementation. However, as previously indicated, the actual expenditures exceeded the budget in 49% of cases.

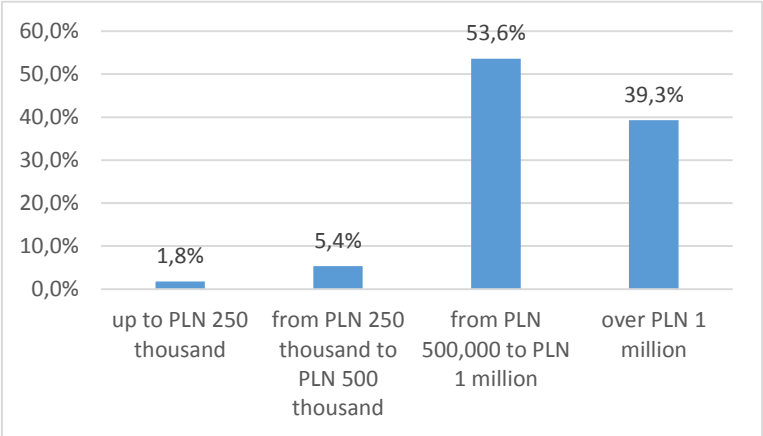

Figure 5. Projected budget for ERP implementation.

Source: own research.

Figure 6 shows the respondents' opinion regarding the cost of one man-day of work of a team member implementing the ERP system. According to 62.5% of respondents, PLN 1200 per day of consultant work is a low price, and according to 19.6%, it is a normal market price. No respondent considered this cost to be high. According to respondents, one man-day often cost up to EUR 450 in the case of complex implementations, especially for fixing a failed previous implementation.

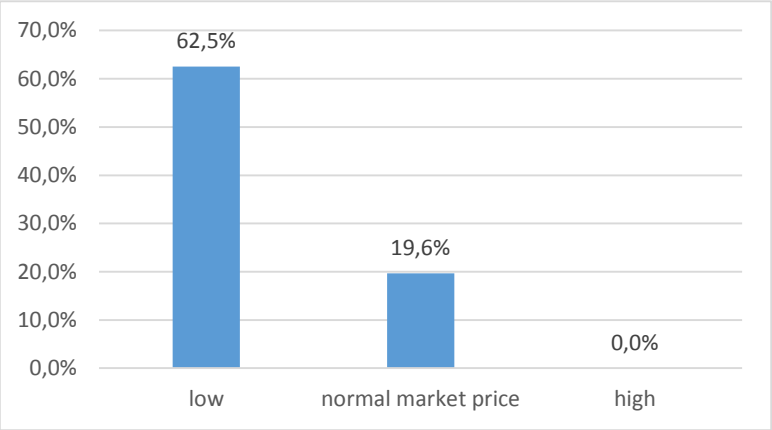

Figure 6. Is PLN 1200 per day for ERP implementation expensive.

Source: own research.

Figure 7 shows the cost of a person-day determined by respondents when implementing the ERP system. Prices depended partly on the type of system being implemented, but also on the complexity of the project. Implementations that improved a previous unsuccessful implementation or in situations where there was a need to consolidate with other systems were much more expensive. On the other hand, several respondents said that it was easier and cheaper to buy an ERP system and add it to existing systems than to implement all the systems together again.

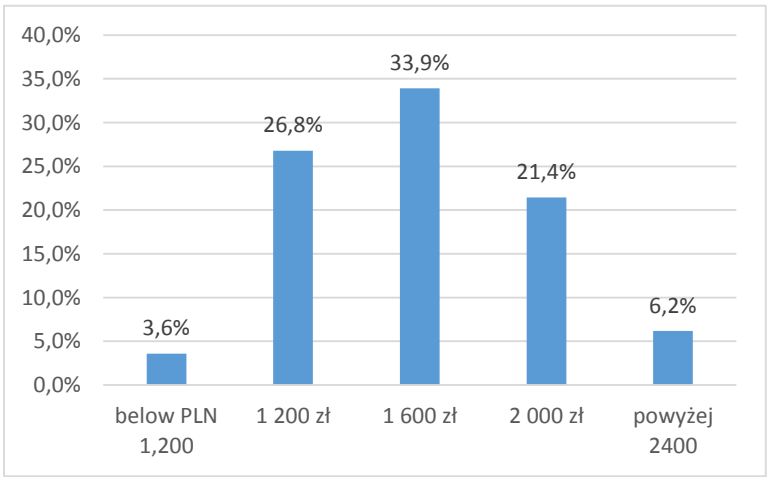

Figure 7. Expected cost per day for ERP implementation.

Source: own research.

Figure 8 shows the estimated costs of implementing the ERP system per user. Most often, respondents declared the amount between PLN 50-60 thousand (42.9%), but a large group believed that it was significantly lower (30.4%) - in general, Polish ERP systems were considered cheaper. In turn, 26.8% of respondents believed that these costs were higher.

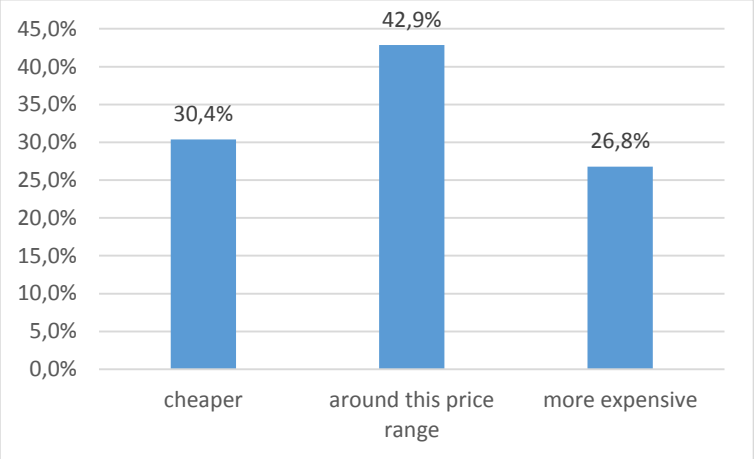

Figure 8. Total implementation costs in the range of PLN 50K-60K per user?

Source: own research.

Figure 9 shows the answers to the question whether, according to respondents, there is an inverse relationship between license costs and implementation costs. According to 73.2% of respondents, the more expensive the license, the lower the implementation costs and the cheaper the license, the more expensive the implementation. In turn, 26.8% of respondents believed that there is no such rule and that there are systems that have cheap licenses and are easy to implement. A frequently cited example of an affordable ERP system was Comarch Optima, the costs of which, according to the interviewees, did not exceed PLN 25,000 - both license and implementation per one workstation.

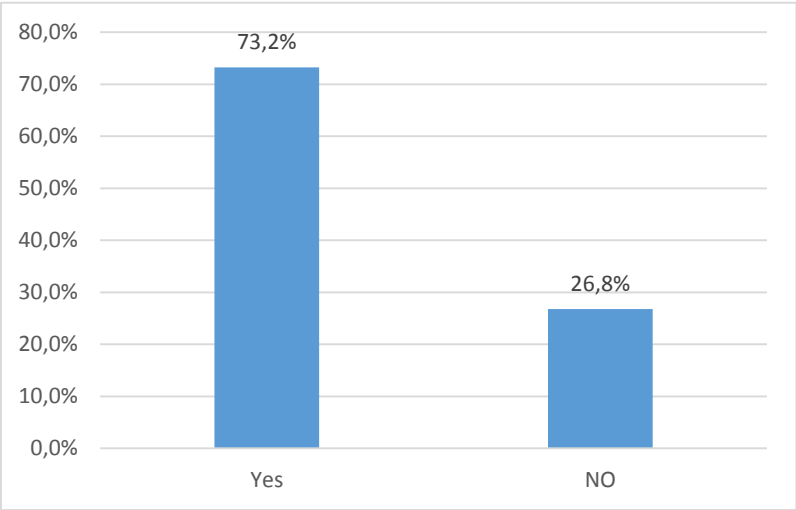

Figure 9. Does cheaper license produce higher implementation costs?

Source: own research.

Figure 10 illustrates the criteria employed by enterprises during the selection of an ERP system. The survey findings reveal a balanced distribution of votes between two primary considerations: prioritizing a favorable combination of price, quality, and system capabilities, and emphasizing the quality of the system and its global implementation track record. Many respondents articulated a preference for investing in a proven system with extensive global implementations and engaging a highly experienced and reputable implementation company, even if it entails higher costs.

Respondents offered varied statistics regarding ERP implementation success rates, with some suggesting that only one in five implementations succeeds, while others cited figures ranging from 30% to 70% failure rates. Such discrepancies underscore the challenge in accurately gauging success or failure in ERP system implementations across different studies. Notably, dissatisfaction and failure to improve work quality post-implementation are often construed as failures, notwithstanding the system's technical implementation.

From the survey results, it's evident that price alone does not dictate decision-making; rather, significant emphasis is placed on system functionality and ensuring effective implementation.

Figure 10. What was more important – price of the ERP implementation or its quality.
Source: own research.

Figure 11 shows what the respondents believed was the relationship between the license cost and implementation costs. The answer that received the most votes was that it was 1:4 (28.6%), many respondents also chose the ratio 1:3 (26.8%), another group believed that the ratio was 1:2 (21.4%) and 17.8% of respondents said it was a 1:1 relationship, finally only 5.4% believed that the relationship was 1:5.

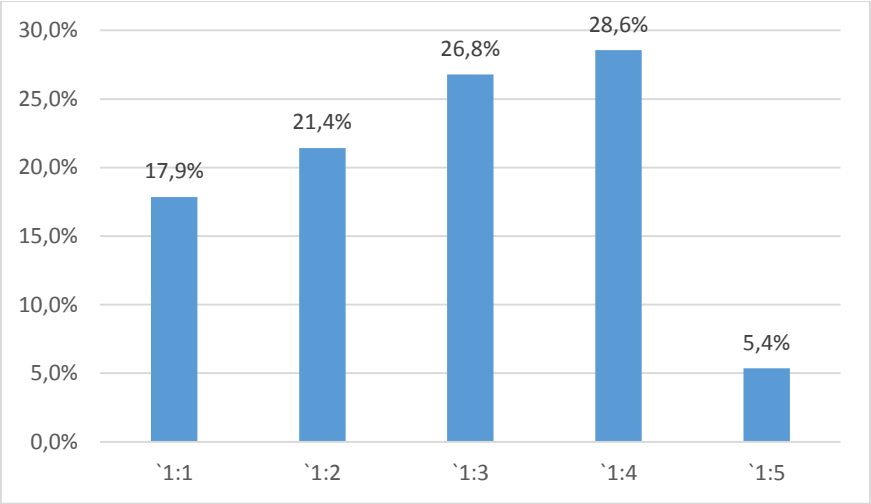

Figure 11. Relation of license costs to implementation costs.

Source: own research.

Figure 12 shows the share of hardware costs in the total ERP implementation budget. According to the majority of respondents, these costs were between 20 and 30% of the total budget (46.4%), although many answers also indicated a range between 10% and 20% (33.9%), the next group was a share of less than 10 % (14.3%) and the share between 30 and 40% (5.4% of respondents).

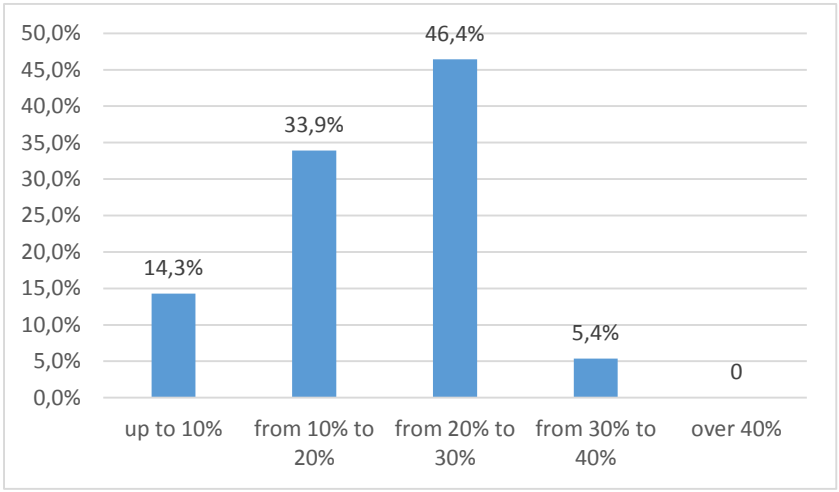

Figure 12. Hardware costs in total ERP budget.

Source: own research.

4. Summary and final conclusions

The primary objective of this research was to scrutinize the frequently cited assertion that ERP system implementation in medium-sized companies averages at USD 8,500 per position, inclusive of licensing, implementation costs, and five-year maintenance. However, this figure

is narrowly construed, omitting expenses such as data transfer, preliminary analysis, and hardware costs. According to our research findings, a more realistic estimate falls between PLN 50,000 and PLN 60,000 per position, with an acceptable margin of error ranging up to PLN 70,000-80,000.

It's worth noting that opting for a budget-friendly system may result in total costs falling below PLN 50,000 per position; however, not all systems can be implemented within this price range. Our survey underscores this point, demonstrating that average costs are highly generalized due to varying implementation requirements, system specifications, and customization scopes. Nonetheless, we contend that the presented figures reflect the average cost per workstation (concurrent user) based on our research findings.

Differences in the statistics provided, in addition to differences between the cost of labor in different countries, differences between systems and the degree of customization, may also result from different definitions of what constitutes the costs of ERP implementation, what scope of implementation we are talking about (how many and what modules a given company has implemented) and the system, because the systems differ significantly in price.

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ChatGPT 4.0 and Google Translate were utilized to enhance the quality of specific sentences in the article (find synonyms or analogous sentences).

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