

# Opportunities and Challenges of Enterprise Resource Planning (ERP) in Construction Companies in Indonesia: A Systematic Literature Review

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## ABSTRACT

*This study delineates a systematic review of literature focusing on the opportunities and challenges associated with implementing Enterprise Resource Planning (ERP) in construction companies in Indonesia. Through the Systematic Literature Review (SLR) approach, this article evaluates and analyzes several related studies published within the last five years (2019-2023). This method allows the identification and synthesis of data from various sources such as academic journals, related publications, and databases, which are then analyzed to identify trends, opportunities, and challenges related to ERP implementation within the context of the construction industry in Indonesia. The findings from this literature review reveal a variety of benefits obtained by construction companies after adopting ERP systems, including improved operational efficiency, better resource management, and enhanced strategic decision-making. However, challenges also emerge, including issues related to adapting to change, integration with existing systems, as well as significant implementation costs and time. This analysis provides deep insights into the ERP implementation in the construction industry in Indonesia, providing a foundation for better understanding and further development in facing challenges and leveraging available opportunities.*

**Keywords:** ERP, Construction, Efficiency, Opportunities and challenges

## ABSTRAK

*Penelitian ini menguraikan sistematis literatur yang berfokus pada peluang dan tantangan dalam penerapan Enterprise Resource Planning (ERP) di perusahaan konstruksi di Indonesia. Melalui pendekatan Systematic Literature Review (SLR), artikel ini mengevaluasi dan menganalisis sejumlah studi terkait yang dipublikasikan dalam rentang waktu lima tahun terakhir (2019-2023). Metode ini memungkinkan identifikasi dan sintesis data dari berbagai sumber seperti jurnal ilmiah, publikasi terkait, dan database akademis, yang kemudian dianalisis untuk mengidentifikasi tren, peluang, serta tantangan yang berkaitan dengan implementasi ERP dalam konteks industri konstruksi di Indonesia. Temuan dari tinjauan literatur ini mengungkap beragam manfaat yang diperoleh oleh perusahaan konstruksi setelah menerapkan sistem ERP, seperti*

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*peningkatan efisiensi operasional, pengelolaan sumber daya yang lebih baik, dan peningkatan dalam pengambilan keputusan strategis. Namun, tantangan juga muncul, termasuk masalah adaptasi terhadap perubahan, integrasi dengan sistem yang ada, serta biaya dan waktu implementasi yang signifikan. Analisis ini memberikan wawasan yang mendalam tentang implementasi ERP dalam industri konstruksi di Indonesia, menyediakan landasan untuk pemahaman yang lebih baik dan pengembangan lebih lanjut dalam menghadapi tantangan dan memanfaatkan peluang yang ada.*

**Kata kunci:** ERP, Konstruksi, Efisiensi, Peluang dan tantangan

## INTRODUCTION

In the era of globalization and intense business competition, modern companies are faced with demands to become more efficient, responsive, and adaptive to market changes. One increasingly adopted solution by companies to optimize their business operations is the implementation of Enterprise Resource Planning (ERP) systems. Over the past 10 years, ERP systems have gained popularity among large companies worldwide, including in Indonesia. Besides large corporations, small and medium-sized enterprises have also started adopting ERP systems. ERP systems reflect an innovative business strategy as they can enhance a company's efficiency and effectiveness. The efficiency and effectiveness derived from this system are ensured by providing easy and fast access to operational data necessary for decision-making and company management (Matende & Ogao, 2013; Winovsky et al., 2023).

In the construction industry in Indonesia, the implementation of ERP is becoming increasingly important in efficiently managing construction service projects. The emphasis on operational efficiency, better resource management, and precise coordination at each project stage are the primary focuses in achieving construction project success (Indrayani, 2022; Alienta et al., 2023). The construction industry in Indonesia has experienced rapid growth in recent years but still faces various challenges such as complex project management, integration of diverse resources, and timely scheduling. In this context, this article aims to explore the implementation of ERP in construction service projects in Indonesia. The main focus is on implementing ERP technology to enhance efficiency, optimize resource allocation, and improve coordination among various project aspects. This study aims to cover an analysis of challenges encountered in implementing ERP in construction projects, such as adapting to a changing work environment, integration with existing systems, and employee readiness for technological changes. Furthermore, this article will explore the advantages gained through ERP implementation, such as increased operational efficiency, cost reduction, and improved project management quality. Therefore, this article aims to provide insights into how ERP implementation can be a key factor in overcoming challenges and leveraging opportunities in construction projects in Indonesia.

## LITERATURE REVIEW

### Opportunities and Challenges of Digitalization Era

Digital transformation is a change that involves the business relationships among organizations, consumers, suppliers, and their employees. Furthermore, digital transformation is a change that involves the business relationships among organizations, consumers, suppliers, and their employees (Avita et al., 2023). The digital era significantly impacts the workplace, notably enhancing the standards of human resource skills. Traditional skills such as communication, collaboration, and decision-making remain essential, but are now supported by technological skills like data analysis, app development, and digital marketing (Hotimah et al., 2023). Rapid and unprecedented changes cannot be anticipated by previous strategies (Avita et al., 2023). Companies capable of wisely adopting and managing this technology will gain a significant competitive advantage (Pratama et al., 2023).

The main impact of digital transformation is the necessity to develop digital skills among the workforce. Skills such as technological understanding, data analysis, and proficiency in using digital tools have become crucial in today's job market. Organizations must utilize focused training and development to ensure employees possess skills aligned with the demands of the digital era (Wahyudi et al., 2023). Organizations should adopt a culture supporting innovation, collaboration, and continuous learning (Wahyudi et al., 2023). Managing digital transformation and effective leadership in the digital era are crucial steps for business success and public service, enabling organizations to compete efficiently and adapt to ever-evolving changes (Wulandari et al., 2023). The use of this technology also presents several challenges. Company cultural changes and the need for relevant skill development are crucial aspects in successfully integrating AI, Big Data, and Automation (Pratama et al., 2023). The challenges of the digital era require not only technical knowledge but also human factors and soft skills such as work ethic, social awareness, and flexibility (Hotimah et al., 2023).

### **Enterprise Resource Planning**

Technological advancements like the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI) have created new challenges (Wulandari et al., 2023). According to Matende & Ogao (2013), ERP is a system created to organize strategies, company operations, management analysis, and decision-making functions within a company. ERP systems are now widely adopted in many companies in Indonesia, including in the construction service business, where many Indonesian companies have implemented ERP.

According to O'Brien & Marakas (1997), ERP systems provide relevant business value, namely:

1. **Quality and Efficiency.** ERP involves processes significantly advancing internal business operations for a company implementing it. For instance, in customer service, manufacturing, and distribution in terms of quality and efficiency.
2. **Decision Making.** ERP systems can swiftly report business performance information to managers, enabling them to enhance managerial skills to make informed and optimal business decisions.
3. **Cost Reduction.** Several companies have reported considerable cost reductions in transaction processes, software, and hardware costs.
4. **Business Coordination.** It provides flexibility in organizational chart planning in a company, which is the management's responsibility, and workplace locations to facilitate the pursuit of new business opportunities.

### **Project Management**

Project management is a combination of resources such as humans, materials, equipment, and gathered capital or costs within an organizational framework to achieve goals. Meanwhile, construction is a series of interconnected activities to achieve objectives. Thus, construction projects are a series of activities to achieve construction/building outcomes within predetermined time, quality, and cost limits (Widiasanti & Lenggogeni, 2013). Involvement in construction projects is always associated with resources (man, materials, machine, method), money, information, and time. In construction projects, attention must be given to three crucial elements: time, quality, and cost (Dipohusodo, 1996)

Quality in a construction project is crucial and should align with planning. However, during project execution, cost overruns, delays, and compromised quality often occur (Husen, 2011). Expected efficiency and effectiveness are sometimes not maximally achieved, leading to a decrease in the project's value in the construction market. The larger the construction project's value, the greater the emerging issues, thus requiring planning, monitoring, and time control (Kiswati & Chasanah, 2019).

## METHODS

This research employs the Systematic Literature Review (SLR) method to investigate the opportunities and challenges associated with the implementation of Enterprise Resource Planning (ERP) in construction service companies in Indonesia. The research stages begin with identifying relevant information sources from academic databases, scholarly journals, and related publications concerning ERP implementation in the construction sector. Data collection is conducted using predefined keywords such as "Opportunities Challenges ERP Construction Projects Indonesia."

The subsequent step involves a selection process based on pre-established inclusion criteria. Inclusion criteria encompass studies focusing on ERP within the context of construction service companies in Indonesia and those clearly outlining associated opportunities and challenges. Exclusion criteria involve articles that do not align with the topic's scope, are not in a relevant language, or do not meet the required methodological quality.

The selected data will then be gathered, systematically analyzed, and synthesized. The data analysis process involves extracting relevant information regarding the opportunities that can be leveraged and the challenges faced by construction service companies in implementing ERP in Indonesia. The extracted information will be categorized, analyzed, and linked to identify significant patterns, similarities, and differences. Throughout the SLR process, verification and data validation steps will be applied to ensure the reliability of the obtained information. Additionally, an assessment of the research methodology quality, serving as the data source, will be conducted to ensure the accuracy and validity of the information presented in this literature review. The objective of this research is to present a comprehensive analysis of the opportunities and challenges encountered by construction service companies in adopting and implementing ERP in Indonesia.

The research begins by formulating research questions relevant to the research topic. The following are the research questions from this article:

**Table 1.** Research Question

No	Research Question
1	How much literature is related to ERP in Construction Companies in Indonesia in the last 5 years (2019-2023)?
2	What changes occur after implementing ERP in Construction Companies in Indonesia?
3	What are the opportunities and challenges obtained from the implementation of ERP in Construction Companies in Indonesia?

The literature sought as data for this research was obtained through a search using the Google Scholar database conducted using the Publish or Perish application, utilizing the keywords 'Opportunities Challenges ERP Construction Indonesia.' The search was filtered within a 5-year range from 2019 to 2023.

There were several inclusion criteria in this study. These criteria helped in sorting articles that were relevant or irrelevant to the research. The inclusion criteria determined by the author are as follows:

- a. The literature searched is available on Google Scholar.
- b. Literature research methods involve qualitative or mixed-method approaches.
- c. Literature published within the last 5 years (2019-2023).
- d. The research subject is Construction Service Companies.

The research protocol utilized PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), employing the Confidence web application with the following stages:

- a. Identification. In this stage, a search was conducted using the Publish or Perish application within the Google Scholar database, limiting publications from 2019 to 2023 using the keyword 'Opportunities Challenges ERP Construction Projects Indonesia,' resulting in 227 pieces of literature.

b. Screening. From the 227 literature pieces, duplicate screening identified 0 duplicates, proceeding to review titles and abstracts, identifying 176 irrelevant literature pieces. Following this, a full-text review identified 26 literature pieces irrelevant to the research topic and 17 pieces not suitable for the research population.

c. Final. After screening, a total of 8 pieces of literature were found to align with the research topic.

## RESULTS & DISCUSSION

Based on the screening results from 227 literature sources obtained using the Publish or Perish application within the Google Scholar database, 8 selected literature pieces were identified. Here are the 8 selected pieces of literature:

**Table 2.** Selected Literature

No	Author's name and year of publication	Journal Names
1	Angelin Alienta, Cindy Julyana Lim, Evelyn Juviani, Juliawati, Iwan Suhardjo (2023)	Seiko: Journal of Management & Business
2	Dedi Muhaidir (2023)	8 <sup>th</sup> Management Dynamic Conference, FEB Universitas Hasanudin
3	Muhammad Iqbal Irfani (2020)	Fakultas Ekonomi, Universitas Islam Indonesia
4	Pinondang Simanjuntak, Chandra Christianti Purnomo, Carlos Fllipus, Haryady (2020)	Fakultas Teknik, Universitas Kristen Indonesia
5	Lucia Stefanie T Suwandy, Yulia, Eveline Vynthia Irawan (2022)	Jurnal Infra
6	Ni Luh Ayu Indrayani (2022)	Crane: Civil Engineering Research Journal
7	Michelle Winovsky, Feby Febriyani, Silly Tan Peiwen, Sherly Celia Natalia, Vivian, Iwan Suhardjo (2023)	Seiko: Journal of Management & Business
8	Robi'ah Al Adawiyah, Yuni Wibawanti, Umar Wirantasa (2023)	JRKT (Jurnal Rekayasa Komputasi Terapan)

Question 1: How much literature is related to ERP in Construction Companies in Indonesia in the last 5 years (2019-2023)?

From the table above, it can be observed that there are 8 pieces of literature related to Opportunities and Challenges of ERP in Construction Companies. Among these, 2 pieces were published in 2020, 2 in 2022, and 4 in 2023.

Question 2: What changes occur after implementing ERP in Construction Companies in Indonesia?

According to Irfani (2020), the SAP ERP system has the potential to enhance PT Pupuk Indonesia Group's performance, including better cost management, optimal inventory management, and effective receivable management. Additionally, business processes become more efficient, and the resulting information becomes faster and more accurate, facilitating faster business decision-making by management. According to Simanjuntak et al. (2020), digital technology (digitization) significantly positively influences the effectiveness of project execution teams. According to Suwandy et al., (2022), the implementation of the Odoo ERP program directly influences the company and individuals within it. Using Odoo ERP, the company's business processes can run more optimally, and the required time is faster compared to before using the Odoo ERP program. According to Indrayani (2022), implementing an Enterprise Resource Planning (ERP) system supports the development of the construction service industry. By using ERP software, companies can manage project costs and the overall project easily. Operational activities can be fully automated, including all stages of the construction process and real-time reporting. The main modules of the ERP system make it easier to support construction activities in companies to advance the construction service industry in the future.

According to Adawiyah et al. (2023), using Odoo ERP centralized project management at PT CIC Consulting, making it more effective and efficient. By using the HRN method in task priority calculation, task determination becomes more consistent and measurable. This Odoo-based project management system is tailored to the SDLC application, so by following the system flow, the SDLC application will be automatically executed. Additionally, automatically arranging tasks based on priority levels makes it easier for users to manage tasks. The hope is that with all the ease and problem-solving provided, this system can help prevent and minimize project completion delays.

Question 3: What are the opportunities and challenges obtained from the implementation of ERP in Construction Companies in Indonesia?

According to Alienta et al. (2023), using an ERP system significantly impacts a company's financial performance because the technology enhances collaboration and communication between departments, enabling better decision-making through real-time insights and reporting. Although companies may face difficult and costly implementation processes, the ERP system is a useful tool for businesses aiming to streamline their operations and expand due to its long-term benefits. Based on the analysis and information from interview sessions, data integration and accessibility are among the main advantages gained after implementing the ERP system. ERP offers a single source of truth, granting authorized staff access to real-time data throughout the company, eliminating the need for repetitive data input. With this accessibility, managers and executives can rely on accurate and up-to-date data to evaluate performance, observe patterns, and make wise strategic decisions.

According to Muhaidir (2023), implementing ERP for Supply Chain Performance positively influences Supply Chain management's performance level. However, positive effects do not always translate to overall user satisfaction, particularly in companies like PT. Poso Energy involved in the project sector. There are still complaints from approver users about some tactical and strategic steps that are not accommodated in the Oracle ERP application concept. An example commonly complained about by approvers is the pricing comparison in the system, which is usually used as a reference for approving Purchase Orders (POs).

According to Winovsky et al. (2023), the benefits of implementing ERP include increased efficiency and effectiveness in financial management, departmental integration, improved information accuracy and precision, and increased supervision and control to minimize errors and data manipulation. The Accurate ERP system used significantly benefits in improving company business processes. However, there are also some drawbacks that arise when implementing ERP systems in companies. The mentioned drawbacks include development costs that are not cheap, requiring adjustments in system usage, and taking time to fully harness the potential of the ERP system. Nevertheless, the drawbacks obtained are proportionate to the benefits provided by the system in enhancing company efficiency and productivity. Therefore, the use of the system can be seen as a beneficial investment for the company.

## CONCLUSION

Enterprise Resource Planning (ERP) is one of the systems that integrates technology into business processes, encompassing marketing functions, production functions, logistics functions, financial functions, resource functions, production functions, and other functions. ERP has been developed as an integration tool to consolidate all company applications into a central data repository. In ERP technology, data integration starts from data entry, performed by department functions that create such entries, allowing this data to be used across various company functions. Enterprise Resource Planning (ERP) is a method of managing company resources using information technology. Utilizing ERP equipped with hardware and software helps to coordinate and integrate information data across all business process areas to make quick decisions. This is done by providing fast financial analysis and reports, timely sales reports, production

reports, and inventory reports. ERP programs are highly beneficial for companies with extensive business processes that utilize databases and management tools for reporting separation. Business processes are a set of activities requiring one or more inputs to produce valuable outputs for consumers. ERP software supports efficient business process operations by integrating activities like sales, marketing, production, logistics, accounting, and personnel throughout the company.

Before implementing ERP, companies often face challenges managing scattered data, non-automated business processes, and limitations in making quick decisions. Customer information might be hard to access quickly, inventory management could become complicated, leading to overstock or understock issues. Additionally, operational costs might be high due to manual processes taking up a lot of time, and lack of system integration hampers efficiency. However, after ERP implementation, companies usually experience significant changes. Data from various departments is integrated into one platform, allowing quick and accurate access to information. Automated business processes reduce operational cycle times and increase efficiency. Inventory management becomes more coordinated and responsive to market demand, reducing the risk of overstock and enhancing customer satisfaction. Financials and reporting are managed more efficiently, enabling companies to make better strategic decisions and respond faster to market changes.

Moreover, ERP can enhance employee productivity. With adequate training, employees can better utilize ERP features, saving time previously used for manual work. This impact enables companies to optimize their human resources, increase productivity, and respond to customer needs more efficiently. When taken together, ERP implementation not only enhances efficiency and cost savings but also provides companies with the ability to compete better in a competitive market. Companies that successfully implement ERP feel the benefits in the form of better responsiveness to market changes, more accurate decision-making, and improved customer service, making ERP a highly valuable investment in business growth and sustainability.

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