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Critical Success Factors of ERP Implementation: Literature Review

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Abstract

Enterprise Resource Planning (ERP) systems are regarded as critical tools for enhancing business competitive advantage. However, adopting a new ERP system requires significant attention and effort, as the failure rates of ERP implementations remain high due to their complexity. This study aims to review existing literature published between 2016 and 2023 to identify the key factors contributing to successful ERP project implementation. By analyzing 38 research studies retrieved through a computer search engine using tabular format and content analysis methods, the study identified seven key success factors frequently cited for ERP project success: top management support, user training and education, project management, change management, communication, business process reengineering, and user involvement. These factors are critical for achieving successful ERP project outcomes.

Keywords: ERP Implementation, Critical Success Factors, Competitive Advantage

Introduction

As competition increases in both domestic and global markets, it is essential for businesses to be flexible and immediately respond to the transformation of the environment. Under the pressure of improving customer satisfaction, the concern for stakeholder needs, and the rapid change of technological, competitive advantage seems to be the main emphasis that all organizations desperately attempt to achieve in order to strengthen their business and to survive in such an intense competitive environment (Kotenko, Heiets, & Yacout, 2021; Denic, Vujovice, Stevanovic, & Spacic, 2016).

Regarding this, many approaches are taken into account to accomplish this goal, such as leadership, organizational culture, resource availability, (Azeem, Ahmed, Haider, & Sajjad, 2021; Irungu & Arasa, 2017) improve performance management (Resurreccion, 2012), innovation (Anyanitha Distanont &

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Orapan Khongmal, 2020), business strategy (Farida & Setiawan, 2022), and information technology also included (Muazu & Abdulmalik, 2021).

Enterprise resource planning (ERP) system is one of the information technologies available in today's business world and play a critical role in helping organizations effectively manage theirs resources and support their business processes (Sheik & Sulphey, 2020) to achieve organizational competitive advantage.

However, to successfully implement the ERP system is not as simple as it seems; it requires intensive attention and effort. Numerous critical success factors have been introduced in the past few decades, but with this pile of factors, it would be too much for practitioners to focus on and would create confusion later on.

Therefore, the aim of this study is to review the existing literature in order to see which success factors are the key to successfully implementing ERP projects, and hoped that the findings of this study will provide a contribution to both practitioners and academicians. In terms of practitioners, the discoveries might offer an understanding and realization of where their attention should be placed at the beginning stage of the project implementation that could help reduce their confusion, whereas the discoveries found in this literature review might encourage academicians to conduct empirical research studies to prove their influence in the real world.

ERP Definition and Benefits

ERP is a large, highly complex information system software. With effective architecture, it is considered backbone of an organization in managing data received from daily business activities. It facilitates the flow of information between different departmental functions such as manufacturing, sales and marketing, accounting, finance, and human resources, including external stakeholders like suppliers, retailers, and customers (Abejo, 2023; Akmila, Fadilah, & Dewi, 2023; Imhoff & White, 2011; Ranjan, Jha, & Pal, 2018; Laudon & Laudon, 2004; Ross, Weill, & Robertson, 2006). The integration of business processes is achievable via the sharing of a common database which is updated in real-time, this makes ERP system different from other traditional information systems that were created as stand-alone operations (Hadidi, Al-Rashdan, Hadidi, & Soubhi, 2020; Tenhiälä, Manus Rungtusanatham, & Miller, 2018).

Moreover, it was proved that implementing an ERP system leads to considerable benefits such as reducing manual data entry, ensuring system upgradability, adaptability, portability, and the application of best practices (Olaoye & Potter, 2024). Organizations like an Irish multinational pharmaceutical firm (Carton, Adam, & Sammon, 2008), Mesfine Industrial Engineering Pvt. (Boltena & Gomez, 2012), Rolls-Royce (Yusuf, Gunasekaran, & Abthorpe, 2004), and more have come to agree that ERP is a professional solution that enables them to accomplish their desired outcomes (Łobaziewicz, 2015; Ranjan et al., 2018). The ERP system also delivers high-quality and reliable information that allows managers to make better decisions,

strengthen internal controls, enhance the value of sustainability operations, and increase long-term profitability (Hsiung & Wang, 2014; Huang, Chiu, Chao, & Armati, 2019; Ouiddad, Okar, Chroqui, & Hassani, 2021).

Success vs Failure in ERP Implementation:

Due to its usefulness, ERP system has become a 'must-have' information technology that is required by all type of organizations wishing to obtain more business opportunities and reaching higher competitive advantage levels (Zouaghi & Laghouag, 2016). Those who achieve successful of ERP implementation may earn higher performance. For instance dry food packaging industry, by implementing an ERP system the company's supplier can track the need for items and makes supplies to complete the company's inventory within required time. According to Menon (2020) who conducted qualitative single case study in oil and gas industry, with successful ERP implementation, the organization benefits in six key areas: standardization of common business processes, single integrated system, standardized reporting, improved key performance indicators (KPI), all countries in one system, and easy access to data.

However, the process of implementing an ERP system is not as easy as it seems. It demands extensive time, money, and organizational resources and also involves a high risk of failure (Aini, Lubis, Witjaksono, & Azizah, 2020; Juniawan, Ashari, Prastiti, Inayah, Gunawan, & Putra, 2022; Pecherskaya, Averina, Kamaletdinov, Tretyakova, & Magomadova, 2016). Besides the failure rate of ERP implementation is considered high, ranging from 67% to 90% and 65% of ERP implementations are found to go beyond the planed budget. Additionally, 70% of ERP implementations is unable to meet the expected benefits. (Aini et al., 2020; Juniawan et al., 2022; Prasetyo, Lubis, Witjaksono, & Azizah, 2019; Saygili, Ozturkoglu, & Kocakulah, 2017).

Therefore, many attempts have been made to identify critical success factors to determine how successful ERP project implementation can be achieved. Tracing back to 1979, Rockart was the first author to develop critical success factors theoretical foundation for ERP research (Goldston, 2019). He described key success factors as the limited number of areas in which results, if satisfactory, will ensure competitive advantage leading to enhanced organizational performance (Menon, 2020). Building on Rockart's theoretical foundation, several critical success factors have been identified by previous researchers (Akmila et al., 2023; Huang, Rahim, Foser, & Anwar, 2021; Epizitone & Olugbara, 2020; Finney & Corbett, 2007; Hasan, Ebrahim, Mahmood, & Rahman, 2018; Holland & Light, 1999; Idilbi & Abu-Shanab, 2019; Jiwasiddi & Mondong, 2018; Madi, Ayoubi, & Alzbaidi, 2024; Nah, Lau, & Kuang, 2001; Somers & Nelson, 2001).

A vast number of critical success factors have been examined for their effect on the ERP implementation (Denic et al., 2016). This study aims to review the critical success factors of ERP project implementation most frequently cited in previous studies and literature available between 2016-2023. By

searching for "ERP implementation, critical success factors, literature review, and case study" utilizing a computer search engine across a number of databases, such as Google Scholar, IEEE/Xplore, EBSCOhost, Emerald, ScienceDirect, Proquest Computing, and ACM Digital Library.

Following the collection of articles, irrelevant papers were eliminated using inclusion and exclusion criteria. First, the publication year ought to fall between 2016 and 2023. Second, a reputable journal must publish the research paper. However, additional unpublished papers- such as theses, final projects, theses, and doctorate dissertations- are not included in this study. The articles retrieved from the search shown in Table 1.

Table 1 Published Articles during the year 2016-2023

Year of Publication	Authors	Research Titles
2016	1. Prodromos Chatzoglou, Dimitrios Chatzoudes, Leonidas Fragidis, and Symeon Symeonidi	- Critical success factors for ERP implementation in SMEs.
	2. Nebojsa M. Denic, Vuk Vujovic, Vesna, Stevanovic, and Boban Spasic	- Key factors for successful implementation of ERP systems
	3. Velina P. Pecherskaya, Lyudmila V. Averina, Yuri A. Kamaletdinov, Natalia V. Tretyakova, and Tamilla L. Magomadova	- Assessment of critical success factors transformation in ERP projects
	4. Raafat George Saade and Harshjot Nijher	- Critical success factors in enterprise resource planning implementation: A review of case studies
	5. Ahmad Saleh Shatat and Naser Dana	- Critical success factors across the stages of ERP system implementation in Sohar university: A case study
2017	1. Naeem Ahmed, A. A. Shaikh, and Muhammad Sarim	- Critical success factors play a vital role in ERP implementation in developing countries: An exploratory study in Pakistan
	2. Jonathan Arvidsson and Daniel Kojic	- Critical success factors in ERP implementation: The perspective of the procurement system user
	3. M. S. Hasan, Z. Ebrahim, W. H. W. Mahmood, and M. N. A. Rahman	- Factors influencing enterprise resource planning system: A review

Year of Publication	Authors	Research Titles
	4. Flávia Campos Fernandes Leandro, Mirian Méxas, and Geisa Meirelles Drumond	- Identifying critical success factors for the for the implementation of enterprise resource planning system in public educational institutions
2018	1. Ashraf Ahmed Fadelelmoula	- The effects of the critical success factors for ERP implementation on the comprehensive achievement of the crucial roles of information systems in higher education sector
	2. Angtyasti Jiwasiddi and Benyamin Mondong	- Analysing ERP implementation critical success factors for SME: A study of SAP one implementation in Jakarta
	3. Shree Ranjan and Vijay Kumar Jha	- Critical success factors in ERP implementation in Indian manufacturing enterprises: An exploratory analysis
	4. Simone C. Santos, Célio Santana, Julliane Mágero, and Cristinne Elhim	- Critical success factors for ERP implementation in sector public: An analysis based on literature and a real case.
2019	1. Wissam El Hajj and Ali Serhan	- Study on the factors that determine the success of ERP implementation
	2. Muradallah Idilbi and Emad Ahmed Abu-Shanab	- Critical success factors for ERP implementation: Two directions focusing on employee perceptions in Qatar
	3. Talluri Sai Kiran and A Vasudeva Reddy	- Critical success factors of ERP implementation in SMEs.

Year of Publication	Authors	Research Titles
	4. Mohamed-Iliasse Mahraz, Loubna Benabbou, and Abdelaziz Berrado	- A systematic literature review of digital transformation. In *Proceedings of the international conference on industrial engineering and operations management*
	5. Marcela Alejandra Varg and Marco Comuzzi	- A multi-dimensional model of enterprise resource planning critical success factors.
2020	1. Safira Nur Aini, Muharman Lubis, Wahjoe Witjaksono, and Anik Hanifatul Azizah	- Analysis of critical success factors on ERP implementation in PT. Toyota Astra Motor using extended information system success model.
	2. Ayogeboh Epizitone and Oludayo O. Olugbara	- Principal component analysis on morphological variability of critical success factors for enterprise resource planning.
	3. Akshay Gavali and Srijeet Halder	- Identifying critical success factors of ERP in the construction industry
	4. Bjørn Jæger, Sophie Bruckenberger, and Alok Mishra	- Critical success factors for ERP consultancies. A case study.
	5. Asimina Kouriati, Thomas Bournaris, Basil Manos, and Stefanos A. Nastis	- Critical success factors on the implementation of ERP systems: Building a theoretical framework.
	6. Sreekumar Menon	- Critical success factors for ERP projects: Recommendations from a Canadian exploratory study.
2021	1. Qian Huang, Mahbubur Rahim , Susan Foster, and Misita Anwar	- Critical success factors affecting implementation of cloud ERP systems: A systematic literature review with future research possibilities.
	2. Angela R. Stone and Xihui Zhang	- Understanding success factors for ERP implementation: An integration of literature and experience

Year of Publication	Authors	Research Titles
	3. Jigar K Patel	- Critical success factors for implementation of enterprise resource planning software.
	4. Adjeng Rizkiana, Hamzah Ritchi, and Zaldy Adrianto	- Critical success factors enterprise resource planning (ERP) implementation in higher education.
	5. Xinzhu Lin	- Exploratory study on key influencing factors of successful implementation of ERP system based on the perspective of grounded theory.
2022	1. Muhammad Akmal Juniawan, Novialdi Ashari, Rizdiani Tri Prastiti, Suci Inayah, Fandi Gunawan, and Panca Hadi Putra	- Exploring Critical Success Factors for Enterprise Resource Planning Implementation: A Telecommunication Company Viewpoint.
	2. Abdallah Abu Madi, Rami M. Ayoubi, and Mohammad Alzbaidi	- A model for enterprise resource planning systems in the higher education sector.
2023	1. Maria Corazon B. Abej	- Enterprise resource planning (ERP) system implementation framework for selected state universities.
	2. Fitriati Akmila, Imam Nur Fadilah, and Herlina Rahmawati Dewi	- Critical success factors of ERP implementation at retail franchise company in Indonesia.
	3. Almutairi	- Critical success factors in ERP implementation: A case of Saudia Aramco
	4. Asimina Kouriati, Christina Moulogianni, Thomas Bournaris, Eleni Dimitriadou, and Stefanos A. Nastis	- Greek Agricultural Processing Industries: Relationships between Critical Success Factors and Enterprise Resource Planning implementation

Year of Publication	Authors	Research Titles
	5. Frank Alaba Ogedengbe and Elohor Katherine, Idolor	- Critical success factors & enterprise resource planning implementation and organizational performance
	6. Sitinjak and Jayadi	- Qualitative case study of critical success factor in three ERP implementation projects.
	7. Juliano Idogawa, Flávio Santino Bizarrias and Ricardo Câamara	- Critical success factors for change management in business process management
	8. Alaa M Ubaid	- The critical success factors of the highly competitive organizations; A systematic literature review

Table 1 presents 39 papers that have been published and were found using a computer search engine. Out of the 124 critical success factors that were retrieved from chosen articles, it was discovered through the use of the tabular format and content analysis method that seven key success factors were frequently mentioned and have been proposed as influential factors that affect the ERP implementation project's success. Top management support was found to be the most important success factor being used when it comes to study ERP implementation, with the score range above 20. This was followed by user education and training, project management, change management, communication, business process reengineering, and user involvement.

Table 2 Frequency of Critical Success Factors Rang above 20

CSFs	2016	2017	2018	2019	2020	2021	2022	2023	Total
Top management support	5	3	4	5	3	4	2	9	35
User training and education	3	4	4	4	4	4	2	6	31
Project management	2	3	3	3	4	4	1	7	27
Change management	3	3	3	2	4	2	2	6	25
Communication	4	3	2	4	4	2	0	5	24
Business process reengineering	5	3	2	3	3	2	1	3	22
User involvement	3	3	1	2	2	4	1	6	22

Top Management Support

One of the most crucial success elements for ERP deployment that has been identified in a number of literatures is top management support (Madi et al., 2024; Kouriati, Bournaris, Manos, & Nastis, 2020; Stone & Zhang, 2021). This is consistent with the definition of top management assistance provided by Jæger, Bruckenberger and Mishra (2020), which is senior executives' application of the ERP system. In order to

successfully implement ERP systems, top management must first set clear project goals, explain to staff the value of these systems to the organization's vision, provide the funding and staffing needed, set a timeline, reorganize the organization's structure to accommodate the new systems, and monitor and assess the implementation process (Fadelemoula, 2018; Kodithuwakku & Madhavika, 2023; Stone & Zhang, 2021; Ranjan et al., 2018). These are compulsory requirements that must be furnished by the executive management to motivate and encourage employees to learn new processes and technologies. Moreover, top management support is also found to have an impact on reducing the possibility of employees' resistance to organizational change (Gavali & Halder, 2019).

User Training and Education

According to Bingi, Sharma, and Godla (1999), employee training is imperative since the ERP systems are complex and difficult for the end user to understand or function well in a short period of time. Employees need training to understand how the system will change business processes. Therefore, proper training is required to educate employees so they can understand how data affects the rest of the company (Bingi et al., 1999). With appropriate training programs, employees as end users will develop cognitive skills that will allow them to understand how an ERP system is operating (Shatat & Dana, 2016). In addition, employee training can also diminish the anxiety and stress that arise from uncertainty, which in turn increases employees' confidence to cope with challenges and changes, consequently lessening employees' resistance.

Project Management

The third critical success factor of ERP implementation frequently cited is project management. Project management refers to the ongoing management process of the implementation plan (Finney & Corbett, 2007). It involves exercising knowledge and incorporating skills, management tools, and methods into project activities to meet the project's goals (Kuriati et al., 2020). The project management team comprises individuals from cross-functional areas who are experts and familiar with business processes, normally senior management from different departments (Shatat & Dana, 2016). Their responsibilities are to develop an implementation plan with clear objectives, budgeting and cost, allocating human resources, providing training, and determining the success measures (AlSudairi, 2013). This allows the project team to emphasize the main part(s) of the ERP project, moreover project management also ensures the project is being delivered on time (Al-Mashari, Al-Mudiming, & Zairi, 2003)

Change Management

The process of unfreezing, shifting, and refreezing values, practices, and processes inside an organization is known as change management (Lewin, 1951). Using an ERP system can change how businesses operate; it can both automatically create new jobs and business processes and eliminate others (Vayyavur, 2015). Since their attitude is believed to be one of the most challenging factors when it comes to information system adoption, these changes may create employees' resistance, bewilderment, and reluctance to participate (Stone & Zhang, 2021). As a result, extremely cautious change management is required since it can ensure that ERP adoption is successful and because, in the absence of it, adverse effects may occur (Haaland & Olsen, 2020).

Communication

Previous research has shown that ineffective communication is one of the reasons that causes ERP implementation failure (Darmaningrat, Muqtadiroh, & Bukit, 2019; Rajapakse & Thushara, 2023). For the ERP project to be successful, effective communication is needed since stakeholders at every level must be informed of what is going on and what is expected from them, including the scope, objectives, and activities of the ERP project (Darmaningrat et al., 2019). In addition, communication is considered a fundamental aspect of project management and is the area that incorporates and coordinates various project management processes and activities (Zulch, 2014). It also integrates all related areas such as cost, time, and scope to achieve the desired product quality in project implementation (Gavali & Halder, 2020; Zulch, 2014).

Business Process Reengineering

According to Jarrar, Al-Mudimigh and Zairi (2000), when businesses find that an essential business operation is not supported by the ERP system they have chosen, they can take one of two approaches. First, adjust the system to the process; however, this method will cause the project to lag since the customization must be dissected and rewritten multiple times until the system is in line with the business process of the company. Changing the process to conform to the software is the second strategy, which calls for significant adjustments to the organization's structure and methods of operation, or business process reengineering. Practically speaking, nearly every corporation prefers business process reengineering since it frequently offers a competitive edge over system rewriting. Since ERP systems are created using best practices,

User Involvement

One other crucial success aspect that has been found to be most commonly mentioned in prior studies on the factors influencing the success of ERP adoption is user involvement. According to Baronas and

Louis (1988), non-technical users are likely to go through a transition during the system implementation phase. To help them deal with the change, they will make an effort to comprehend and manage the many differences between the old and new systems, as well as their expectations from the differences. They see the deployment of a system as a danger to a user's sense of control over their work. Because it pertains to user perceived control, which is defined as individual control over decision-making, predictability, accountability, and the capacity to lessen or find alleviation from an unpleasant condition, user engagement is significant (Esteves, Pastor, & Casanovas, 2005). Therefore, including the end user in decision-making throughout the implementation of a new system, like ERP, may motivate them to work harder and be more satisfied with the outcome.

Conclusion

ERP implementation is very complex. It requires well-managed processes and close attention, or else it could lead to project failure. This study aims to review existing literature to identify key success factors for successful ERP project implementation. Through reviewing the literature, it was found that 7 key success factors were repeatedly cited and have been suggested to be effective factors in influencing the success of the ERP implementation project: top management support, user training and education, project management, change management, communication, business process reengineering, and user involvement. The findings of this review would guide practitioners to focus on, if not all, at least the critical success factors that need to be kept in mind while implementing an ERP project. Meanwhile, empirical research should be conducted to examine the influence of these critical success factors and whether they can be applied to all kinds of industries, especially in Thailand, where very few research studies have investigated what critical success factors influence ERP implementation projects and how they do so.

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