

Assessing the Business Value and Critical Success Factors of Cloud ERP Systems: A Meta-Analysis

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Abstract

Cloud enterprise resource planning (CERP) systems are frequently touted for their scalability, flexibility, operational efficiency, and organizational performance, yet empirical evidence on their realized business value remains inconsistent. This study synthesizes quantitative evidence on two questions: whether CERP implementation produces measurable organizational benefits and which critical success factors (CSFs) are most strongly associated with CERP success. This meta-analysis examined 65 CSF effect sizes clustered within 10 independent primary studies and 12 success-outcome effect sizes clustered within 8 independent primary studies. Results show that CSFs are positively associated with CERP success and that CERP success is positively associated with organizational outcomes, although substantial heterogeneity indicates that the magnitude of these relationships can vary across constructs, outcome types, and study contexts. Moderator analyses based on CSF categories, outcome type, country development status, SME focus, and COVID-era timing reveal exploratory patterns, but the differences are not statistically significant. For example, outcome-category results suggest larger mean effects for organizational-effectiveness and user/service benefits than for financial/market outcomes, but these comparisons remain exploratory. Among the CSFs tested, switching benefits, compatibility, vendor support, top management support, and relative advantage are among the stronger descriptive antecedents, whereas switching costs show a small negative association. The implication is that measurable business value from CERP depends on the implementation context, perceived advantages of the system, organizational and vendor support, and how success is measured.

Keywords

Cloud ERP, Enterprise Resource Planning, Critical Success Factors,

1. Introduction

The term “cloud computing” was first used in 1996, but it wasn’t until the early 2000s when Google and Amazon began offering cloud services that it gained widespread popularity (Regalado, 2011). Since then, its use has steadily grown, with a significant increase during the COVID-19 pandemic. According to recent surveys, over 90% of organizations now use cloud computing in their operations (Loukides, 2021; Wise, 2026). The global cloud computing market is projected to continuously grow and is expected to reach \$1.5 trillion by 2030 (Wise, 2026). Cloud computing generally falls into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS). SaaS is the most commonly used model, as corporations grow more comfortable with running portions of their business in a controlled cloud environment (Miller, 2022). A well-known SaaS application is Cloud Enterprise Resource Planning (CERP).

Organizations can streamline their business processes and data management by shifting their mission-critical ERP to the cloud. However, the benefits of this approach have been difficult to achieve. In fact, a recent PwC survey revealed that only 10 percent of respondents noted significant business benefits in their workplaces (PwC, 2023). As a result, some organizations are contemplating returning some of their data and applications to traditional systems (Linthicum, 2023). Similar concerns were raised by other researchers. For example, Alharbi & Almouteq (2024) point out the significant impact, both positive and negative, of shifting traditional ERP systems to cloud-based solutions. Pankow (2024) explores current trends of cloud repatriation, providing insight into why some organizations revert to traditional ERP solutions despite potential cloud benefits. The search for successful factors in utilizing and benefiting from CERP persists.

The purpose of this research is to create and evaluate a model for CERP success. Whereas many CERP success models and guidelines have been proposed (e.g., Alam et al., 2024; Alsharari et al., 2020), little empirical evidence exists that offer convincing arguments for migration to CERP. The focus of this research is to quantitatively analyze available empirical evidence. The purpose is to generate evidence-based insights to aid companies to materialize tangible business benefits from their investment in cloud computing in general and CERP in particular. Specifically, the model aims to identify and validate the relationship between a set of independent variables (the critical success factors) and a set of dependent variables (CERP success) that can guide future development of CERP in practice and inspire further research on this critical topic.

2. Literature Review

2.1. CERP Success

The emergence of cloud computing in the late 2000s played a key role in the development and adoption of CERP (Jain & Sharma, 2016; Peng & Gala, 2014; Seethamraju, 2015). Lured by the savings and other benefits touted by cloud vendors, small and mid-sized companies began to move their ERP systems to the cloud in earnest in the early 2010s. The success of CERP is characterized by a number of benefits that have appeared in the literature as discussed below.

A popular expected saving is reduced upfront investment in infrastructure as CERP promises to eliminate the need for companies to invest in expensive hardware and infrastructure, as the system is hosted and maintained by the vendor (Peng & Gala, 2014). In addition, CERP typically involves a subscription-based pricing model, reducing ongoing maintenance, support, and upgrade expenses (Abd Elmonem et al., 2016; Jain & Sharma, 2016; Peng & Gala, 2014). Increased flexibility and scalability are another often touted benefit. CERP solutions offer flexibility, enabling businesses to scale their resources up or down based on their evolving requirements (Abd Elmonem et al., 2016; Jain & Sharma, 2016; Scholtz et al., 2016). A related advantage is enhanced accessibility as CERP systems can be accessed from anywhere with an internet connection, facilitating remote work and enhancing employee flexibility (Jain & Sharma, 2016; Jatav et al., 2022; Peng & Gala, 2014).

Operationally, CERP can enhance efficiency and productivity. Alam, Sharma, & Chowdhury (2024) highlight cloud-based ERP's role in operational cost reduction, resource management enhancement, and improved decision-making, particularly in Small and Medium Enterprises (SMEs). Efficiency is increased from automated and streamlined various business processes, from finance and accounting to supply chain management and human resources (Jain & Sharma, 2016; Jatav et al., 2022). CERP provides real-time data visibility across the organization, enabling higher productivity and more effective decision-making (Alsharari et al., 2020; Jain & Sharma, 2016; Peng & Gala, 2014). Cloud ERP vendors handle system upgrades and maintenance, ensuring the system remains current and secure without requiring internal IT effort (Jain & Sharma, 2016; Peng & Gala, 2014). Simplified upgrades and maintenance of CERP allows the in-house IT teams to manage internal systems more efficiently and more productively.

A related benefit is better disaster recovery and data security as CERP providers typically have robust disaster recovery plans and security measures in place, ensuring data protection and business continuity (Jain & Sharma, 2016; Mandava, 2024). As a result, both internal and external communication and collaboration can improve among teams and departments, fostering seamless information sharing and workflow coordination (Jain & Sharma, 2016; Scholtz et al., 2016).

Column two of **Table 1** provides a more comprehensive list of the success measures of CERP that have been reported in the literature.

Table 1. Cloud ERP success.

Category	Success Measure	Source(s)
Financial Performance	Improved Profitability	Ikegwuru & Gabriel, 2022; Hamad et al., 2022
	Increased Revenue	Ahn & Ahn, 2020
	Higher Return on Investment (ROI)	Gupta et al., 2018; Jayeola et al., 2022b
Operational Efficiency	Improved Work Efficacy	Jatav et al., 2022; Kinuthia & Chung, 2017
	Enhanced Productivity	Alam et al., 2024; Kinuthia & Chung, 2017
	Reduced Operational Costs	Abd Elmonem et al., 2016; Idoko, 2021; Kinuthia & Chung, 2017
	Improved Decision-Making	Alam et al., 2024; Alsharari et al., 2020; Kinuthia & Chung, 2017
	Better Data Integration	Gupta et al., 2018
Customer Satisfaction	Increased Customer Service/Satisfaction	Ikegwuru & Gabriel, 2022; Kinuthia & Chung, 2017
	Improved Communication with Customers	Gupta & Misra, 2016; Kinuthia & Chung, 2017
	Increased Customer Retention	Gupta & Misra, 2016
Competitive Advantage	Increased Market Share	Gupta et al., 2018; Kinuthia & Chung, 2017
	Enhanced Ability to Enter New Markets	Kinuthia & Chung, 2017
	Improved Competitiveness	Kinuthia & Chung, 2017
Organizational Goals	Goal Accomplishment	Alsharari et al., 2020; Ikegwuru & Gabriel, 2022; Idoko, 2021
	Meeting User Requirements	Gupta & Misra, 2016
System Related*	Ease of Use	Gupta & Misra, 2016
	Continuance Intention	Cheng, 2019
	System Quality	Chang et al., 2019; Chang, 2020; Nguyen & Luc, 2018
	Information Quality	Chang et al., 2019; Chang, 2020; Nguyen & Luc, 2018
Strategic Alignment	Alignment with Business Strategy	Kinuthia & Chung, 2017
Employee Factors	Improved Worker Participation	Seethamraju, 2015
	Enhanced Organizational Learning	Ahn & Ahn, 2020

*System-related outcomes included not only system and information quality but also post-adoption continuance intention when the study explicitly examined continued use of cloud ERP as a success measure.

These success measures can be classified into major categories as shown in Column one of **Table 1**. A few observations can be made about the categories:

- **Multidimensionality:** CERP success is evaluated through a range of financial, operational, customer-related, and strategic measures (Gupta et al., 2018, Ikegwuru & Gabriel, 2022, Kinuthia & Chung, 2017).
- **Interrelation of Measures:** Customer satisfaction can lead to better financial performance (Gupta et al., 2018).
- **Importance of Intangibles:** Besides financial gains, improvements in decision-making, data integration, and strategic alignment are crucial success indicators

(Kinuthia & Chung, 2017).

- Organizational Effectiveness: Cloud ERP adoption has a positive and significant influence on organizational effectiveness, goal accomplishment, and strategic constituencies' satisfaction (Ikegwuru & Gabriel, 2022).

2.2. CERP Critical Success Factors

Numerous studies have investigated critical success factors (CSFs) for cloud ERP implementations. Researchers have reported widely inconsistent effects of various CSFs. For example, an extensively studied CSF, top management support, has generally been found to have a positive effect on implementation success (e.g., Barbieri & Sott, 2025; Marinho et al., 2021); however, its effect can be nonsignificant (Pratiwi & Sfenrianto, 2024) or even negative on a firm's financial performance (Jayeola et al., 2022a). Review studies similarly identified inconsistent lists of CSFs. For example, a comprehensive literature review identifies security, project management, and communication as the top three widely cited CSFs during cloud ERP implementation (Huang et al., 2021). A more recent review concludes that system compatibility with the organization's needs, data security, and senior management support are the most-frequently researched CSFs (Barbieri, Sott, & Monticelli, 2024). The research into CSF attracts keen research interest constantly as different lists are studied in different regions and new factors are discovered continuously (Barbieri & Sott, 2025). These critical success factors are usually categorized as organizational, people or technological factors (Gupta et al., 2019) or using the technology-organization-environment (TOE) framework (Ahn & Ahn 2020; Chang, 2020).

In the organizational category, top management support is a prevailing factor, as in any major information systems implementation (Hwang & Schmidt, 2011). In CERP projects, top management support is a necessary condition for needed resources. On the other hand, lack of top management support can demotivate employees and hinder cross-functional cooperation (Peng & Gala, 2014). Similarly, transparent and precise communication to ensure employees understand their roles and the changes to be expected is critical. Cross-department collaboration is equally critical to implementation of Cloud ERP and its ongoing use (Al-sharari et al., 2020; Peng & Gala, 2014). Additionally, strategic clarity and well-defined organizational objectives are foundational for ERP success as highlighted by Gupta & Misra (2016) and Gupta et al. (2018).

In the people category, again, as in any major information systems projects, user involvement is critical. User participation and training is needed to ensure user requirements are met and the resulting CERP is properly used (Gupta et al., 2019; Huang et al., 2021). Closely related is the external party involved, i.e., the vendor. Vendor selection is important because the type and quality of services offered by different vendors vary greatly. Reliability and responsive support from the ERP vendor are among the important factors of evaluation. Vendor lock-in is a significant challenge in CERP adoption (Peng & Gala, 2014).

Additionally, vendor support during outage and ongoing maintenance are vital (Gupta et al., 2019; Huang et al., 2021).

Many technological factors play a vital role in CERP success. Chief among them is security and data quality. Data security refers to the measures put in place to safeguard sensitive information from unauthorized access or misuse. In the case of cloud-based ERP systems, data security is of utmost importance due to the sensitive nature of the stored and processed data, compounded by the increasing threat of cybercrime (Abd Elmonem et al., 2016; Madhava Varma et al., 2023). Inadequate data security measures could result in data breaches, which could have severe financial and reputational consequences for organizations. Shared multi-tenant environment poses significant security, privacy, and information loss risks (Alsharari et al., 2020). Managing data privacy, security, compliance requirements and minimizing security costs are major security issues (Huang et al. 2021; Peng & Gala, 2014; Shatat & Shatat, 2021; Naveed et al., 2021).

Data quality refers to the accuracy, completeness, consistency and reliability of information within the ERP system, which is essential to the design, implementation and usage of CERP (Gupta et al., 2019; Huang et al., 2021). If the data quality is poor, it can result in negative impacts such as decreased business performance, increased costs and a decrease in trust in the system. In contrast, high-quality data is necessary for the smooth functioning of cloud ERP systems, as it enables organizations to make informed decisions and improve their business processes (Haug et al., 2009).

Column two of **Table 2** provides a more comprehensive list of the critical success factors. Column one displays the three major categories: organizational, people, and technological. A fourth category, environment, is included in Column one for factors that are external to an organization such as competitive pressure and government regulations that induce the migration to CERP.

Table 2. Cloud ERP success factors.

Category	CSF	Source(s)
Organizational	Top Management Support	Shatat & Shatat, 2021; Huang et al., 2021
	Clear Strategic Goals and Objectives	Gupta & Misra, 2016; Gupta et al., 2018
	Organizational Culture	Ahn & Ahn, 2020; Gupta et al., 2018
	Project Management	Huang et al., 2021; Shatat & Shatat, 2021
	Business Process Reengineering	Shatat & Shatat, 2021
	Cost Effectiveness	Shatat & Shatat, 2021; Zhao & Kirche, 2018
	Implementation Strategy	Gupta & Misra, 2016; Gupta et al., 2018
	Firm Size	Marinho et al., 2021; Shatat & Shatat, 2021
People	Effective Communication	Huang et al., 2021
	User Training and Education	Alharthi et al., 2017; Shatat & Shatat, 2021
	Employee Involvement	Gupta & Misra, 2016; Shatat & Shatat, 2021
	IT Expertise of Employees	Ahn & Ahn, 2020; Sener et al., 2016

Continued

	Skilled Labor	Ahn & Ahn, 2020
Technological	Security	Alharthi et al., 2017; Huang et al., 2021; Sener et al., 2016
	Compatibility	Alharthi et al., 2017
	Relative Advantage	Kinuthia & Chung, 2017; Mohammed et al., 2023
	Data Integrity	Alharthi et al., 2017
	Vendor Support	Marinho et al., 2021; Shatat & Shatat, 2021
	Network and Infrastructure	Alharthi et al., 2017
	System Quality	Chang et al., 2019
	Information Quality	Chang et al., 2019
	Scalability	Alharthi et al., 2017; Marinho et al., 2021
Environmental	Competitive Pressure	Barbieri et al., 2024; Shatat & Shatat, 2021
	Government Regulations and Support	Ahn & Ahn, 2020; Chang, 2020

It is important to note that the classification is not absolute. Some factors could potentially fit into multiple categories. For example, vendor selection can be considered a people factor or a technological factor. Similarly, different classification schemes have been proposed. For example, the TOE Framework has been developed to study the adoption and benefits of cloud computing from three perspectives (Ahn & Ahn 2020; Chang, 2020). Moreover, some critical success factors can be considered CERP success measures too. A good example is information quality. Whereas information quality or data integrity pertains to the quality of input data that goes into a CERP, it can also be a measure of the quality of data generated from the system, as shown in **Table 1**. This underscores the importance of examining both the input and the output of CERP. In other words, **Table 1** and **Table 2** represent two pieces of the puzzle integral to unravelling the effect of factors that contribute to CERP success. As a result, the relationship between success measures in **Table 1** and critical success factors in **Table 2** needs to be teased out. Consequently, two research questions are relevant here:

Q1: What, if any, are the benefits of CERP?

Q2: What are the determinants of these benefits and their effect?

A quantitative answer to the two research questions can be obtained by testing the relationships (r1 and r2) depicted in **Figure 1** below. Conceptually, the (successful) implementation of a cloud ERP is a function of some determinants or critical success factors. A successful cloud ERP, in turn, is manifested by a number of success measures.



Figure 1. Research model.

3. Methodology

A systematic review of the literature is conducted to provide answers to the two research questions. Unlike past reviews, this research focuses on a quantitative analysis of the variables involved using meta-analysis. Meta-analysis is a set of tools used for knowledge synthesis, theory development, and testing (Borenstein et al., 2009; Jeyaraj & Dwivedi, 2020; Schmidt & Hunter, 2014). It has been applied to topics in various disciplines including education, business, psychology, medicine, and information systems. Behera and Dhal (2020) conducted a meta-analysis of ERP implementation studies. However, their study is qualitative and does not generate any effect size measures related to CERP success. The current research is the first attempt to gain a better understanding of the relationship between success factors and CERP success through meta-analysis.

To collect relevant studies for the meta-analysis, the Web of Science database was searched with the phrase: “business benefits of cloud ERP”, which returned 39 articles. A second search was conducted using the phrase: “critical success factors for cloud ERP,” which returned 24 articles. Similar searches using Scopus returned 83 and 45 articles, respectively. Additional articles were identified through searches using Science Direct, Semantic Scholar, Google Scholar and AI research tool Elicit (<https://elicit.com/>). Finally, citing mining was used to locate additional studies from the initial lists of articles. In all, close to 200 articles were identified.

The titles and abstracts of the sample articles were next scanned to assess their relevance to the research questions. Studies that specifically focused on the applications, benefits, and challenges of CERP were shortlisted for further review. Full-text articles of shortlisted studies were then scrutinized in detail to further assess their relevance. Studies were excluded for the following reasons:

- Conceptual papers (e.g., Alharbi & Almouteq, 2024)
- Qualitative studies (e.g., Mukhtar & Hussin, 2024)
- Review papers (e.g., Barbieri et al., 2024; Behera & Dhal, 2020)
- Empirical studies without usable effect sizes (e.g., Alharthi et al., 2017; Barbieri & Sott, 2025; Gupta & Misra, 2016; Hamad et al., 2022; Jain & Sharma, 2016; Naveed et al., 2021; Scholtz et al., 2016; Şener et al., 2016; Zhao & Kirche, 2018)

Figure A1 in the Appendix depicts a PRISMA-style flow diagram of study identification and selection. The CSF dataset consisted of 65 effect sizes representing relationships between critical success factors and cloud ERP success extracted from 10 independent primary studies. The Success dataset consisted of 12 effect sizes measuring relationships between cloud ERP success and organizational outcomes extracted from 8 independent primary studies. In this article, k denotes the number of extracted effect sizes, not the number of statistically independent studies or samples. The number of independent studies is reported separately in the “Studies” column of the results tables. Because several primary studies contributed multiple correlations from the same sample, summing the per-effect sample sizes would overstate the number of unique participants. Therefore, sample size infor-

mation is used only for computing sampling variances and inverse-variance weights, whereas independent-study counts are used to describe clustering and dependence in the robust-variance models. For each study, the reported statistics are coded and converted into correlations, if necessary, using commonly accepted formulas (Borenstein et al., 2009), as shown in **Appendix Table A1**. The coding sheet is available at

https://figshare.com/articles/dataset/CERP_dataset/33954475?file=69183988.

Because multiple effect sizes were frequently extracted from the same primary study, the assumption of statistical independence required by conventional meta-analysis was invalid. To address this issue, the study identifier was treated as the clustering variable and Robust Variance Estimation (RVE) was employed, so that standard errors and tests were adjusted for dependence among effect sizes originating from the same study. Correlations were transformed into Fisher's z values and weighted by the inverse of their sampling variances. Thus, the analyses use all available effect sizes while avoiding the interpretation that 65 CSF effects or 12 success effects represent 65 or 12 independent samples. In addition to estimating overall effects, four moderator analyses were performed as outlined in **Table 3** below.

Table 3. Moderator models.

CSF	Success	Construct	Study-Level
Technology	Financial/market performance	Compatibility	Development
Organization	User/service performance	Vendor Support	SME
Environment	Organizational effectiveness	etc.	Covid
Innovation			

The CSF correlations were tested for moderator effect based on the Technology-Organization-Environment (TOE) framework. The success correlations were tested for moderator effect based on three levels: financial/market, user/service, or organizational performance. Construct-level analyses were also conducted for determinants that appeared in at least two independent studies. Finally, study-level moderators were tested based on three study characteristics: developed vs. developing countries, SME vs. non-SME organizations, and study dated pre-Covid vs. post-Covid. The rationale is that, compared with developing countries, developed countries tend to have better technology infrastructure and hence more likely to reap the benefits of CERP. SMEs are the main targets of CERP vendors and hence are more likely to report larger benefits than non-SMEs. Finally, cloud usage jumped during Covid and should result in more CERP benefits than pre-Covid.

Robustness was assessed using Leave-One-Out diagnostics, while publication bias was evaluated with Egger's p -value and funnel plots. All analyses were conducted in R.

4. Results

The intercept-only RVE model revealed a significant positive relationship between critical success factors and cloud ERP success. The pooled mean effect was 0.33 ($p < 0.01$), based on 65 effect sizes clustered within 10 independent primary studies. This finding indicates that critical success factors collectively exert a small-to-moderate positive influence on cloud ERP implementation success. Similarly, the meta-analysis of organizational outcomes indicated that cloud ERP success is positively associated with organizational performance measures such as financial performance, operational performance, market performance, service quality, goal accomplishment, and net benefits. The pooled effect for the outcome model was 0.42 ($p < 0.01$), based on 12 effect sizes clustered within 8 independent primary studies. **Table 4** displays the pooled effects and heterogeneity statistics; the k column reports the number of extracted effect sizes, whereas the Studies column reports the number of independent study clusters used in the RVE models.

Table 4. Overall pooled effects (Fisher's z , back-transformed r).

Model	k	Studies	z	r	CI_r	tau2	I ²	Q
CSF	65	10	0.343	0.330	[0.217, 0.435]	0.0376	90.7%	686.22
Success	12	8	0.446	0.419	[0.215, 0.587]	0.1018	87.9%	90.93

Note: k refers to the number of extracted effect sizes. "Studies" refers to the number of independent primary-study clusters used for robust variance estimation. Sample sizes were used to compute sampling variances and weights but were not summed as unique participant counts because several studies contributed multiple dependent effect sizes from the same sample.

These findings indicate that cloud ERP success is influenced by a broad set of critical success factors which, in turn, generates meaningful business value. High heterogeneity indices suggest that moderator analyses are warranted. Results are presented in **Table 5** and **Table 6**.

Table 5. CSF moderators.

Moderator	Category	k	z	r	CI_r	SE	df	p
TOE	Environment	8	0.306	0.297	[0.154, 0.428]	0.077	7.4	.005
TOE	Innovation	16	0.376	0.359	[0.238, 0.469]	0.068	8.5	<.001
TOE	Organization	22	0.333	0.321	[0.201, 0.433]	0.066	8.6	<.001
TOE	Technology	19	0.326	0.315	[0.178, 0.440]	0.075	8.8	.002
COVID	0	10	0.435	0.410	[0.245, 0.552]	0.095	2.0	.044
COVID	1	55	0.303	0.294	[0.148, 0.427]	0.078	6.0	.008
Development	0	38	0.391	0.372	[0.172, 0.543]	0.111	4.0	.024
Development	1	27	0.296	0.287	[0.164, 0.402]	0.066	4.0	.011
SME	0	50	0.325	0.314	[0.198, 0.421]	0.063	7.0	.001
SME	1	15	0.420	0.397	[-0.061, 0.717]	0.245	1.0	.337

Table 6. Success moderators.

Moderator	Category	k	z	r	CI_r	SE	df	p
OutcomeType	Financial	5	0.200	0.197	[0.058, 0.329]	0.072	2.0	0.10987
OutcomeType	Organization	3	0.648	0.570	[0.025, 0.854]	0.318	1.7	0.20441
OutcomeType	UserService	4	0.570	0.515	[0.341, 0.655]	0.109	3.5	0.00953
COVID	0	7	0.363	0.348	[0.182, 0.494]	0.091	4.0	0.0163
COVID	1	5	0.593	0.532	[0.012, 0.826]	0.296	2.0	0.1839
Development	0	10	0.455	0.426	[0.143, 0.644]	0.158	5.0	0.035
Development	1	2	0.428	0.403	[0.258, 0.531]	0.084	1.0	0.123
SME	0	9	0.494	0.457	[0.192, 0.661]	0.153	5.0	0.0233
SME	1	3	0.309	0.300	[0.141, 0.443]	0.085	1.0	0.1715

Table 5 shows that the pooled effects within each TOE category were positive. However, the omnibus small-sample-corrected HTZ test was nonsignificant ($F = 1.01$, $p = .615$), indicating that TOE category did not statistically moderate the CSF relationship. Therefore, the category-level differences should be interpreted as descriptive patterns rather than statistically confirmed differences. The omnibus tests for the other moderators in **Table 5** were also nonsignificant.

Table 6 showed that organizational and user/service performance had a larger effect size than that of financial performance (0.57 and 0.515 vs. 0.197). However, the omnibus test was nonsignificant ($F = 2.34$, $p = 0.356$), suggesting that outcome type did not moderate the success relationship. None of the other moderators in **Table 6** had a significant omnibus test result either. These findings may be due to low statistical power from applying the test to a small sample. Thus, the absence of significant moderation is better interpreted as inconclusive rather than as evidence of no moderation. As more data from future primary research become available, the relationships can become clearer.

To further explore the effects of individual CSFs, a construct-level RVE moderator analysis was performed on constructs investigated in two or more studies. Several observations can be derived from the results shown in **Table 7**:

- Innovation constructs dominate the top (Switching Benefits, Relative Advantage) but also include the only negative one (Switching Costs).
- Technology constructs are mixed (Compatibility high, Complexity null).
- Organization constructs are consistently moderate (Top Management Support, Organizational Culture).
- Environment constructs are weak (Vendor Support moderate, Competitive Pressure weak).

These findings are descriptive and suggest promising hypotheses that can be tested in future research.

Robustness Check

Two tests were performed to check the robustness of the results. Egger's tests

Table 7. Construct-level moderators.

Construct	TOE domain	k	Studies	r	95% CI	I ²
Switching Benefits	Innovation	2	2	0.53	[0.48, 0.58]	0.0%
Compatibility	Technology	3	3	0.43	[0.17, 0.63]	84.9%
Vendor Support	Environment	2	2	0.41	[0.13, 0.64]	70.0%
Top Management Support	Organization	4	4	0.38	[0.13, 0.59]	90.6%
Relative Advantage	Innovation	4	4	0.37	[0.25, 0.48]	61.7%
Organizational Culture	Organization	2	2	0.32	[0.21, 0.42]	0.0%
Trialability	Innovation	2	2	0.30	[0.19, 0.41]	6.4%
Project Management	Organization	2	2	0.29	[−0.18, 0.66]	88.2%
Competitive Pressure	Environment	2	2	0.14	[−0.27, 0.51]	90.6%
Complexity	Technology	2	2	0.02	[−0.10, 0.13]	0.0%
Switching Costs	Innovation	2	2	−0.09	[−0.16, −0.01]	0.0%

were performed to detect small-study effects or publication bias using the multi-level Egger's regression (Rodgers & Pustejovsky, 2021), which accommodates dependent effect sizes via cluster-robust variance estimation. Neither the CSF ($b = 1.19$, $t(1.54) = 0.57$, $p = .639$) nor the Success ($b = 6.51$, $t(1.36) = 2.19$, $p = .218$) model showed a significant standard-error coefficient. Funnel plots shown in **Figure A2** and **Figure A3** confirm the absence of asymmetry. However, given the small number of studies ($k = 10$ and $k = 8$) and the resultingly low denominator degrees of freedom ($df < 2$ in both cases), these tests have low power and hence the results should be interpreted with caution.

Sensitivity of the results to outliers was assessed by Leave-One-Out diagnostics. Results indicated that the overall meta-analytic estimate was robust to exclusion of individual effect sizes. Removal of the strongest positive or negative correlations did not materially alter the pooled effect, and the direction and substantive interpretation of the relationship between critical success factors and Cloud ERP success remained unchanged.

5. Discussion

As cloud computing becomes increasingly popular, companies have migrated their mission-critical ERP systems to the cloud by leaps and bounds in the last decade. Enticed by lower costs and higher efficiency, CERP has found widespread adoption especially among small and medium businesses. While academic literature often highlights the theoretical advantages of CERP, industry surveys present a more nuanced perspective. For instance, a study by Epicor revealed that although 96% of organizations felt confident during the initial stages of CERP adoption, 48% expressed a need for greater support from vendors during implementation and beyond (Epicor Software Corporation, 2022). Lack of vendor support and other challenges can result in disillusionment with materializing real business

benefits of CERP (PwC, 2023). It is critical to examine empirical evidence to gain a better understanding of CERP's accrued business value.

The purpose of this research is twofold. The first is to quantify the business benefits of CERP and the second is to quantify the effect of factors that contribute to the successful implementation of CERP. After a systematic review of the literature, empirical data from 15 primary studies were meta-analyzed. Results showed that the adoption of CERP is, on average, likely to yield moderate positive business benefits. This is true despite inconsistent results reported in different studies. For example, Gupta et al., (2019) reported CERP has a positive effect on market performance ($r = 0.70$); however, Gupta et al., (2018) reported a negative effect ($r = -0.13$). The significance test result suggests that any negative effect is probably a result of random chance rather than a manifestation of the true relationship.

Whereas the evidence suggests that CERP's business benefits are likely significant statistically, it does not mean that the benefits are substantial in real terms. **Table 6** reveals that largest success measures examined in prior empirical studies are organization or user-oriented variables, e.g., strategic constituencies satisfaction or goal accomplishment (Ikegwuru & Gabriel, 2022), net benefit (Nguyen & Luc, 2018). As a result, managers should broaden their evaluation criteria beyond traditional financial metrics when assessing cloud ERP investments. As shown in **Table 1**, other categories of CERP success exist, and they should be studied as well to demonstrate the value of CERP. Prior work on cloud-based ERP business value similarly emphasizes that SMEs may realize value through process integration, accessibility, and operational improvements that extend beyond immediate financial indicators (Hustad et al., 2019). Future research can collect empirical data on the people aspects (communication and collaboration), the system aspects (ease of use, ease of maintenance, etc.) or customer aspects (customer satisfaction). This type of research can lead to discovery of larger effect sizes or business benefits and hence provide greater justification for continued investment in CERP.

In addition, researchers should statistically test the effect of any measures they investigate. It is not useful to measure some variables but report only raw scores or the means and standard deviations as was done in several studies (e.g., Gupta & Misra, 2016; Scholtz et al., 2016). A mean of 3.5 (out of 5 points) is not an objective measure of, say, increased market performance. An effect size, e.g., a correlation coefficient of 0.60, offers a concrete measure of the underlying relationship between CERP and its benefits.

The second objective of this research is to test the effect of factors contributing to successful implementation of CERP. Our results confirm the significant effects of many variables proposed in prior studies. Similar to the effect of CERP success, the size of the effect of the critical success factors is modest. More research is needed to have a clearer understanding of the effect of individual factors and their interactions (Mukhtar & Hussin, 2024). It would be insightful to compare the effects of various categories—such as organizational, people, and technology factors—on implementation success to determine which has the greatest impact and

understand the underlying reasons (Naveed et al., 2021). A popular way to rank the importance of the CSFs of CERP is to count the number of times each factor has been investigated (e.g., see Barbieri & Sott, 2025; Huang et al., 2021; Shatat & Shatat, 2021).

The present study formally tested category differences using a TOE-based robust variance estimation meta-regression. Innovation-related factors showed the strongest descriptive average relationship with cloud ERP success, followed by organizational factors, technical factors, and environmental factors (Ahn & Ahn, 2020; Chang, 2020). However, these differences were not statistically significant after cluster-robust adjustment and should therefore be interpreted as exploratory patterns rather than confirmed category effects. At the construct level, innovation factors such as switching benefits and relative advantage were strongly associated with cloud ERP success, while traditional organization factors including top management support and organizational culture also showed moderate positive associations. Compatibility and vendor support also emerged as notable descriptive predictors. These exploratory findings provide directions for future researchers in developing and testing theories.

For practitioners, these findings indicate that successful cloud ERP implementations depend not only on internal managerial support but also on external ecosystem conditions and the perceived strategic advantages of cloud-based ERP systems. At the same time, while one of the benefits of cloud computing is streamlined in-house IT operations, managers should obtain vendor support without abdicating strategic planning and cloud controlling. The cloud-powered companies develop an enterprise-wide data strategy, optimize data governance, risk, and control framework, and work closely with service providers to integrate their CERP with other systems (PwC, 2023). These are the hallmarks of innovative organizations that have achieved measurable business value.

6. Conclusion

This research systematically examined empirical evidence regarding the accrued business value in Cloud-based Enterprise Resource Planning (CERP) systems. While the adoption of cloud ERP has increased rapidly, driven by potential cost savings, scalability, and operational improvements, achieving consistent and tangible business benefits remains challenging. The meta-analysis confirms significant positive outcomes from the use of CERP, although the magnitude of these benefits varies widely. **Table 8** summarizes the major findings.

Critical success factors—categorized as organizational, people-related, technological, and environmental—have a similar moderate impact on successful CERP implementation. Factors such as top management support, relative advantage, robust data security, and vendor support have consistently been touted as critical. However, other technological factors such as technology compatibility may be equally important in materializing the full potential of CERP investments (Tarani et al., 2021). Practitioners should pay careful attention to these confirmed critical

Table 8. Research findings summary.

- CSFs significantly influence cloud ERP success.
- Cloud ERP success significantly improves organizational outcomes.
- Innovation factors show the strongest descriptive average antecedent effects, but category differences were not statistically significant.
- Organizational-effectiveness outcomes show larger descriptive average effects than financial outcomes, but outcome-type differences were not statistically significant.

success factors to maximize the likelihood of successful outcomes. More empirical research along this line is encouraged. Researchers are also urged to provide comprehensive statistical reporting in their studies to facilitate knowledge accumulation and enable effective synthesis through meta-analysis. Additionally, future empirical studies should broaden their focus beyond firm-level financial performance to include more diverse success measures, such as employee satisfaction, customer retention, and system usability. Such research can provide more comprehensive insights and assist businesses in harnessing the full value of their cloud ERP investments.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

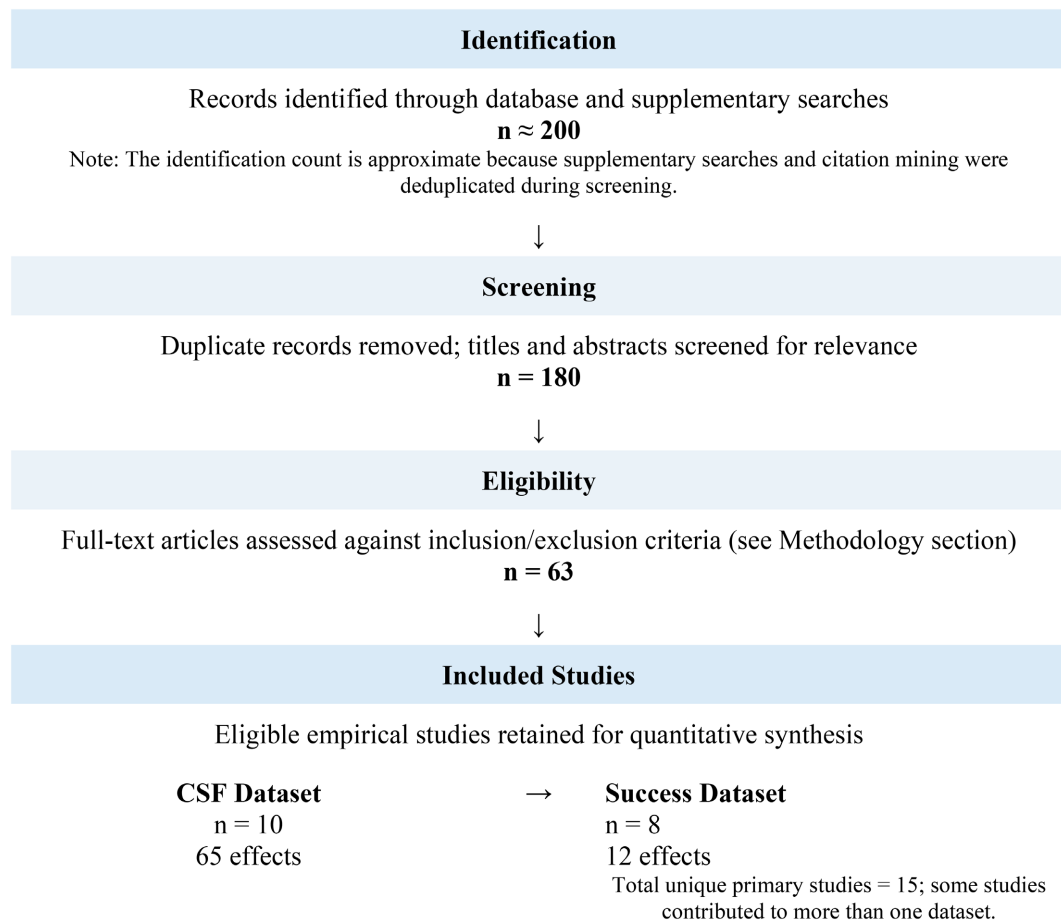


Figure A1. PRISMA-style study identification and selection flow.

Table A1. Meta-analysis coding.

Study	CERP CSF	Effect Size (r1)	CERP Success	Effect Size (r2)	N	Reported Statistic
Ahn & Ahn, 2020	ICT Skill	0.057			148	t → r
	Organizational Culture	0.355				
	Regulatory Environment	0.191				
	Relative Advantage	0.327				
	Complexity	0.038				
	Trialability	0.353				
	Observability	0.028				
	Data Security	0.064				
	Vendor Lock-In	−0.228				
	Customization	0.005				
Chang et al., 2019	Switching Costs	−0.08			480	r

Continued

	Switching Benefits	0.52			
Chang, 2020	Switching Costs	−0.10	212	r	
	Switching Benefits	0.56			
Cheng, 2019			Continuance Intention	0.47 315	r
Gupta et al., 2018			Financial Performance	0.00 154	SEM Path β
			Market Performance	0.13	
Gupta et al., 2019			Market Performance	0.28 231	SEM Path β
			Operational Performance	0.32	
Idoko 2021			Service Quality	0.39 107	
			Competitive Advantage	0.36	
Ikegwuru & Gabriel, 2022			Goal Accomplishment	0.87 30	
			Strategic Constituencies Satisfaction	0.81	
Jayeola et al., 2022b	Top Management Support	0.59	Financial Performance	0.22 204	$\beta/t \rightarrow r$
Kinuthia & Chung, 2017	Relative Advantage	0.51	Perceived Benefits	0.33 159	t-test $\rightarrow r$
	Compatibility	0.50			
	Security Concern	0.45			
Marinho et al., 2021	Relative Advantage	0.38		109	OR $\rightarrow r$
	Technology Complexity	0.15			
	Technology Compatibility	0.41			
	Technology Readiness	0.39			
	Organization Competency	0.28			
	Top Management Support	0.34			
	Organizational Size	0.27			
	Regulatory Compliance	0.18			
	Competitive Pressure	0.34			
	Vendor Support	0.29			
Mohammed et al., 2023	Relative Advantage	0.24		136	$\beta/t \rightarrow r$
	Compatibility	0.18			
	Complexity	−0.01			
	Trialability	0.24			
	Security & Privacy	0.24			
	Cost Savings	0.27			
	Firm Size	0.22			
	Employees' Cloud Knowledge	0.18			

Continued

	Information Intensity	0.20				
	Competitive Pressure	-0.07				
	Industry Sector	0.20				
	External Support	0.19				
	Decision Makers Innovativeness	0.18				
	Decision Makers Cloud Knowledge	0.30				
Nguyen & Luc, 2018	System quality	0.69	Net Benefit	0.53	182	r
	Information Quality	0.66				
	IT Quality	0.50				
	Perceived Risk	-0.31				
	Trust	0.65				
Pratiwi & Sfenrianto, 2024	Organizational Culture	0.27			138	$\beta/t \rightarrow r$
	Communication	0.04				
	Project Management	0.07				
	Consultant Capability	0.00				
	End-User Participation	-0.06				
	Top Management Support	0.06				
	Infrastructure	0.17				
	System Customization	0.13				
Shatat & Shatat, 2021	Top Management Support	0.48			50	r
	User Involvement	0.80				
	Security	0.49				
	Readiness	0.15				
	Project Management	0.51				
	Vendor Support	0.55				
	Compatibility	0.59				
	Business Process Reengineering	0.42				
	Minimal Customization	0.09				
	Careful Package Selection	0.35				

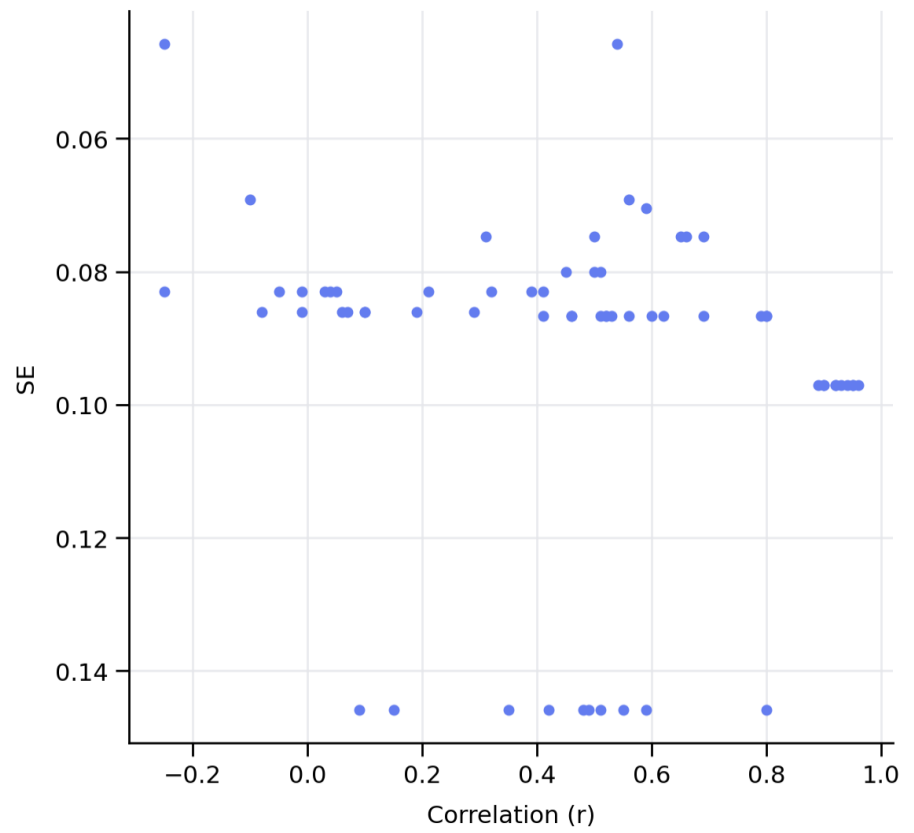


Figure A2. Funnel plot: CSFs → CERP success.

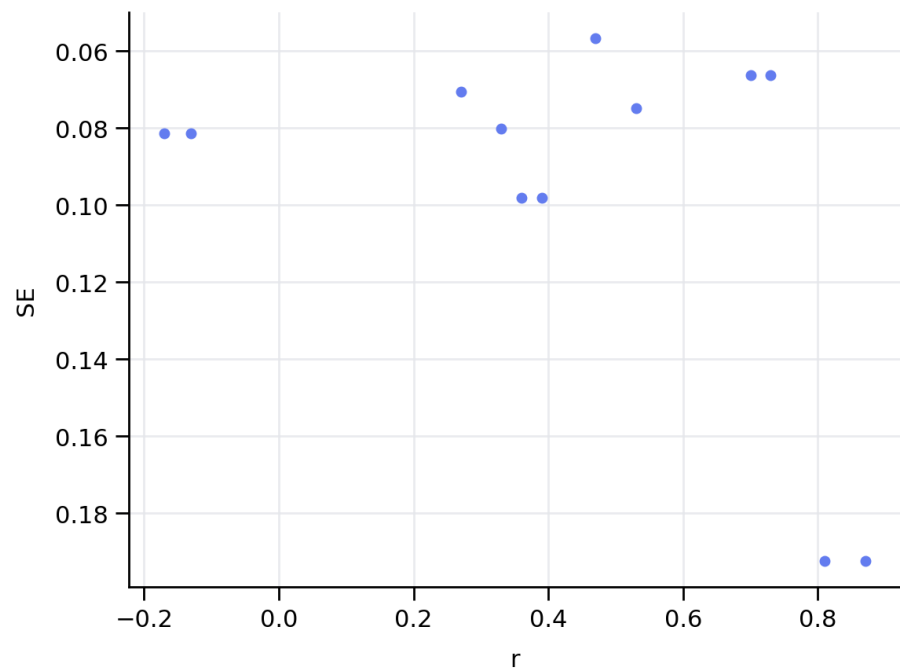


Figure A3. Funnel plot: CERP success → outcomes.