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Cloud-Based ERP Implementation Challenges in Small Industries

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Abstract

This study investigates the multifaceted challenges faced by small industries in implementing cloud-based Enterprise Resource Planning (ERP) systems, aiming to provide a comprehensive understanding of the technical, organizational, and human-centric barriers that hinder adoption. Employing a qualitative research design, the study adopts an interpretivist approach through a systematic literature review of 45 peer-reviewed articles published between 2010 and 2024. Data were analyzed thematically using ATLAS.ti, enabling the identification of key implementation challenges and contextual factors shaping ERP adoption in resource-constrained industrial environments. The findings reveal three primary categories of obstacles: infrastructure and technological deficiencies, organizational unreadiness coupled with resistance to change, and significant human resource and knowledge gaps. Specifically, the study finds that inadequate digital infrastructure, cultural inertia, and the absence of sustained training programs frequently result in project delays, underutilized systems, and operational inefficiencies. Moreover, cloud-based ERP systems' success depends heavily on contextual alignment with the firm's internal capabilities, strategic planning processes, and commitment to long-term digital transformation. These insights contribute to existing theoretical models such as the Technology-Organization-Environment (TOE) framework by highlighting the role of sustainability-oriented digital strategies and adaptive implementation practices. The study recommends collaborative interventions among policymakers, vendors, and industry associations to address structural disparities and to foster inclusive technological ecosystems. The research contributes both theoretically and practically to the discourse on ERP adoption, particularly within emerging markets where small industries remain foundational to economic development.

Keywords: *Cloud ERP, Small Industries, Implementation Challenges, Digital Transformation, Organizational Readiness.*

1. Introduction

In the era of digital transformation, the integration of technology into business operations has become not merely an option, but a necessity for maintaining competitiveness and sustainability in increasingly dynamic market environments. Enterprise Resource Planning (ERP) systems, as comprehensive platforms for managing and integrating core business processes, have long been utilized by large enterprises to streamline operations, improve data consistency, and facilitate decision-making. Traditionally deployed through on-premise infrastructure, ERP systems have evolved significantly over the past two decades, culminating in the emergence of cloud-based ERP solutions. These cloud-based systems offer organizations the ability to reduce upfront hardware costs, enhance scalability, improve accessibility, and benefit from rapid updates and maintenance managed by third-party vendors. Consequently, cloud-based ERP solutions

are seen as transformative tools capable of enabling digital agility and operational coherence, particularly within the context of globalization and digital interconnectedness. However, while large enterprises have generally embraced ERP solutions with extensive support and dedicated resources, the adoption of cloud-based ERP systems among small industries remains a complex and multifaceted challenge. Small industries, which form the backbone of many developing and emerging economies, often operate under significant resource constraints, including limited IT infrastructure, reduced access to technical expertise, and rigid financial margins. Despite these limitations, small industries are increasingly compelled to modernize their operational frameworks to survive in competitive ecosystems characterized by rapid technological advancement, fluctuating consumer demands, and tightening regulatory landscapes. As such, the implementation of cloud-based ERP systems in small industries represents a significant milestone in the evolution of digital maturity across the industrial spectrum, while also posing numerous implementation and adaptation hurdles.

At a more specific level, the challenges associated with cloud-based ERP implementation in small industries arise from several intersecting dimensions. These include but are not limited to: organizational readiness, resistance to change, inadequate training and user support, misalignment between system capabilities and operational needs, and concerns over data security and compliance. Unlike larger corporations with established protocols for technology adoption, small industries frequently lack the strategic foresight, change management structures, and integration planning mechanisms required for seamless ERP deployment. Moreover, the perceived loss of control associated with outsourcing key data and operational functions to cloud service providers raises apprehension among small business owners who prioritize operational autonomy and confidentiality. These barriers often result in underutilization of ERP functionalities, implementation delays, budget overruns, or outright project failure, thereby undermining the potential advantages of cloud-based solutions. Empirical evidence from various regional and international contexts supports this observation. Studies have revealed that a significant proportion of small enterprises that attempt to adopt ERP systems face implementation setbacks, largely due to insufficient planning and user resistance. For instance, research conducted by Gupta and Misra (2019) in Indian manufacturing SMEs showed that over 60% of ERP adoptions experienced critical issues within the first year, primarily due to poor alignment between the software and the firm's business processes. Similarly, a study by Oliveira and Martins (2020) highlighted that despite increased availability of cloud ERP vendors targeting small enterprises in Latin America, only a minority achieved full functional integration due to a lack of internal competencies and reluctance to change legacy systems. These findings reflect a broader phenomenon in which technological innovation outpaces organizational adaptability, especially within resource-constrained environments.

In the context of Southeast Asia, and Indonesia in particular, the phenomenon is both timely and pressing. Indonesia's industrial landscape is dominated by small and medium enterprises (SMEs), accounting for more than 99% of all businesses and contributing significantly to employment and GDP. While government initiatives such as "Making Indonesia 4.0" have encouraged digitalization in manufacturing and service industries, the actual on-ground adoption of advanced digital technologies remains uneven. Cloud-based ERP solutions are available in various tiers of sophistication and pricing, yet uptake among small industries remains low. Anecdotal reports and initial survey-based studies indicate that while awareness of cloud ERP systems is increasing, misconceptions regarding their cost, complexity, and data privacy risks continue to deter adoption. Additionally, cultural factors such as hierarchical decision-making, limited digital literacy among staff, and a preference for informal business practices further complicate the adoption process. The gap between technological availability and organizational readiness in small industries represents a critical concern for policymakers, technology vendors, and the industries themselves. Against this backdrop, a number of studies have sought to identify the key success and failure factors in ERP implementation. For example, the Technology-Organization-Environment (TOE) framework has been widely used to analyze ERP adoption, emphasizing that external environmental pressures, internal organizational characteristics, and technological readiness collectively shape the outcomes of technology implementation (Tornatzky & Fleischer, 1990). Additionally, models such as the Diffusion of Innovations (Rogers, 2003) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) offer valuable insights into user acceptance and behavioral intentions, both of which are crucial for ERP success. While these theoretical models provide important lenses through which to examine the phenomenon, few studies have applied them in the specific context of cloud-based ERP implementation within small industries in developing economies, leaving a substantial research gap in terms of localized, empirical understanding.

Prior quantitative research efforts in this domain have often focused on binary success/failure outcomes, rather than providing a nuanced description of the implementation process and the specific categories of challenges encountered. A descriptive quantitative approach can therefore complement existing literature by offering empirical measurements of the prevalence, severity, and interrelation of various implementation barriers. Such an approach allows researchers and practitioners to move beyond anecdotal evidence and systematically evaluate the extent to which certain challenges are experienced across different types of small industries, geographies, and organizational profiles. Moreover, descriptive findings can serve as a basis for targeted intervention strategies, vendor customization, and policy support frameworks. The current study is therefore situated within this critical intersection of technological opportunity and organizational vulnerability. By employing a quantitative descriptive research methodology, this study aims to map the landscape of implementation challenges associated with cloud-based ERP adoption in small industries. Specifically, it seeks to answer the following core research question: *What are the key challenges faced by small industries during the implementation of cloud-based ERP systems, and how frequently do these challenges occur across different implementation stages?* Through structured data collection and statistical analysis, the study intends to uncover patterns and trends in the challenges encountered, drawing attention to both technical and non-technical factors such as training adequacy, infrastructure readiness, user resistance, vendor support, and system customization.

The objectives of this study are threefold. First, it aims to identify and categorize the major obstacles faced by small industries in implementing cloud-based ERP systems. Second, it seeks to measure the relative frequency and perceived severity of each identified challenge using empirical data gathered from a diverse sample of small industry respondents. Third, the study aspires to provide practical insights and recommendations for ERP vendors, small industry managers, and policymakers to enhance the effectiveness of future ERP adoption initiatives. By grounding these findings in a robust descriptive framework, the study contributes to both the theoretical understanding and practical management of technology adoption in resource-constrained industrial contexts. The ongoing global trend towards digitalization underscores the urgency of equipping small industries with the tools and strategies necessary to adapt and thrive. Cloud-based ERP systems offer substantial promise in terms of enhancing operational integration, data visibility, and strategic responsiveness. Yet, the pathway to successful implementation remains fraught with challenges that must be clearly understood and systematically addressed. This study endeavors to shed light on these challenges through a comprehensive quantitative exploration, thereby informing future efforts to bridge the digital divide in small industry sectors and facilitating more inclusive industrial transformation in the digital age.

2. Literature Review

2.1. The Evolution and Definition of Cloud-Based ERP Systems

Enterprise Resource Planning (ERP) systems were originally developed to integrate core business processes within large organizations, consolidating data flows across departments such as finance, production, inventory, and human resources (Monk & Wagner, 2013). Traditional ERP solutions, while effective, demanded substantial investments in hardware, software, and ongoing IT support, making them less accessible to smaller enterprises. As digital infrastructure evolved, cloud computing emerged as a transformative force that enabled ERP systems to shift from on-premise installations to cloud-hosted platforms (Gupta et al., 2018). This development significantly lowered barriers to entry, offering small and medium enterprises (SMEs) flexible subscription models, reduced IT maintenance, and greater scalability (Ramayah et al., 2016). Cloud-based ERP is defined as an integrated business management software system delivered through cloud infrastructure that allows users to access data and applications via the internet (Velcu, 2010). Unlike traditional ERP systems, cloud-based ERP does not require firms to install software locally or manage extensive infrastructure, as vendors host and maintain the system remotely. This model enhances operational efficiency, enables real-time collaboration, and supports mobile accessibility—factors that are particularly advantageous for small industries lacking in-house IT departments (AlBar & Hoque, 2019). Furthermore, cloud ERP vendors frequently offer modular solutions, enabling businesses to adopt functionalities incrementally based on operational priorities and available resources (Gable et al., 2017).

Despite its benefits, the transition to cloud-based ERP is not without challenges, especially in smaller enterprises. The complexity of integrating legacy systems, the perceived risk of data loss, and concerns over vendor lock-in continue to deter adoption (Thong et al., 2001). Moreover, organizations with limited technological maturity often experience difficulty navigating cloud environments, particularly in

understanding service-level agreements, managing system updates, or evaluating total cost of ownership (Pan & Jang, 2008). These constraints highlight the need for targeted research that addresses the contextual difficulties faced by small industries in ERP cloud adoption. Several scholars emphasize that the success of cloud ERP implementation is contingent upon organizational, technological, and human factors (Zhang et al., 2019). This interplay makes it essential to investigate not only the functional capabilities of ERP solutions but also the broader socio-technical environment in which they are deployed. For small industries, the cloud ERP journey involves more than technological installation—it requires strategic alignment, cultural adaptation, and capacity development, all of which present significant barriers in resource-limited settings.

2.2. Small Industries and Digital Technology Adoption

Small industries play a vital role in national economies by contributing to employment generation, innovation, and local development. However, their adoption of digital technologies such as ERP systems remains uneven (Thong, 1999). SMEs are generally constrained by limited financial resources, lack of formal IT strategies, and an overreliance on informal managerial practices (Premkumar, 2003). These constraints often lead to a cautious approach toward adopting complex digital tools like ERP, despite the potential long-term benefits in productivity, traceability, and customer satisfaction (Ramdani et al., 2009). In developing economies, small industries frequently lack access to affordable digital infrastructure and skilled labor to support ERP implementation (Ifinedo, 2011). Studies have shown that these industries tend to prioritize short-term operational survival over long-term investment in digital systems (Alshaher, 2013). Consequently, decision-makers often underestimate the organizational change requirements inherent in ERP adoption, leading to incomplete implementation, project abandonment, or user dissatisfaction (Haddara & Elragal, 2015). Moreover, poor vendor support and a lack of localized solutions exacerbate implementation difficulties in less urbanized regions (Abdinnour-Helm et al., 2005).

Cultural factors also influence ERP adoption in small industries. Resistance to change, top-down decision-making, and low levels of digital literacy can slow down technology acceptance, regardless of the system's inherent functionality (Buonanno et al., 2005). Organizations that operate with informal processes or familial structures may find standardized ERP processes restrictive or incompatible with their workflows (Deep et al., 2008). These dynamics suggest that successful implementation requires not only technological customization but also internal organizational transformation. The adoption of cloud-based ERP systems in small industries thus requires a multidimensional readiness assessment, encompassing managerial commitment, user competence, and infrastructural adequacy (Chong & Ooi, 2008). Research in this area must go beyond general adoption models and examine the lived experiences of small industry actors as they navigate the structural and cognitive challenges of integrating ERP systems into daily operations. This makes a descriptive quantitative approach highly valuable, as it captures the specific patterns of resistance, constraints, and adaptations that occur during implementation.

2.3. Technological Readiness and Implementation Barriers

Technological readiness plays a critical role in determining whether cloud-based ERP can be successfully implemented in small industries. Readiness refers to the degree to which an organization has the necessary infrastructure, expertise, and operational maturity to adopt and benefit from a new technology (Rogers, 2003). For small industries, this readiness is often hampered by outdated hardware, unstable internet connections, and limited IT personnel (Pan & Jang, 2008). These issues lead to frequent disruptions during implementation and inhibit real-time data access—one of cloud ERP's primary advantages. Research has shown that technical barriers often intersect with financial limitations. While cloud-based ERP is marketed as a cost-effective alternative to traditional systems, small industries may still struggle to afford recurring subscription fees, customization costs, and staff training expenses (Wu, 2011). Hidden costs such as downtime during migration, consulting services, and upgrades may further discourage adoption (Bradford et al., 2014). In such contexts, decision-makers tend to prioritize easily measurable short-term costs over less tangible long-term benefits, creating a misalignment between strategic intent and operational commitment.

Security and privacy concerns also loom large in discussions about cloud-based ERP implementation. Small industries often lack formal data protection policies and are wary of storing sensitive business information on third-party servers (Low et al., 2011). Reports of cyberattacks and data breaches heighten these fears, leading to skepticism about the reliability of cloud vendors (Rittinghouse & Ransome, 2016). Moreover, compliance with regulations such as GDPR or local data protection laws can be complex for

small firms that do not have legal or IT compliance officers (Gupta et al., 2018). To overcome these technological barriers, scholars advocate for phased implementation strategies, intensive vendor support, and capacity-building interventions tailored to small firms (Haddara, 2014). However, the success of such interventions is contingent upon context-specific understanding of the technical and managerial realities faced by target organizations. Therefore, comprehensive studies that quantify the nature and extent of these challenges can inform more effective policies, training programs, and vendor-client relationships in the ERP ecosystem.

2.4. Human Factors and Organizational Change

Beyond technical readiness, the human dimension of ERP implementation plays a pivotal role in shaping outcomes. User resistance, lack of training, and unclear communication about the system's benefits are often cited as major obstacles to successful ERP deployment (Nah et al., 2001). In small industries, employees often wear multiple hats and may lack the time or motivation to learn new software, particularly if the system disrupts familiar workflows (Somers & Nelson, 2004). Without adequate change management strategies, the introduction of cloud ERP can lead to frustration, errors, and decreased productivity. Organizational culture also influences the effectiveness of ERP adoption. Firms that promote openness to innovation, continuous learning, and participatory decision-making are more likely to succeed in integrating ERP systems (Kwahk & Lee, 2008). Conversely, hierarchical cultures where employees have little input into technology decisions may experience alienation or passive resistance, reducing system utilization (Bradley, 2008). Leadership commitment is therefore crucial in modeling positive attitudes toward change and in allocating resources for system integration.

Training programs are another vital yet often overlooked component of ERP success. Studies have shown that even well-designed systems can fail if users are not properly trained or if training is rushed and superficial (Strong et al., 2006). For small industries with limited training budgets, this often results in a skills gap between the capabilities of the system and the competencies of its users. Moreover, the absence of internal ERP champions—staff members who can provide ongoing support—can lead to overreliance on external vendors and further delays in problem-solving (Zach et al., 2014). In addressing these challenges, scholars emphasize the importance of inclusive planning, user-centered design, and gradual implementation schedules (Dezdar & Ainin, 2011). In particular, studies recommend that ERP systems for small industries should be configured to align with existing workflows rather than forcing radical process redesign. Such adaptive strategies increase the likelihood of system acceptance and long-term sustainability. A descriptive quantitative exploration of how these human factors manifest during implementation can thus yield actionable insights for small firms and ERP providers alike.

3. Research Methodology

This study employs a qualitative research methodology grounded in the interpretivist paradigm to explore the challenges associated with the implementation of cloud-based Enterprise Resource Planning (ERP) systems in small industries. The choice of a qualitative approach is motivated by the complex, multifaceted, and context-dependent nature of ERP adoption processes, particularly in resource-constrained environments. Qualitative inquiry provides the flexibility and depth necessary to capture the nuances of technological, organizational, and human factors that shape the success or failure of cloud-based ERP implementation. Given that the aim of this study is not to generalize findings statistically but rather to understand the lived experiences, meanings, and dynamics underlying implementation challenges, a qualitative lens is particularly well suited for the inquiry. The philosophical orientation of this study is based on interpretivism, which emphasizes the role of human interpretation and context in the construction of meaning. Interpretivist researchers view reality as socially constructed, fluid, and influenced by culture, history, and individual experience. In the context of ERP implementation in small industries, different stakeholders—such as owners, IT staff, end-users, and vendors—may perceive and respond to implementation challenges in diverse ways shaped by their roles, knowledge, and expectations. Through an interpretive lens, this study aims to make sense of these varying perspectives by analyzing patterns and themes reported in existing scholarly and practitioner literature. Rather than imposing predefined categories, the research seeks to identify emergent insights from within the data, recognizing the subjective and context-specific nature of organizational change and technology adoption.

The research design is based on a systematic qualitative literature review, which involves collecting, synthesizing, and interpreting data from existing peer-reviewed academic publications, conference

proceedings, and institutional reports that focus on the implementation of cloud-based ERP systems in small industries. A literature-based qualitative methodology is particularly valuable in this case, as it allows the researcher to analyze a wide range of empirical cases and theoretical discussions without being limited to a single field setting. Moreover, the use of secondary data sources, when analyzed rigorously and systematically, can provide rich insights into recurring patterns, divergent outcomes, and emerging debates in the field of ERP adoption. This approach is especially pertinent when direct fieldwork is constrained by access, time, or geographical limitations, or when the goal is to produce a theoretically grounded synthesis of existing knowledge. The process of data collection began with the identification of relevant literature published between 2010 and 2024, a period that reflects the increasing maturity and adoption of cloud-based ERP systems across various regions and industries. Databases such as Scopus, Web of Science, IEEE Xplore, ScienceDirect, and Google Scholar were searched using a combination of keywords, including “cloud ERP,” “implementation challenges,” “small industries,” “SMEs,” “ERP adoption,” and “qualitative ERP studies.” Inclusion criteria required that sources be written in English, explicitly focus on ERP systems hosted on cloud platforms, and discuss or examine challenges within the context of small or medium-sized enterprises. Articles focusing solely on large enterprises or traditional on-premise ERP systems were excluded, as the organizational dynamics and technological requirements in those contexts differ significantly from those of small industries.

The final sample comprised 45 primary sources, including empirical case studies, cross-sectional surveys with qualitative components, theoretical models, and institutional white papers. Each source was imported into ATLAS.ti software to facilitate coding, annotation, and thematic extraction. Thematic content analysis was chosen as the primary method of data analysis due to its suitability for identifying, organizing, and interpreting patterns of meaning across a data set. Following Braun and Clarke’s (2006) six-phase framework, the analysis began with familiarization with the data, followed by the generation of initial codes. These codes were iteratively refined into candidate themes such as “organizational resistance,” “infrastructure inadequacy,” “vendor dependency,” “training deficits,” and “perceived data insecurity.” Each theme was then reviewed and defined in terms of its contribution to the understanding of cloud-based ERP implementation barriers in small industries. To enhance the trustworthiness of the study, multiple strategies were employed. First, triangulation was achieved by including sources from diverse geographical regions and economic contexts, ensuring that the identified themes were not limited to a single cultural or regulatory environment. This cross-contextual analysis allowed the study to capture both globally shared and regionally distinct implementation challenges. Second, reflexivity was maintained throughout the research process, with the researcher documenting analytical decisions, coding changes, and interpretive reflections in a research journal. This helped minimize the risk of bias and promoted transparency in how conclusions were drawn. Third, peer debriefing was conducted by presenting preliminary findings to a group of academic colleagues with expertise in information systems and organizational studies. Their feedback helped challenge assumptions, confirm analytical rigor, and refine thematic interpretations. Lastly, a detailed audit trail was maintained, including keyword search logs, inclusion/exclusion justifications, coding hierarchies, and memos, thereby supporting the credibility and dependability of the research process.

One of the advantages of using a literature-based qualitative design is the ability to synthesize a wide variety of organizational experiences and implementation scenarios, providing a more comprehensive view than single-case fieldwork. However, this approach also presents certain limitations. Since the study relies entirely on published secondary data, it is constrained by the quality, completeness, and interpretive framing of the original sources. There is also a risk of selection bias if relevant literature is inadvertently excluded or if the sample overrepresents particular types of organizations, technologies, or implementation outcomes. Furthermore, while the study identifies general patterns and critical factors, it cannot capture real-time dynamics, emotional responses, or evolving challenges as would be possible in ethnographic or longitudinal field research. These limitations are acknowledged and addressed by clearly defining the scope of the analysis and situating the findings within the boundaries of interpretive qualitative synthesis. Ethical considerations in literature-based qualitative research differ from those involving human participants. Since this study does not involve direct interaction with individuals, informed consent and confidentiality protocols do not apply in the conventional sense. Nevertheless, academic integrity was upheld by properly citing all sources and avoiding any form of plagiarism or misrepresentation. All secondary data were obtained from publicly accessible databases and publications, ensuring that intellectual property rights and access permissions were respected. In addition, care was taken not to misinterpret or overgeneralize the original findings of cited studies. Each interpretation was grounded in the source material, and when possible, contextual details were retained to preserve the integrity of the original insights.

In terms of methodological contributions, this study demonstrates how qualitative literature synthesis can be used as a powerful tool for theory-building and policy guidance in under-researched domains. By applying a rigorous thematic analysis to existing ERP research, the study highlights underexplored dimensions of cloud ERP implementation in small industries, such as emotional resistance, informal learning, and symbolic concerns about technological modernity. These themes may not be readily apparent in traditional surveys or quantitative models but are essential for a holistic understanding of technology adoption in human-centered organizations. The findings also serve as a platform for further empirical research, suggesting hypotheses and categories that could be tested through field interviews, focus groups, or mixed-method studies. This research method also facilitates dialogue between theory and practice. By reviewing and synthesizing both academic and grey literature, the study bridges the gap between scholarly knowledge and real-world organizational experience. The identified challenges are not merely theoretical constructs but are drawn from the documented struggles of practitioners, consultants, and industry stakeholders involved in actual ERP implementation processes. As such, the methodology adopted in this study aligns with the goals of applied qualitative research: to generate insights that are both conceptually robust and practically actionable.

In conclusion, the use of a qualitative literature-based research methodology has enabled this study to explore, interpret, and synthesize the complex array of challenges that small industries face when implementing cloud-based ERP systems. Through a systematic search, rigorous thematic analysis, and interpretivist orientation, the study provides a context-sensitive and theory-informed understanding of ERP adoption in resource-constrained environments. While acknowledging the limitations of relying solely on secondary data, the research nevertheless contributes valuable insights to the academic field and offers a foundation for both policy development and future empirical inquiry. The methodology thus reinforces the importance of qualitative synthesis in expanding our understanding of technological transformation in small industrial organizations.

4. Result And Discussion

The findings of this study, drawn from a rigorous qualitative literature analysis, reveal that the implementation of cloud-based Enterprise Resource Planning (ERP) systems in small industries is characterized by a complex interplay of technological, organizational, and human-centric challenges. These challenges do not occur in isolation but instead manifest as interdependent constraints that shape the overall adoption experience. The qualitative synthesis, grounded in 45 scholarly sources from diverse economic and regional contexts, provides a holistic picture of the barriers that limit the successful deployment and utilization of ERP systems in resource-limited industrial settings. By employing thematic analysis, the study identifies critical themes that illustrate not only the nature of these barriers but also the contextual conditions under which they arise and persist. This section presents a detailed discussion of the study's three major thematic findings: (1) Infrastructure and Technological Deficiencies, (2) Organizational Readiness and Change Resistance, and (3) Human Capacity and Knowledge Gaps. Each of these themes is interwoven with insights on how they hinder implementation progress, as well as their implications for future sustainable ERP adoption strategies. The analysis is contextualized within broader discussions on digital transformation and sustainable innovation in small and medium enterprise (SME) environments.

4.1. Infrastructure and Technological Deficiencies

One of the most persistent barriers to cloud-based ERP adoption in small industries is the inadequacy of digital infrastructure and technological resources. Unlike large corporations that operate with robust internal IT departments, many small enterprises lack the foundational infrastructure required to support cloud-based systems effectively. This includes limited broadband connectivity, outdated hardware, and insufficient data storage policies. Studies reviewed in this research consistently report that small industries in developing and emerging economies experience slow internet speeds, unreliable connections, and frequent downtime, all of which impair real-time ERP access and functionality. Such limitations diminish the value proposition of cloud ERP, which relies heavily on consistent online availability and system responsiveness.

Beyond hardware and connectivity issues, technological immaturity also manifests in the form of legacy systems that are difficult to integrate with cloud platforms. Small industries often operate with fragmented, paper-based, or outdated digital systems, making the transition to a centralized ERP system technically challenging. As noted in several case studies, incompatibility between existing data formats, lack of digital

records, and absence of standardized workflows hinder the seamless data migration necessary for ERP implementation. These incompatibilities not only delay the rollout of cloud ERP systems but also increase dependence on external consultants and vendor support, thereby escalating costs and implementation complexity. Security concerns further complicate technological acceptance. Many small industry actors express skepticism regarding data sovereignty and cybersecurity risks associated with cloud storage. Fear of data breaches, unauthorized access, and legal non-compliance discourage firms from fully trusting external ERP vendors. This is especially acute in countries where cybersecurity laws are still developing or where enforcement mechanisms are weak. Despite the efforts of vendors to offer encryption, multi-factor authentication, and service-level guarantees, the perception of vulnerability persists and deters full-scale adoption.

From a sustainability perspective, these infrastructural and technological deficiencies signal a broader structural challenge in developing equitable access to digital innovation. The digital divide between large corporations and small enterprises may widen if infrastructure investment and policy support are not simultaneously pursued. Therefore, sustainable ERP implementation must include collaborative efforts between governments, industry associations, and technology providers to invest in shared digital infrastructure, provide affordable access to cloud platforms, and develop localized ERP solutions that align with the technical constraints of small industries. Cloud ERP cannot be considered a universally applicable solution until the baseline technological readiness of target industries is addressed systematically and inclusively.

4.2. Organizational Readiness and Change Resistance

In addition to technological hurdles, the study reveals that organizational readiness plays a decisive role in the success or failure of ERP implementation in small industries. Organizational readiness refers to the extent to which a firm is psychologically, culturally, and operationally prepared to adopt a significant technological innovation. Many small enterprises operate within rigidly defined operational hierarchies where strategic decisions are centralized in the hands of a few individuals, often the founders or owners. This concentration of decision-making power can result in delayed approvals, insufficient consultation with key stakeholders, and a top-down implementation approach that excludes employee input and feedback. One recurring issue observed in the literature is the resistance to change from both management and employees. For many small businesses, the current *modus operandi*—however inefficient—is perceived as familiar and manageable. The introduction of an ERP system represents not only a technological shift but a disruption of existing roles, responsibilities, and reporting structures. Employees accustomed to manual or semi-digital processes often resist automation, fearing redundancy or loss of job control. Similarly, managers may perceive ERP as a threat to their autonomy or a challenge to their informal authority, particularly in family-owned enterprises where business decisions are guided more by tradition than by formalized policies.

The lack of formal strategic planning among small industries exacerbates these issues. Many ERP implementations occur without comprehensive feasibility assessments, roadmaps, or risk mitigation frameworks. As a result, organizations often face unforeseen challenges that could have been preempted through better planning. For instance, sudden cost overruns, underestimation of implementation timelines, and unanticipated user training needs create stress within the organization, further reinforcing resistance to the new system. Such challenges reflect a misalignment between organizational culture and the demands of ERP transformation. From the perspective of sustainability, fostering organizational readiness requires more than internal reforms; it calls for a paradigm shift in how small industries engage with digital change. Sustainable ERP adoption should involve participatory decision-making processes, inclusive training, and change management strategies tailored to the organizational structure and culture of small businesses. It also entails the creation of ERP literacy among managers and frontline workers alike. Stakeholder empowerment—rather than top-down imposition—can generate collective ownership of the technology and promote a more enduring and adaptive transformation process. Embedding ERP adoption within long-term strategic thinking, rather than viewing it as a short-term technical fix, is key to creating sustainable digital infrastructure in small industry contexts.

4.3. Human Capacity and Knowledge Gaps

Perhaps the most profound barrier to cloud-based ERP implementation in small industries is the shortage of human capacity and relevant knowledge. The success of ERP systems is deeply dependent on the ability of users to understand, operate, and optimize system functionalities. However, many small

industries face acute shortages of personnel with sufficient technical proficiency, digital fluency, or process management skills. This results in a low rate of ERP feature utilization, suboptimal system configuration, and frequent reliance on vendor intervention for routine tasks. In several reviewed studies, businesses that had implemented ERP systems reported using only a fraction of the available modules due to a lack of user training or comprehension.

The knowledge gap is particularly visible during the early stages of implementation, where system setup and initial customization require a nuanced understanding of both the ERP architecture and the company's internal operations. When internal staff lack this dual awareness, the firm either outsources the process entirely or implements a generic version of the system, often failing to adapt it to their specific workflows. This leads to poor user-system fit, low adoption rates, and ultimately, project underperformance. The issue is further aggravated in rural or less developed regions where access to professional development opportunities and ERP-specific training programs is limited or nonexistent. Furthermore, small industry employees often have multiple responsibilities and limited time to participate in comprehensive training programs. In the absence of dedicated ERP champions or internal trainers, knowledge dissemination remains fragmented and inconsistent. The implementation process, rather than building long-term organizational knowledge, becomes a vendor-led exercise that does not empower users to troubleshoot, adapt, or evolve the system over time. This dependency on external parties contradicts the core value proposition of cloud ERP, which is designed to offer agile and self-managed technological solutions.

To achieve sustainability, ERP adoption must be coupled with long-term human resource development. Sustainable ERP integration requires investment in employee training, the development of modular and context-sensitive learning tools, and the creation of support networks that allow peer-to-peer knowledge exchange among similar small enterprises. Policymakers, vocational institutions, and industry associations can play a key role by designing ERP literacy programs tailored to the needs of small businesses. Cloud ERP vendors must also reconsider their role not merely as technology providers, but as partners in capability building. By embedding knowledge transfer mechanisms into their implementation services, they can contribute to sustainable ERP ecosystems that foster resilience, adaptability, and continuous improvement among small industry users.

5. Conclusion

This study has illuminated the multifaceted and deeply embedded challenges associated with the implementation of cloud-based Enterprise Resource Planning (ERP) systems within small industries. Drawing from an extensive qualitative literature analysis, the research identifies that the barriers to successful ERP deployment are not confined to technical misalignments or financial limitations, but are shaped by a broader matrix of infrastructural inadequacies, organizational unpreparedness, and human capacity constraints. These factors interact with each other in ways that create systemic inertia and render technology adoption a far more complex and fragile process than typically assumed. Technologically, small industries often struggle with inconsistent internet access, outdated IT equipment, and limited internal support capabilities, all of which undermine the core functionalities and accessibility advantages of cloud-based ERP platforms. Organizationally, many of these firms exhibit low levels of readiness for digital transformation, stemming from hierarchical decision-making processes, entrenched informal routines, and a general resistance to change. On the human level, skill shortages, knowledge asymmetries, and the absence of structured training further exacerbate implementation difficulties, rendering the ERP system underutilized or misapplied. As a result, the promise of cloud ERP to democratize enterprise management capabilities remains unfulfilled for many small-scale industrial actors, particularly in emerging economies.

From a theoretical perspective, the findings of this study offer meaningful contributions to the literature on information systems, digital transformation, and SME innovation management. Thematically, this research underscores the necessity of extending ERP implementation frameworks beyond traditional Technology-Organization-Environment (TOE) and Unified Theory of Acceptance and Use of Technology (UTAUT) models to incorporate more nuanced socio-technical and capability-based considerations. These findings suggest that readiness for ERP is not merely a static checklist of technological criteria, but rather a dynamic interplay between contextual enablers, human capital development, and adaptive organizational culture. The study also calls attention to the limitations of vendor-driven success narratives that often overlook the agency, interpretive practices, and resistance strategies of small industry actors. In doing so, it advances the theoretical understanding of digital infrastructure adoption by repositioning ERP not as a plug-and-play solution, but as a socially constructed and negotiated process. Furthermore, by framing ERP

adoption through a sustainability lens, this research contributes to the emerging discourse on inclusive digital transformation, emphasizing the need for systems that evolve in tandem with local capacities, institutional support, and long-term human development goals.

Managerially, the study highlights several implications for business leaders, policymakers, and technology vendors seeking to facilitate the successful and sustainable implementation of cloud-based ERP systems in small industrial contexts. First, decision-makers within small industries must reframe ERP adoption not as a one-time software installation, but as a strategic process of organizational transformation that requires holistic planning, inclusive engagement, and continuous learning. Building organizational readiness—through early stakeholder involvement, transparent communication, and iterative implementation—can mitigate resistance and foster a culture of ownership and adaptability. Second, investment in human capital must be treated as a parallel priority to the technological investment. Without structured training programs, internal ERP champions, and digital literacy initiatives, even the most sophisticated cloud solutions risk failure due to low user competence and confidence. Third, ERP vendors must evolve from system providers to long-term partners in capacity building. This involves developing industry-specific ERP modules tailored to the unique workflows of small enterprises, offering localized support in native languages, and embedding knowledge transfer as a core element of service delivery. Finally, policymakers and development agencies have a vital role to play in reducing the digital divide by funding infrastructure projects, subsidizing ERP access for small firms, and creating regulatory frameworks that protect data security while encouraging innovation. By recognizing the systemic nature of the challenges involved, and by aligning technological solutions with social and organizational realities, stakeholders can transform cloud ERP from a high-risk investment into a sustainable enabler of small industry growth, resilience, and competitiveness in the digital age.

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