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ICT For Development:

Exploring the challenges and CSFs of SAP implementation in the Egyptian public sector

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ABSTRACT (MAX. 200 WORDS):
This thesis explores the challenges and critical success factors (CSFs) of SAP implementation in the Egyptian public sector through qualitative thematic analysis. Insights were obtained from interviews with SAP consultants involved in 28 public sector companies. Key challenges identified include leadership and management issues, resource and infrastructure limitations, organizational culture and employee engagement difficulties, communication and coordination problems, operational inefficiencies, skills and competence gaps, regulatory and compliance challenges, and technology adoption issues. These challenges underscore the complexity of ERP implementations in this context. The research also highlights CSFs essential for successful SAP implementation, such as effective coordination and collaboration, comprehensive training and skill development, robust data management strategies, proactive change management, accurate requirement gathering, effective resource allocation, openness to new technologies, and strong financial risk management. The thesis concludes that addressing these challenges and leveraging the identified CSFs are crucial for successful SAP implementation in

the Egyptian public sector, leading to improved operational efficiency, data management, and organizational control. This approach ultimately contributes to the sector's modernization and efficiency.

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1 Introduction

This chapter provides an introduction to the study, which examines the implementation of SAP within Egypt's public sector, focusing specifically on the unique challenges of ICT4D. The section starts with a background overview, progresses to the aims of our research, and the questions we seek to answer, and outlines the delimitations that define the focus and scope of our inquiry.

1.1 Background

My thesis explores the implementation of SAP, an evolving ERP technology, within the Egyptian public sector to contribute to the expanded research area focusing on inclusivity within the ICT4D literature. ICT4D, as outlined by Andersson and Hatakka (2023), aims to harness the potential of Information and Communication Technologies (ICTs) for advancing the Sustainable Development Goals (SDGs). This field emphasizes four main areas: increased liberty, expanded inclusion, economic productivity, and enhanced well-being, with my research particularly focused on expanded inclusion (Chipidza & Leidner, 2019). The study navigates the challenges posed by rapidly changing technologies, complex social interactions, and the nuanced understanding of development processes, power dynamics, and the impacts of ICTs on these elements (Zheng et al., 2018). By examining the adoption of SAP in Egypt's public sector, I address these issues within a sociotechnical framework, aiming to contribute valuable insights to the ICT4D discourse.

Enterprise Resource Planning (ERP) represents a comprehensive software solution that consolidates various business functions into a unified system featuring a shared database (Lee & Lee, 2000). An ERP system integrates functions such as finance, marketing, manufacturing, and human resources, facilitating real-time data collection, processing, and communication to speed up decision-making and eliminate data redundancy. There are a variety of vendors for ERP solutions; most notably SAP and Oracle.

Established in 1972, the company initially operated under the name System Analysis Program Development (Systemanalyse Programmentwicklung), later abbreviated to SAP (SAP, 2024). Since its inception, it has evolved from a small-scale venture with five personnel to a multinational corporation headquartered in Walldorf, Germany, having a workforce exceeding 105,000 individuals worldwide (SAP, 2024). SAP pioneered the global standard for enterprise resource planning (ERP) software with the introduction of its original SAP R/2 and SAP R/3 software (SAP, 2024). Currently, SAP S/4HANA represents the next revolutionary step in ERP, leveraging in-memory computing capabilities to efficiently process vast data volumes while accommodating advanced technologies like artificial intelligence (AI) and machine learning (SAP, 2024). The company's suite of integrated applications seamlessly connects all facets of business operations onto a digitally driven platform, replacing the legacy, process-oriented systems (SAP, 2024). SAP presently serves over 230 million cloud users, offers over 100 solutions spanning all business functionalities, and has the most extensive cloud portfolio among providers in the industry (SAP, 2024). At SAP, the business model is centred around strategic partnerships. SAP develops products, platforms, methodologies, best practices, and

learning materials. These resources are then utilized through strategic collaborations with consulting firms. These firms employ experts known as SAP consultants, who play a crucial role in configuring SAP products to align with the unique business needs of each of their companies' clients. This collaborative approach ensures that SAP solutions are tailored effectively to meet the diverse requirements of businesses.

The evolution of SAP's implementation methodologies, from the longstanding Accelerated SAP (ASAP) to the more recent SAP Activate Methodology, reflects the company's commitment to providing comprehensive frameworks for successful enterprise software deployment. Since 1997, SAP has advocated for the use of Accelerated SAP (ASAP) as the recommended implementation methodology for enterprises. ASAP, being a phased methodology bears resemblances to the software development lifecycle model commonly adhered to by software engineers (Gulledge & Simon, 2005). Then in 2015, SAP introduced the Despite the Activate Methodology, the implementation and migration to SAP for Hana (S4H) Public Cloud are supported by the SAP Activate Methodology. SAP promotes this methodology as the roadmap for achieving successful implementations of S4H solutions, whether on-premise or in the cloud (Scheck et al., 2019).

SAP has been actively involved in supporting digital transformation across various public sector organizations in Egypt. While specific numbers of companies are not publicly detailed, the implementation of SAP's systems has been significant in key sectors such as petroleum and governmental financial operations. For example, the Ministry of Petroleum in Egypt has adopted SAP S/4HANA to modernize its operations and streamline processes, which is part of a broader effort within the public sector to enhance efficiency and productivity (Magyar, 2020). In terms of specific figures, it's difficult to pinpoint exactly how many public sector companies in Egypt have implemented SAP, but the push for digital transformation by the Egyptian government and the collaboration with SAP suggests a significant and growing number. SAP's engagement with Egypt includes the establishment of a Cloud Data Centre and collaboration with the Ministry of Communications and Information Technology to support digital skills and technological innovation (SAP MENA, 2022)

The Ministry of Communications and Information Technology (MCIT) is dedicated to the vision of a "Digital Egypt," where technology seamlessly integrates into every aspect of Egyptian society (MCIT, 2024). With this goal in mind, MCIT is committed to developing the nation's ICT infrastructure and enhancing digital services across governmental agencies (MCIT, 2024). By doing so, it aims to optimize the performance of ministries and other governmental bodies, elevating the quality and efficiency of services provided (MCIT, 2024). This involves creating a productive work environment, facilitating informed decision-making, and addressing societal challenges (MCIT, 2024). The strategic focus of digital transformation in Egypt revolves around elevating citizens' quality of life through enhanced services, fostering a digitally connected government, and advancing e-governance principles such as transparency and accountability through collaboration with various societal stakeholders like universities, the private sector, and civil society organizations (MCIT, 2024). Through these concerted efforts, Egypt aims to realize a future where technology serves as a catalyst for positive societal change (MCIT, 2024). The MCIT considers SAP to be one of the most notable stakeholders that would enable the Egyptian government to achieve its "Digital Egypt" vision. This is evident by what Dr. Amr Talaat, Egypt's Minister of Communications and Information Technology said "Investments and partnerships with global technology innovators such as SAP support our endeavours to produce a generation of competent technology leaders. Such calibres

will lead the country's digital transformation endeavours and contribute to building Digital Egypt" (SAP MENA, 2022).

1.2 Problem Area

In general, Implementing SAP involves challenges like aligning unique systems with re-engineered business processes, integrating strategy, and overcoming technical, cultural, and organizational issues while also managing timelines and evaluating benefits (Martin & Cheung, 2000; Yusuf et al., 2004; Zhao, 2004). Critical success factors for SAP implementation include managing costs, and schedules, achieving goals, ensuring system fit, overcoming organizational resistance, fostering learning, appointing experienced leaders early, and breaking large projects into manageable parts (Parr & Shanks, 2000; Sun et al., 2005; Zhong Liu & Seddon, 2009).

The bulk of the literature addressing the challenges and critical success factors (CSFs) associated with the implementation of SAP systems predominantly originates from developed countries. This geographical skew offers a limited perspective, particularly when considering the unique challenges faced by developing nations. Among the existing studies from developing regions, there is a notable focus on general ERP system implementations, discussing various success factors without specifically addressing the unique challenges and CSFs of different ERP systems. This indicates a significant research gap in understanding the specific challenges and CSFs associated with SAP implementation in these contexts.

Moreover, existing research tends to concentrate on the end-users of SAP systems rather than the consultants responsible for their implementation. This focus omits crucial insights from those who are intimately involved in the initial and most critical phases of the ERP lifecycle. The absence of detailed studies from the perspective of SAP consultants limits the comprehensiveness of current understandings in both developing and developed countries.

Another area that remains underexplored regardless of the geographical region is the implementation of ERP systems within the public sector, particularly in the context of e-governance and digital transformation initiatives. While there is substantial discourse surrounding the digitization of public services and e-government frameworks, less attention is paid to the specifics of ERP implementation in this sector. This is especially prominent for developing countries where public sector institutions often face unique challenges that differ significantly from those encountered by their counterparts in the private sector.

In the case of Egypt, a notable study has attempted to create a quantitative model to predict the success index of ERP implementations (El Sawah et al., 2008). However, the researcher has acknowledged the need for further investigation to address certain limitations. It is suggested that future research should include in-depth case studies to provide a richer understanding of the actual challenges and success factors experienced during ERP implementations in Egypt. Such studies would benefit from a dual approach combining detailed case studies with extensive surveys to draw a more comprehensive picture.

Specifically, there is a compelling need for research that focuses on the experiences of SAP consultants who have implemented these systems in the Egyptian public sector. By examining

the perspectives of these consultants, future studies could uncover nuanced insights into the practical challenges and effective strategies for successful ERP implementation. This approach would not only enrich the existing body of literature by providing a focused study on a significantly underrepresented group but also enhance the understanding of ERP implementation in a critical and complex environment.

Therefore, conducting such research is essential for developing targeted strategies that could facilitate more effective and efficient ERP implementations in the public sector, potentially leading to better governance and public service delivery. Moreover, this research could serve as a foundational stone for policymakers and IT leaders in developing countries to devise contextually appropriate ERP strategies that align with their developmental goals and administrative capacities. By filling this gap, scholarly discourse can provide actionable insights that extend beyond theoretical discussions, offering tangible benefits to those involved in or affected by ERP implementations in similar contexts. Additionally, it would shed light on how applying standard Western methodologies in local settings without substantial adjustments might lead to suboptimal results.

1.3 Objective and Purpose

The primary objective of this study is to understand the challenges and critical success factors (CSFs) associated with implementing SAP products within the Egyptian public sector. By focusing on this specific area, the research seeks to provide valuable insights that can enhance the effectiveness and efficiency of SAP system implementations in this vital sector. This goal is pursued through a series of semi-structured interviews with functional SAP consultants who have direct experience with these implementations, offering a perspective that is rich in practical and situational knowledge.

Additionally, this study aligns with the broader academic endeavour of decolonizing Information and Communication Technology for Development (ICT4D). This involves challenging and re-evaluating Western-centric IT practices and theories, reconceptualizing them to better fit the cultural, economic, and political realities of non-Western countries. In the context of Egypt, a country with its own unique set of values and operational paradigms, this study aims to contribute to the decolonization of ICT4D by grounding research in local experiences and viewpoints. By doing so, it helps in reconstructing the understanding of technology implementation in ways that resonate more closely with Indigenous value systems.

The purpose of this study is therefore twofold. Firstly, it seeks to fill a significant gap in the existing literature regarding ERP implementations, particularly from the viewpoint of SAP consultants in the Egyptian public sector. Insights garnered from this study are expected to guide future implementations, offering strategies and practices that are informed by local experiences rather than imposed external models. Secondly, by documenting and analysing the specific challenges and successes encountered in the Egyptian context, this study contributes to a more nuanced global dialogue about how ERP systems can and should be adapted to different cultural and administrative contexts.

This research not only aims to add to the academic knowledge base but also to provide practical guidance for policymakers, IT professionals, and administrative leaders in Egypt and

similar environments. The findings are intended to support the development of more culturally attuned and effective ERP systems that are capable of supporting public sector reform and digital transformation initiatives. Through this approach, the study embodies the principles of decolonizing ICT4D, promoting a more equitable and context-aware perspective in technology research and implementation.

1.4 Research Question

- What are the key challenges and critical success factors for implementing SAP systems within the Egyptian public sector?

1.5 Delimitation

This study aims to deepen the understanding of the challenges and critical success factors (CSFs) encountered during the implementation of SAP systems in the Egyptian public sector. This research, conducted through semi-structured interviews with functional SAP consultants, seeks to illuminate the unique perspectives and insights of these key stakeholders who have firsthand experience with such implementations. The focus on this specific group of professionals, whose experiences are often underrepresented in the broader discussions on ERP implementations, enhances the value of the study by offering a detailed exploration of nuanced their views on the subject matter.

However, the methodology and scope of this study inherently include several limitations that must be acknowledged. First, the participant pool is confined to functional SAP consultants involved in public sector implementations. While this specific focus allows for an in-depth examination of particular experiences and viewpoints, it restricts the generalizability of the findings. The insights derived from this narrow group might not fully represent the experiences of other stakeholders, such as end-users, IT staff, or management teams. Consequently, these limitations are critical to consider when applying the results to other contexts or in the formulation of generalized policies.

Moreover, since the research concentrates exclusively on SAP implementations within public sector organizations in Egypt. This geographic and sectoral focus means that the findings may not be entirely applicable to other regions or sectors that may differ in cultural, economic, and regulatory environments. The unique challenges and success factors identified through this study could be heavily influenced by local conditions that are specific to the Egyptian public sector, thus limiting the broader applicability of the results.

Another consideration is the potential for interview bias, which is inherent in qualitative research methods such as semi-structured interviews. Consultants may have personal biases based on their professional experiences, which could skew the information they provide. Additionally, the interpretation of these interviews by the researcher could introduce another layer of bias, potentially influencing the analysis and conclusions drawn from the study. This subjectivity must be carefully managed to ensure the reliability and validity of the research findings.

Furthermore, the study relies on the retrospective accounts of SAP implementation projects, which may be affected by the passage of time and the current perceptions of the consultants. This retrospective analysis can lead to memory decay or post-rationalization, where consultants may reconstruct their experiences in a manner that seems logical but might not accurately reflect the actual events or conditions at the time of the implementation.

Despite these limitations, the research conducted is vital for advancing our understanding of ERP system implementations in less explored contexts, such as the Egyptian public sector. By examining the specific experiences and challenges faced by SAP consultants, this study not only contributes to the academic literature on ERP implementations but also provides valuable insights for practitioners and policymakers involved in similar projects. The findings could assist in developing more effective implementation strategies tailored to the needs and conditions of the public sector in developing countries, leading to more successful ERP system implementations and improved public service delivery. This research thus offers a significant step forward in filling a gap in the information systems literature, providing a unique lens through which to view the complexities of public sector ERP projects.

2 Literature Review

2.1 Information and Communication Technologies for Development (ICT4D)

ICT4D refers to the utilization of information and communication technologies within the context of global development objectives (Walsham, 2017). It emphasizes how technology can bring about positive changes in less-developed areas while aiming to enhance developmental outcomes on a broader scale (Sein et al., 2019). ICT4D is recognized as a multidisciplinary domain where technology, social dynamics, and development intersect (Sein et al., 2019). It underscores the significance of information and communication technologies in driving societal transformations by empowering individuals and communities digitally (Sein et al., 2019). In ICT4D, there are diverse approaches to participation in ICT4D projects, ranging from top-down, hierarchical structures to collaborative, community-driven initiatives (Singh & Flyverbom, 2016). In summary, ICT4D research is fundamentally about leveraging technology to address the unique challenges of development, aiming to create equitable growth and empower marginalized communities.

The history of ICT4D is marked by increasing sophistication in both theoretical and methodological approaches, aiming to better align technological interventions with the complex, multifaceted nature of developmental challenges. In the mid-1980s, ICT4D emerged as an academic endeavour within the information systems field (Walsham, 2017). Initially, its primary focus was on utilizing ICTs to aid development in less economically advanced nations (Walsham, 2017). The emphasis is based on comprehending and facilitating how ICTs could foster socio-economic progress by enhancing both access to information and communication channels (Walsham, 2017). During the 1990s and 2000s, the scope of ICT4D broadened as ICTs gained widespread global adoption (Sein et al., 2019). The field extended beyond its roots in information systems, encompassing a wider array of disciplines (Sein et al., 2019). Scholars began to critically examine the socio-economic impacts of ICT in developing nations, employing sophisticated theoretical frameworks such as the Capability Approach, Affordances, and Actor-Network Theory (Sein et al., 2019). This era also witnessed a growing emphasis on understanding the transformative processes that connect ICT with development processes (Sein et al., 2019). In the 2010s and onwards, contemporary research in ICT4D has advocated for a 'strong critical' perspective, emphasizing a thorough examination of post-colonial states, local histories, and the influence of global agreements like the Washington Consensus (De´ et al., 2018). This phase underscores the importance of comprehending the unique developmental contexts and the effects of both external and internal power dynamics on ICT4D endeavours (De´ et al., 2018). Additionally, there is a growing call for increased involvement of research beneficiaries and a shift towards decolonizing ICT4D to challenge Western-centric research paradigms (De´ et al., 2018).

The main goals of ICT4D focus on leveraging technology to achieve various development outcomes in underdeveloped regions. ICT4D encourages socioeconomic advancements by improving information access and communication channels in developing nations (Chipidza & Leidner, 2019). The overarching goal is to leverage ICT to catalyse positive social and economic transformations, including increased economic productivity, broader social inclusivity,

and improved overall well-being within these societies (Chipidza & Leidner, 2019). ICT4D aligns with the United Nations' Sustainable Development Goals (SDGs), utilizing technology to push forward such as quality education, gender equality, diminished inequalities, and sustainable urban and community development (Rothe et al., 2022). This objective, in particular, prioritizes universal, global, and integrated developmental goals to guarantee that technological interventions make constructive contributions across various SDGs (Rothe et al., 2022). ICT4D research is placing growing emphasis on the significance of context-specific strategies, which take into account local socio-cultural nuances, political landscapes, and economic conditions (De´ et al., 2018). This objective entails a critical engagement with the environments in which ICT4D initiatives are implemented, ensuring that interventions are relevant and impactful (De´ et al., 2018). These goals collectively aim to use ICT as a tool to achieve broader development aims, focusing on both the direct benefits of technology and the necessary conditions that enhance its impact

The areas and themes in ICT4D research are diverse, reflecting the interdisciplinary nature of the field and its evolution over the years. ICT4D research delves into the link between development and technology, investigating how technologies intersect with and can potentially reshape development processes (Zheng et al., 2018). A notable emphasis lies in evaluating the socioeconomic results of ICT4D endeavours, with research scrutinizing the field for its frequent inability to achieve or prove significant impacts in practical settings (Harris, 2016). Continuous critique and self-reflection are evident within the domain, grappling with issues such as the neoliberal tendencies inherent in ICT4D approaches, Eurocentrism, and the importance of ethical deliberation in both research and implementation (Schelenz & Pawelec, 2022). Developing robust evaluation frameworks is pivotal for comprehending the outcomes and effects of ICT4D initiatives, highlighting the importance of encompassing various dimensions of evaluation in these frameworks (Mthoko & Khene, 2018). ICT4D draws upon a spectrum of theoretical underpinnings, encompassing the Capability Approach, Affordances, Actor-Network Theory, and Social Capital. These theories aid in explaining how ICT can facilitate development within marginalized communities (Sein et al., 2019). These themes highlight the field's complexity and the necessity of an integrated approach that combines theoretical depth with practical insights, aiming to effectively achieve ICT for development purposes.

There are several theoretical frameworks and models for the ICT4D literature. The Capability Approach highlights supporting the capacities of individuals and communities to attain diverse developmental outcomes via ICT (Johri & Pal, 2012). It underscores technology's role in broadening the capabilities and opportunities accessible to marginalized populations (Johri & Pal, 2012). Affordances Theory examines the potential actions facilitated by technologies in a developmental context (Sein et al., 2019). It investigates how various ICT tools can create fresh opportunities for action and interaction within communities (Sein et al., 2019). Actor-network theory (ANT) scrutinizes the networks established among diverse human and non-human entities, including technologies, and their impact on developmental outcomes (Sein et al., 2019). It offers an intricate analysis of how ICTs are integrated into social practices and their potential to help achieve development (Sein et al., 2019). Social Capital Theory explores how ICT can Increase social connections and trust within a community by nurturing networks of relationships among individuals, facilitating cooperation and coordination for mutual advantage, thus strengthening developmental endeavours (Sein et al., 2019). Critical Realism offers a framework for comprehending the tangible effects of ICT interventions in the real world, acknowledging the intricate interplay of social, economic, and political factors that influence the outcomes of ICT4D projects (Andoh-Baidoo, 2017). It underscores the importance

of a profound understanding of context to explain the reasons behind the success or failure of specific ICT4D initiatives (Andoh-Baidoo, 2017). Comprehensive Evaluation Models advocate for thorough assessments of ICT4D interventions, incorporating multiple dimensions such as strategic value, significant change, empowerment, budgeting, and sustainability (Mthoko & Khene, 2018). This holistic approach aims to enhance understanding and measurement of the impact of ICT on development (Mthoko & Khene, 2018). These frameworks and models offer diverse perspectives and tools for examining the complex interactions between technology and development, helping researchers and practitioners to design, implement, and evaluate ICT4D initiatives more effectively.

The evolving landscape of ICT4D research emphasizes multidisciplinary approaches, holistic perspectives, and decolonization efforts for more inclusive and sustainable development practices. There is an increasing acknowledgment of the necessity for an interdisciplinary approach in ICT4D research, aimed at bridging the divide between researchers, practitioners, and policymakers (Walsham, 2017). This encompasses discussions concerning the role of theory, the selection of topics, and the influence of research on development practices (Walsham, 2017). A notable discourse in ICT4D revolves around the absence of a unified narrative that harmonizes various theoretical viewpoints to comprehensively grasp how ICT drives development (Walsham, 2017). There is a movement towards adopting holistic perspectives that incorporate theories such as the Capability Approach, Affordances, Actor-Network Theory, and Social Capital (Sein et al., 2019). A pivotal discussion revolves around the level of engagement and impact of ICT4D research has on the intended communities. Critiques suggest that researchers and institutions may not be sufficiently engaging with users or effectively disseminating their findings to influence both practice and policy (Harris, 2016). Recent dialogues underscore the significance of critical and context-specific methodologies in ICT4D research (De´ et al., 2018). This involves grasping the socio-economic shifts in developing nations and the intricate local histories and cultural dynamics that shape the implementation and utilization of ICT (De´ et al., 2018). There is a growing recognition of the imperative to decolonize ICT4D research, emphasizing a transition from Western-centric to more indigenous theoretical frameworks (Khene & Masiero, 2022). This endeavour entails critically scrutinizing the politics inherent in ICT4D and confronting biases that could influence knowledge production (Khene & Masiero, 2022). These discussions reflect a broader evolution within the ICT4D field towards more inclusive, reflective, and context-aware research practices, aiming to ensure that the benefits of ICT truly contribute to sustainable development.

2.2 Decolonizing Information and Communication Technologies for Development

Decolonizing ICT for Development (ICT4D) involves reevaluating and reshaping the practices and methodologies in deploying information and communication technologies in development contexts, particularly those that perpetuate colonial dependencies or power imbalances. There is a growing recognition of the importance of decolonizing ICT4D research, emphasizing a transition from Western-centric to more indigenous theoretical frameworks. (Khene & Masiero, 2022). This endeavour entails critically scrutinizing the politics inherent in ICT4D and confronting biases that could influence knowledge production (Khene & Masiero, 2022). Decolonizing ICT4D holds significant importance as it advocates for the incorporation of indigenous knowledge and practices into the design of technological solutions

(Khene & Masiero, 2022). This approach enhances the likelihood of sustainability and effectiveness of development efforts (Khene & Masiero, 2022). It also counters the imposition of external solutions that may lack contextual relevance, fostering technological self-reliance and innovation within local contexts (Khene & Masiero, 2022). Failing to decolonize ICT4D practices may perpetuate dependency on Western technology and expertise, diminishing local capacities and innovation (Khene & Masiero, 2022). This reliance can hinder local economic and technological advancement, perpetuating a cycle where local needs and contexts are inadequately addressed, resulting in ineffective development interventions (Khene & Masiero, 2022). This focus highlights the shift towards a more equitable, context-aware, and sustainable approach to using ICTs in development efforts.

The discourse on decolonizing ICT for Development (ICT4D) incorporates a range of theoretical frameworks that help critique and reshape the conventional approaches to technology deployment in development contexts. Postcolonial Theory offers insights into the enduring impacts of colonialism on present-day development endeavours and explains how ICT can perpetuate neo-colonial structures unless actively countered (Khene & Masiero, 2022). It calls for a reassessment of the power dynamics inherent in the transfer of ICTs from developed to developing nations (Khene & Masiero, 2022). Subaltern Studies, originating from South Asian historiography, centre on the viewpoints and voices of marginalized individuals often excluded from mainstream development discourses (Khene & Masiero, 2022). Within ICT4D, this approach highlights the significance of amplifying the voices of communities typically disregarded in top-down technological implementations (Khene & Masiero, 2022). It confronts conventional ICT4D narratives that frequently overlook local realities (Khene & Masiero, 2022). Theories of Technological Sovereignty advocate for the empowerment of local communities to govern their technological landscapes (Khene & Masiero, 2022). They endorse the creation and utilization of indigenous technologies that cater to local needs and are devoid of external influence (Khene & Masiero, 2022). This framework facilitates the cultivation of autonomous and enduring technological capacities within marginalized communities (Khene & Masiero, 2022). These frameworks highlight the need to consider local cultures, knowledge systems, and power dynamics within ICT projects.

In crafting a study on the challenges and critical success factors in implementing an ERP platform like SAP in the Egyptian public sector, Postcolonial Theory emerges as particularly interesting. This choice is based on its profound ability to scrutinize and articulate the power dynamics inherent in the transfer and adaptation of Information and Communication Technologies (ICTs) from developed to developing contexts.

Postcolonial Theory provides a critical lens through which one can evaluate the nuances of implementing Western-developed artifacts within a non-Western setting. It highlights how such technologies can unintentionally maintain existing power imbalances or introduce new forms of dependency. This is critical in the context of the Egyptian public sector where institutional legacies, local administrative cultures, and practices might be at odds with the norms and functionalities embedded in a standard SAP system and its implementation methodology. Furthermore, the theory aids in exploring how the adoption of SAP could either challenge or reinforce neo-colonial structures. It allows for a deeper understanding of how SAP, as a product of Western corporate culture, is received and adapted in a public sector environment that is influenced by different historical, cultural, and administrative contexts. This includes assessing whether the implementation process respects local expertise and meets actual needs or simply imposes a one-size-fits-all solution that might not be optimal. Thus, while other

theories like Subaltern Studies and theories of Technological Sovereignty offer valuable perspectives on inclusivity and local empowerment, Postcolonial Theory directly addresses the overarching power relations and cultural exchanges involved in technology transfer. It is instrumental in dissecting the layers of influence that a global system like SAP imposes, making it an important framework for analysing ERP implementations in transitional and developing country contexts. This approach not only enriches the discourse on technology adoption in such settings but also aligns with broader concerns about equity, autonomy, and development in the postcolonial world.

Decolonizing approaches to ICT for Development (ICT4D) could significantly transform practices and outcomes in the field. Decolonizing ICT4D highlights the importance of empowering local communities to exert greater influence and participation in technology development processes that impact them (Khene & Masiero, 2022). This transition towards community-cantered development ensures that ICT solutions are not only culturally relevant but also more effectively address the needs and aspirations of the people (Khene & Masiero, 2022). Empowerment fosters enhanced community ownership and improved adoption of ICT initiatives (Khene & Masiero, 2022). Decolonizing ICT4D by integrating local knowledge systems and practices can enhance the sustainability of technology interventions (Khene & Masiero, 2022). Technologies crafted with a profound grasp of local contexts are apt to be more environmentally sustainable and economically viable in the long run (Khene & Masiero, 2022). This approach avoids the pitfalls of deploying technologies unsuited to the specific environmental, social, and economic conditions of the community (Khene & Masiero, 2022). Decolonizing ICT4D additionally strives to rectify disparities in technology access and governance (Khene & Masiero, 2022). By contesting the centralization of technological control and fostering local participation, it advocates for a more equitable distribution of technological advantages (Khene & Masiero, 2022). This diminishes reliance on external technologies and cultivates local capabilities in developing and managing ICT resources effectively (Khene & Masiero, 2022). In summary, decolonizing ICT4D could lead to a paradigm shift where development is not only about the introduction of technology into communities but about the holistic integration of these technologies into the socio-economic fabric of these communities, ensuring that technology serves as a true enabler of development. This approach helps mitigate the risks of neo-colonialism in ICT4D and fosters a more inclusive and sustainable development pathway.

2.3 Enterprise Resource Planning (ERP) systems

Enterprise Resource Planning (ERP) systems are defined in a variety of ways across the literature, reflecting their extensive application and significant influence on business operations. As tools for comprehensive business integration, ERP systems are engineered to consolidate all primary business processes to boost efficiency and secure competitive advantages (Nah et al., 2001). They link diverse business functions such as accounting, finance, human resources, and production to facilitate streamlined operations and cohesive information flows within organizations (Nah et al., 2001). ERP systems have a profound impact on companies by centralizing and automating business processes and data management, moving from isolated departmental systems to integrated, organization-wide applications (Sternad et al., 2011). This transformative aspect is especially critical in areas like accounting, where ERP systems contribute

to the enhancement of reporting of financial and non-financial measures and the implementation of management controls (Sternad et al., 2011).

Enterprise Resource Planning (ERP) systems play a pivotal role in integrating various business functions such as accounting, finance, human resources, supply chain, production, and distribution. By facilitating a seamless flow of information across these departments, ERP systems promote efficient decision-making and enhance coordination within organizations (Waheed & Abbas, 2023). These systems streamline operations through the automation of routine tasks and real-time data provision, thereby increasing operational efficiency and reducing costs (Waheed & Abbas, 2023). They also centralize various financial functions, which improves financial reporting, budgeting, and compliance management, ultimately enhancing an organization's financial performance (Epizitone & Olugbara, 2019). Furthermore, ERP systems contribute to improved supply chain management by optimizing procurement, inventory management, and logistics, which helps reduce lead times and increase operational efficiency (Metaxiotis & Liagkouras, 2017). Additionally, the inclusion of customer relationship management (CRM) components within ERP systems helps businesses improve customer interactions and service, thus boosting customer satisfaction and loyalty (Jagoda & Samaranayake, 2017). The comprehensive, accurate, and real-time business data provided by ERP systems support superior decision-making at all management levels, enabling companies to respond more adeptly to market conditions and business opportunities (Sternad et al., 2011).

The deployment of ERP systems can also be critically analysed through cultural frameworks, acknowledging the profound organizational changes they induce. These systems often standardize business solutions, affecting how an organization’s culture adapts to and integrates these technologies (Boersma & Kingma, 2005). In specific sectors, ERP systems are tailored to meet the unique and complex demands of industries like construction or education, demonstrating their versatile application. However, this also underscores the challenges faced in sectors where generic ERP solutions may not fully meet specific needs (Waheed & Abbas, 2023). This nuanced understanding of ERP implementation across different cultural and sectoral contexts highlights the importance of adapting ERP solutions to meet the diverse requirements of various industries, ensuring their effective integration and utilization.

The transformation of Enterprise Resource Planning (ERP) systems from basic Material Requirements Planning (MRP) to today's comprehensive, integrated systems underscores the swift progress in business technology (Powell et al., 2013). Initially centred on inventory control, the early MRP systems evolved into Manufacturing Resource Planning (MRP II), which added functionalities like demand forecasting, maintenance scheduling, and financial management (Powell et al., 2013). These enhancements provided the foundation for more holistic ERP systems (Powell et al., 2013).

By the early 1990s, these systems had advanced into what are now known as ERP systems, which integrate all fundamental functions of an enterprise into one comprehensive system (Dziembek, 2021). This integration was designed to streamline processes and data throughout the organization, thereby enhancing operational efficiency (Dziembek, 2021). The ERP systems from this period represented a major shift from the previously compartmentalized focus of MRP and MRP II, delivering a unified view of the entire enterprise’s operations (Dziembek, 2021). The evolution continued into the late 1990s and early 2000s with the emergence of ERP II, which broadened ERP functionalities to encompass external business

interactions and e-business capabilities (Dziembek, 2021). This development extended the systems' reach to include a wider variety of functions and industries, such as supply chain management, customer relationship management, and more, allowing ERP systems to accommodate the increasingly intricate network of global business interactions (Dziembek, 2021).

Today's ERP systems are characterized by even greater integration, incorporating advanced analytics, cloud computing, and mobile accessibility (Dziembek, 2021). Current trends emphasize real-time data processing, improved user interfaces, and enhanced connectivity through technologies such as the Internet of Things (IoT) (Dziembek, 2021). These systems are increasingly flexible, adapting to the digital economy's needs and enabling businesses to respond more effectively to global market dynamics (Dziembek, 2021). The ongoing evolution suggests a future where ERP systems are integrated with advanced technologies like AI and machine learning, offering even more powerful tools for enterprise management (Dziembek, 2021).

Enterprise Resource Planning (ERP) systems consist of various integrated modules that serve different functional areas within an organization. Each module aligns with a key business function, providing a cohesive interface and streamlined processes across the enterprise (Nah et al., 2001). The Finance Module is essential for financial reporting, ledger management, budgeting, and financial analysis, playing a crucial role in managing the economic health of the organization and ensuring compliance with accounting standards and regulations (Nah et al., 2001). The Human Resources (HR) Module deals with employee records, payroll, recruitment, and benefits administration, enhancing the management of human capital by integrating employee-related processes (Pekša & Grabis, 2018).

The Manufacturing Module supports production planning, work scheduling, daily production monitoring, and product forecasting. Manufacturing firms need to streamline their production processes and maintain operational efficiency (Arachchi et al., 2019). The Supply Chain Management (SCM) Module handles logistics, procurement, order processing, and inventory control (Aggarwal et al., 2021). This module is instrumental in optimizing supply chain operations and improving responsiveness to market demands (Aggarwal et al., 2021).

The Project Management Module within Enterprise Resource Planning (ERP) systems aids in project planning, resource allocation, progress tracking, and project costing. This module is particularly valuable for companies managing multiple projects concurrently, helping to ensure that projects are delivered on time and within budget (Alshalfi, 2018). ERP systems' integrated nature allows for uninterrupted data flow among these modules, diminishing the need for multiple standalone systems. This integration not only improves data accuracy but also provides deeper insights into business operations, which aids in better decision-making and strategic planning (Chaushi et al., 2018). Such a cohesive framework allows organizations to achieve higher operational efficiency and more dynamically adapt to market shifts and internal demands.

Enterprise Resource Planning (ERP) systems deliver substantial benefits across organizations by enhancing efficiency, accuracy, and overall operational effectiveness. By integrating core business processes, ERP systems significantly boost operational efficiency, minimizing the time and effort needed for data entry and streamlining workflows across various departments including inventory management, procurement, and sales (Alshalfi, 2018). This integration facilitates optimized processes that improve the flow of operations. Furthermore, ERP

systems offer comprehensive financial management tools that enhance the accuracy of financial reporting, improve compliance, and aid in better cash flow management, leading to improved financial planning and analysis (Grabski et al., 2011).

Additionally, ERP systems afford visibility into all aspects of business operations, enabling management to access real-time information for more informed decision-making. This enhanced visibility improves accuracy in forecasts and increases customer satisfaction by providing a clearer view across the supply chain (Munthe, 2022). By standardizing business processes across various departments and geographical locations, ERP systems simplify complex operations and eradicate inefficiencies, which is particularly crucial for large organizations that operate in multiple locations or countries (Aloini et al., 2016). As organizations expand, these systems are designed to accommodate growth seamlessly, eliminating the need for major changes or additional systems (Arachchi et al., 2019). Moreover, ERP systems improve data security and quality through centralized data management, featuring advanced user permissions and access controls that mitigate the risk of data breaches and ensure uniformity and accuracy of data throughout the organization (Botta-Genoulaz & Millet, 2006). Moreover, while ERP systems necessitate an initial outlay, they can ultimately result in substantial cost reductions by automating routine tasks, decreasing labor costs, and minimizing errors that could lead to expensive corrections (Bajahzar et al., 2012). These benefits collectively underscore the significant value that ERP systems add to organizations, not only facilitating day-to-day operations but also enhancing strategic planning and management.

2.4 SAP

SAP, originally known as Systemanalyse Programmentwicklung (System Analysis Program Development), is recognized as a global leader in enterprise resource planning (ERP) software (Iriberri et al., 2015). Founded in 1972 by five former IBM employees in Mannheim, Germany, SAP initially focused on developing a real-time data processing system to facilitate business operations by integrating different business functions into one coherent system (Iriberri et al., 2015). The company's first product, SAP R/1, launched in 1973, laid the groundwork for a comprehensive suite of applications that processed data as users entered it (Iriberri et al., 2015). This innovation was succeeded by the more advanced SAP R/2 in the late 1970s, which supported multiple languages and currencies, setting the stage for international expansion (Iriberri et al., 2015). A significant breakthrough occurred with the release of SAP R/3 in 1992, which transitioned from a mainframe environment to a client-server architecture, greatly expanding SAP's market due to the scalability and affordability of servers (Iriberri et al., 2015).

SAP's innovative approach to ERP software has enabled businesses to streamline their operations by integrating all facets of operational management into one software environment, significantly improving data management and access. Over the years, SAP has continually evolved its product offerings to include SAP S/4HANA, launched in 2015, which leverages in-memory computing to process large amounts of data and supports advanced technologies such as artificial intelligence (AI) and machine learning within business processes (Sirse et al., 2023). Today, SAP is one of the world's leading providers of ERP systems and software solutions, helping organizations of all sizes and industries run their operations more

efficiently (Iriberri et al., 2015). The company's global reach and impact underscore its critical role in the digital transformation journeys of businesses worldwide (Iriberri et al., 2015).

SAP implementation methodologies provide comprehensive frameworks that guide organizations through the various stages of deploying SAP ERP systems, ensuring successful adoption and optimal utilization across different organizational functions. Multiple SAP implementation methodologies are discussed here with insights from multiple scholarly sources. The Accelerated SAP (ASAP) methodology is designed to facilitate quick and efficient implementation of SAP systems (Gulledge & Simon, 2005). It includes a structured roadmap with five phases: Project Preparation, Business Blueprint, Realization, Final Preparation, and Go Live Support. This methodology reduces implementation time and costs by utilizing pre-configured templates and business processes, which streamline the adoption process (Gulledge & Simon, 2005).

Another approach is the SAP Launch Methodology, which is specifically tailored for implementing SAP S/4HANA, the next-generation ERP suite. This methodology aims for simpler and faster implementations and can be applied in cloud, on-premise, or hybrid settings (Archana et al., 2022). It incorporates agile principles that emphasize flexibility and continuous improvement throughout the implementation process, ensuring that the system adapts to the evolving needs of the organization (Archana et al., 2022). The SAP Activate Methodology is a modular and agile framework specifically designed for the implementation or migration of SAP solutions, including SAP S/4HANA (Scheck et al., 2019). It provides content and guidance throughout the project lifecycle, from planning and preparation through deployment and support (Scheck et al., 2019). The methodology is structured around six phases: Discover, Prepare, Explore, Realize, Deploy, and Run. These phases help organizations manage the complexity and risks of implementing SAP solutions by providing clear guidance and tools at each step (Scheck et al., 2019). These methodologies demonstrate the strategic planning and structured approaches necessary for successful ERP system deployment, highlighting the importance of tailored solutions that align with specific organizational requirements and contexts. Each of these methodologies provides a structured approach to implementing SAP ERP systems, ensuring that strategic business goals are met, risks are managed effectively, and the full potential of SAP solutions is realized within the organization. By following these methodologies, companies can improve their operational efficiency, data accuracy, and decision-making capabilities, leading to enhanced overall business performance

2.5 Challenges in implementing Enterprise Resource Planning (ERP) systems

Implementing Enterprise Resource Planning (ERP) systems involves several complex challenges that vary across organizations but share common themes in the literature. One of the main challenges is managing the cultural and operational shifts during the transition to a new ERP system, which often faces resistance from within the organization (Ranjan et al., 2016). Effective communication and leadership are crucial to managing this change (Ranjan et al., 2016). Additionally, aligning ERP systems with existing business processes can be difficult, often requiring extensive customization and reengineering of workflows, leading to extended deployment times and increased costs (Hawking et al., 2007). Ensuring that staff are adequately trained and competent in using the new ERP system is also vital; inadequate training

can lead to underutilization and failure to realize the full benefits of the ERP investment (Nah et al., 2001). Furthermore, ERP implementations are notorious for exceeding budgets due to unforeseen costs associated with customization, integration, and extended implementation timelines, making cost and budget management a significant challenge (Salimi & Dankbaar, 2008).

Navigating The integration of ERP systems with existing IT infrastructure poses significant technical challenges, including issues such as data migration, system compatibility, and real-time data integration, which are critical hurdles that can affect the success of the implementation (Arachchi et al., 2019). Moreover, gaining widespread user adoption and ensuring that the ERP system is utilized effectively across the organization remains a persistent challenge. This requires ongoing support and possibly adjustments to the system based on user feedback to ensure effective utilization (Annamalai & Ramayah, 2011). These challenges underscore the complexity and multifaceted nature of ERP system implementations, requiring a comprehensive approach that involves strategic planning, skilled project management, and an understanding of organizational dynamics.

In another geographical context, Developing countries often encounter significant economic constraints that impact the scale and effectiveness of Enterprise Resource Planning (ERP) implementations. Budgetary limitations can severely restrict access to high-quality ERP solutions and necessary technological infrastructure, essential for successful system deployment (Huang & Palvia, 2001). These financial constraints not only affect the quality of technology available but also limit the scope of ERP projects, making it difficult for these countries to leverage the full advantages of ERP systems in enhancing business efficiency and integration.

Additionally, the lack of robust IT infrastructure presents a major challenge in many developing nations. Issues such as inadequate internet connectivity, limited access to modern hardware, and unreliable power supplies can severely impede the effective operation and reliability of ERP systems (Ghosh, 2002). Furthermore, there is often a noticeable shortage of local professionals trained in ERP system implementation and management, which necessitates substantial investments in training and skill development (Otieno, 2008). This skill gap may also lead to a dependency on foreign expertise, which can be both costly and unsustainable in the long term. Addressing these challenges requires a concerted effort to improve IT infrastructure and develop local expertise, ensuring that ERP implementations can be as effective and sustainable as possible.

Studies focused on ERP implementation challenges in the public sector reveal specific hurdles that underscore the complexity of these projects. In Malaysia, the primary challenge in public sector ERP implementation lies in the complexity of existing bureaucratic structures (Fernandez et al., 2018). These structures often struggle to meet ERP requirements due to issues like adapting to new systems and a lack of appropriate skills among employees to manage these complex systems (Fernandez et al., 2018). Additionally, effective ERP implementation in the public sector requires strong management support and the right staffing (Crisostomo, 2008). Challenges here often include top management's reluctance to change and difficulties in managing the transformation that ERP systems necessitate (Crisostomo, 2008). Moreover, finding and retaining skilled staff capable of handling the intricacies of ERP systems is a significant challenge (Crisostomo, 2008).

Moreover, public sector organizations frequently encounter cultural and organizational resistance to change. The implementation of ERP systems can lead to significant changes in work processes, which may be resisted by employees accustomed to existing workflows and systems (Kumar et al., 2002). This resistance can slow down or even disrupt the implementation process (Kumar et al., 2002). These studies highlight the unique challenges faced by public sector organizations when implementing ERP systems, pointing to the need for careful planning, strong leadership, and effective change management strategies.

ERP implementation within the Egyptian public sector research suggests several challenges unique to this region. One insightful paper explores a detailed case study of ERP customization failure in an Egyptian state-owned company, AML, employing new institutional sociology (NIS) and its extensions to analyze the failure. It reveals that the customization failure was shaped by the entrenched institutionalized accounting practices, conflicting institutional demands, power relations, and market forces (Kholeif et al., 2007). Data for this study were gathered through interviews, observations, discussions, and documentary analysis (Kholeif et al., 2007). It specifically noted that the failure stemmed from the ERP system's inability to meet the stringent requirements of the central agency for accountability, which led to resistance against the ERP system from within and pressure from the holding company for engineering industries as well as market competition (Kholeif et al., 2007).

Additionally, a study surveying the impact of ERP systems on decision-making in the Egyptian petroleum sector employed a fifteen-question survey to explore opinions (Emam & Hassan, 2021). Analysis of the responses indicated that around 72% of participants felt the petroleum sector needed to leverage technological advancements to improve performance (Emam & Hassan, 2021). They believed that adopting an ERP system would address deficiencies in the current information systems of petroleum companies and significantly enhance decision-making efficiency through better data integration and ease of transfer across different administrative levels (Emam & Hassan, 2021). Nevertheless, some respondents were sceptical, noting potential complications in business function performance and questioning the ERP system's ability to support decision-making as expected in the oil and gas industries (Emam & Hassan, 2021).

Research on the implementation of Enterprise Resource Planning (ERP) systems in the public sector of developing nations, particularly in the MENA region and Egypt, is notably scarce in peer-reviewed journals. Furthermore, the limited studies that do exist on these topics often feature outdated information, which does not adequately address the current challenges and dynamics of ERP implementation. Additionally, there is a marked lack of specific, detailed scholarly work focusing on the SAP ERP product and its unique challenges within these contexts. This gap highlights a critical need for updated and comprehensive research to better understand and navigate the complexities associated with deploying ERP systems in these specific settings.

2.6 Critical success factors of implementing Enterprise Resource Planning (ERP) systems

The implementation of Enterprise Resource Planning (ERP) systems involves several critical success factors (CSFs) that have been widely recognized in scholarly research. These CSFs

are essential for the successful deployment and operation of ERP systems in organizations. Top management support is crucial in ERP implementation as it provides the necessary authority and resources, ensuring that the project aligns with strategic objectives (Epizitone & Olugbara, 2019). Alongside, effective training programs are essential to prepare users for the new system, which helps in reducing resistance and enhancing user acceptance (Reitsma & Hilletofth, 2018). Additionally, a well-defined project plan and effective project management are critical to keep the ERP implementation within scope, budget, and time constraints (Françoise et al., 2009). Managing the change process effectively is key to ensuring that the organization adapts to the new system without significant disruptions (Colmenares & Otieno, 2005).

Furthermore, aligning existing business processes with the new ERP system is crucial for maximizing the system's effectiveness and ensuring that it meets the business's needs (Chaushi et al., 2016). Ensuring the quality and proper management of data being migrated into the new ERP system is critical for its successful functioning and the accuracy of the information it generates (Nah et al., 2001). Lastly, having a clear strategic vision and defined goals for what the ERP system is supposed to achieve helps in guiding the implementation and measuring the success of the project (Epizitone & Olugbara, 2019). These critical success factors (CSFs) are identified through extensive literature reviews and empirical studies, making them robust guidelines for organizations looking to implement ERP systems successfully.

Critical success factors (CSFs) for ERP implementation across all sectors in developing nations are crucial for overcoming distinct challenges and optimizing the transformative impact of these systems on organizational efficiency and performance. The study by Al-Mashari et al. (2006) highlights four critical success factors (CSFs) essential for effective ERP implementation in developing countries, particularly within Middle Eastern companies. First, top management support is vital as it provides the strategic direction and resources necessary to align the ERP implementation with the organization's overall goals. Effective project management is another critical factor, involving thorough planning, execution, and monitoring to address the complexities of ERP implementation and keep the project on track. Change management is crucial for managing the transition from old processes to the new system, dealing with employee resistance, and ensuring smooth adoption through proper training and communication. Lastly, cultural fit is imperative; it involves adapting the ERP system to local cultural and business practices to ensure compatibility with existing workflows, making it easier for employees to accept and utilize the system. Managing these factors effectively can significantly enhance the integration of ERP systems in developing nations, supporting organizational needs and boosting operational capabilities. Asemi and Jazi (2010) conducted a study that revealed that while the critical success factors (CSFs) for ERP implementation are broadly similar between developed and developing countries, there are still notable differences. One significant distinction is the impact of national culture on ERP implementation in developing countries, which plays a substantial role. Additionally, companies in developing nations tend to rely more heavily on ERP vendors compared to their counterparts in developed countries. Furthermore, there appears to be an underestimation of the importance of business process reengineering (BPR) and the alignment between ERP systems and business/process factors in developing countries. These differences underscore the unique challenges and considerations that influence ERP implementation success in these regions.

The 2013 study by E. Ziemba and Iwona Oblak, "Critical Success Factors for ERP Systems Implementation in Public Administration," identifies several key factors critical to the success

of ERP system implementations within the public sector. Top management support is highlighted as essential, providing the necessary funding and resources while ensuring strategic alignment amidst significant political influences (Ziemba & Oblak, 2013). Effective project management is crucial to handle the scope and complexity of public sector ERP projects, with strong leadership and clear governance needed (Ziemba & Oblak, 2013). User training and support are vital to ensure effective utilization of the ERP system across various departments and to help overcome resistance to change, which is often strong in public sector environments (Ziemba & Oblak, 2013). Managing the change process is also critical due to public accountability and the substantial scale of change introduced by ERP systems (Ziemba & Oblak, 2013). This involves employing clear communication and tailored engagement strategies (Ziemba & Oblak, 2013). Business process reengineering is necessary to align existing processes with the new system to improve efficiency, often requiring significant modifications to fit standardized ERP solutions (Ziemba & Oblak, 2013). Data quality and management are imperative to maintain the integrity and security of sensitive information handled by public administrations (Ziemba & Oblak, 2013). Lastly, selecting a vendor with extensive experience in public sector implementations is essential, as continuous support and customization are required to meet specific regulatory and compliance needs (Ziemba & Oblak, 2013). These factors collectively contribute to the effective integration and functionality of ERP systems in public sector settings.

In the context of the Egyptian public sector, there is a noticeable gap in research detailing the critical success factors (CSFs) for implementing ERP systems. While there are a limited number of studies addressing CSFs within other sectors in Egypt, specific insights into the public sector remain scarce. This lack of targeted research highlights a significant need for further investigation into how ERP systems can be successfully implemented in Egypt's public administrative environment.

3 Methodology

This chapter outlines the methodology adopted for this research into the challenges and critical success factors of SAP implementation in the Egyptian public sector. We describe the theoretical underpinnings, research philosophy, and scientific methods used to gather and analyse data from semi-structured interviews with predominately SAP functional consultants. Our approach combines a comprehensive literature review with empirical data collection to provide a nuanced understanding of the contextual SAP implementation landscape. This chapter also details our systematic approach to thematic analysis, which enables us to identify key themes and patterns related to the implementation challenges and success factors within this unique context.

3.1 Research Philosophy

Research philosophy fundamentally shapes how researchers perceive the world and guides their approach to inquiry. It is pivotal because it profoundly influences the research methodology, and the alignment between research philosophy and the objectives of a study is crucial for its success.

Positivism in Information Systems (IS) research operates on the belief that reality is objective and quantifiable. Researchers within this philosophical framework favour empirical and often quantitative methods to explore phenomena, as noted by Chen and Hirschheim (2004) and Walsham (2006). Historically, positivism has been predominant in IS research, accounting for a significant portion of publications in major IS journals from 1991 to 2001 (Chen & Hirschheim, 2004). In contrast, interpretivism suggests that reality is subjective and constructed by individuals. This philosophy argues that to truly understand a phenomenon, researchers must delve into the meanings that people attribute to it, a view supported by both Chen and Hirschheim (2004) and Walsham (2006). Walsham (2006) also notes the importance of qualitative analysis in interpretive research for grasping the complex, multilayered subjective realities and social elements intrinsic to IS.

This research aims to develop guidelines and identify pitfalls in the integration and implementation of SAP within the Egyptian public sector. Achieving this requires a deep understanding of the experiences, concerns, and workflows of SAP functional consultants working within this sector. Such an understanding is intrinsically linked to an interpretive approach, which seeks to extract meaning from the subjective experiences of individuals. This approach enables a nuanced exploration of the complex challenges and critical success factors associated with SAP implementation in this unique context.

The use of inductive reasoning, which involves deriving knowledge directly from data to make generalizations based on those data, is central to our methodology (Bhattacherjee, 2012). This approach is crucial for identifying patterns emerging from the subjective experiences of SAP functional consultants, which can then inform the identification of challenges and CSFs of SAP implementation in the Egyptian public sector. The contextual and novel nature of our study further supports the selection of interpretivism as the most suitable research philosophy. Additionally, research paradigms help in distinguishing different scientific

perspectives on the best ways to explore and understand complex systems (Patton, 2015). For this study's purposes, the interpretivism paradigm, with its focus on individual perspectives and experiences, is particularly well-suited to examining and understanding the nuanced experiences and challenges faced by SAP implementations in the Egyptian public sector according to SAP consultants. This alignment ensures that our research is conducted through a lens that accurately reflects the subjective nature of the phenomena under study, enabling a deeper understanding of the implementation context's dynamics and success factors.

3.2 Research Approach

For our investigation into the integration and application of SAP in the Egyptian public sector, we have chosen a qualitative research methodology. This approach is particularly suited to our goals, as it allows for an exploratory and context-based examination of phenomena, that quantitative methods may not adequately capture. Qualitative methods provide rich, holistic insights that are essential when the research objective is to provide perspectives emerging from their professional experiences (Patton, 2015; Recker, 2013). As SAP implementation within government sectors involves complex, multi-layered interactions between technology and organizational processes, it necessitates a thorough exploration of how public sector organizations can effectively leverage this technology.

Our focus on the SAP implementations within the public sector demands a detailed exploration within a socio-technical context, where the interaction between the SAP system and its experts (SAP consultants) is intricate and inseparable. This necessity for a nuanced understanding of human-technology interaction in professional settings is supported by the work of experts who have examined the challenges and successes of technology implementations in similar contexts.

Interviews, which are structured conversations designed to elicit participants' views on specific topics (Sayrs, 1998), are a primary method in qualitative research. However, as Nunkoosing (2005) points out, this method is not without challenges; interviews can sometimes yield ambiguous, inconsistent, or contradictory responses (Watson, 2006). To mitigate these issues and enhance the reliability of the data collected, our study will employ semi-structured interviews. This type of interview is chosen because it balances the need for structured inquiry with the flexibility to explore responses more deeply, making it particularly effective for understanding complex issues within a group or team context.

Semi-structured interviews are adept at uncovering shared understandings and nuances within professional teams, facilitating a more accurate and comprehensive gathering of information (Vrij et al., 2014). By maintaining an open yet guided dialogue, we aim to capture the diverse opinions and experiences of SAP consultants, providing a robust foundation for developing practical insights into the challenges and CSFs of SAP implementations within the Egyptian public sector. This approach not only addresses our specific research questions but also adheres to ethical research standards, reducing potential downsides and enhancing the overall validity of our findings.

Literature review approach

In this section, we aim to build a theoretical framework around the challenges and critical success factors of SAP implementation in the Egyptian public sector. To support our investigation, we conducted a literature review, A literature review is a crucial step in advancing knowledge and theory development, facilitating theory development and identifying areas for future research (Webster & Watson, 2002). The methodology for conducting the literature review is guided by the concept-centric approach advocated by Webster and Watson (2002). This approach emphasizes a thorough synthesis of concepts over a mere aggregation of authorial contributions, making it particularly suitable for dissecting the complex interplay of technology, policy, and human factors in ICT for Development (ICT4D). To understand the multifaceted challenges and critical success factors associated with SAP implementations in the public sector, this review adopts a concept-centric approach. By focusing on key concepts rather than individual authors or studies, the review will categorize and critically analyse major themes such as challenges of ERP implementations and critical success factors of ERP implementations. A pivotal tool in our literature review methodology is the use of concept matrices. These matrices will help organize the literature around specific challenges and success factors identified in SAP implementations.

The literature search will employ both forward and backward citation tracking to ensure a comprehensive inclusion of seminal works and the most recent studies relevant to SAP implementations in the public sector. This rigorous search strategy is vital to capturing the full spectrum of academic and practical insights into the deployment of SAP systems within the unique context of the public sector in developing countries. Given the interdisciplinary nature of ICT4D, this review will draw on theories and research from information systems, development studies, and public administration. This approach will enrich the analysis and ensure that the review encapsulates a broad range of perspectives and methodologies, enhancing the robustness of the findings. By synthesizing the identified literature using Webster and Watson's structured approach, this review aims to not only summarize current knowledge but also to build theoretical contributions that can inform both practice and future research. It will highlight under-researched areas to effectively manage SAP implementation challenges in the public sector.

A literature review provides a comprehensive understanding of the research area of SAP implementation in the Egyptian public sector, enabling a more informed analysis and conclusions. It identifies exemplary studies, avoiding redundant research efforts and enhancing the efficiency of the research process. Additionally, it sparks innovative ideas that can be integrated into the research, contributing to the development of new theories and concepts specific to SAP challenges and successes. This approach also helps in identifying potential limitations or gaps in the existing research, which are crucial for SAP functional consultants to address to improve the quality and applicability of their implementations. To ensure a high-quality and well-considered theoretical foundation, specific keywords related to SAP implementation were employed during the literature review process. Following Webster and Watson (2002) recommendations, When beginning a literature review, it's crucial to first define your topic clearly and outline the objectives of the review. This step helps in setting the scope and boundaries of your research, ensuring that you focus your efforts on relevant sources and establish a clear direction for your inquiry. By articulating what you aim to discover or analyse, you can efficiently organize your review and align it with your overall research goals. This was achieved through the identification of the relevant keywords and their connectors.

Initially intended to focus on Egypt and the public sector, the scope was then expanded to include studies from all regions and sectors. This adjustment was made to encompass a wider array of literature, addressing the gap in research specifically targeting ERP implementations in the public sector of developing nations. By broadening the scope, this review intends to capture a more diverse range of experiences and insights, which are critical for understanding the universal as well as unique aspects of ERP system implementations. This broader approach allows for a more robust analysis of available literature, ensuring that the review comprehensively covers the varied dimensions of ERP implementations. It enables the identification of patterns and distinctions in challenges and success factors across different contexts, providing valuable insights that are applicable on a global scale.

The second step recommended by Webster and Watson (2002) is to conduct a comprehensive search using various sources like journals, databases, and conference proceedings. Use both forward and backward citation tracking to ensure you cover seminal and recent works. The research process utilized two major digital academic databases, Google Scholar and Consensus, to collect pertinent scholarly materials. Webster and Watson recommend using a concept matrix to categorize and synthesize findings effectively. This third step was accomplished by creating two synthesis tables to organize the challenges and critical success factors of ERP implementations according to sector and geographical region. According to Webster and Watson (2002), the fourth step should be structuring the review to guide the reader through the literature logically. That is why the literature review started by defining terms and describing historical evolution then moved to discussing the challenges and CSFs of ERP implementations first globally until it reached the Egyptian region. Moreover, Webster and Watson (2002), encourage the critical assessment of the literature for quality and relevance to your research question. This was accomplished through the inclusion of only peer-reviewed articles.

3.3 Data Collection Methods

Qualitative research framework

The methodology for our research incorporates semi-structured interviews, which will adhere to a predetermined set of questions outlined in an interview guide while allowing for the exploration of individual responses as needed (Recker, 2013). This qualitative approach is particularly suited for capturing the nuanced experiences, concerns, and operational processes of public sector organizations implementing ERP systems, the very group for whom these insights are being developed. This method aligns with Patton (2015) advocacy for the use of interviews to address exploratory research questions. The insights gained from participants' experiences are intended to inform various stakeholders in the SAP implementation industry of the challenges and the CSFs unique to the research context.

While the utility of interviews is evident, they come with potential drawbacks, such as the likelihood of respondents providing socially desirable answers. This concern is noted by Recker (2013) among others. Despite these challenges, we believe that the depth of insight and the opportunity to engage in meaningful dialogue make interviews the most appropriate method for this study. Effective communication is critical, and to ensure this, interviews will be conducted in Arabic, the native language of all participants. This linguistic consideration is

essential to ensure that responses are not only accurate but also that participants feel comfortable enough to express detailed thoughts and emotions, which is crucial for the authenticity of the data gathered.

The interviews will generally be conducted online. This flexibility ensures participant comfort and compliance with their preferences, which can significantly impact the quality of the data collected. All interviews will be recorded and transcribed with informed consent, ensuring that the insights are accurately captured and contribute effectively to the body of knowledge on ERP implementations in the public sector. Given the comprehensive nature of this research, it is crucial to delineate which pieces of collected data are included in the final analysis. This distinction will be managed in collaboration with the internal supervisor, who will provide criteria for data exclusion, thereby maintaining the clarity and relevance of the information presented in the research document.

Participant selection

The number and characteristics of interview participants can substantially influence the outcomes of qualitative studies (Saunders & Townsend, 2016). From the outset, efforts were made to ensure that a varied group of SAP functional consultants were included, particularly those with experience in public sector implementations in Egypt. The main goal of this study is to delve into the unique challenges and critical success factors (CSFs) associated with ERP implementations within this specific context. By focusing on consultants who have been directly involved in such projects, the study aims to uncover distinct patterns and insights that are particular to the public sector environment in Egypt, thereby enhancing our understanding of the dynamics at play in these implementations.

To secure relevant participants who could offer detailed and insightful responses, we specifically targeted experienced SAP functional consultants involved in public sector implementations in Egypt. These roles included individuals from various hierarchical levels within organizations that provide consultancy services to Egyptian public sector organizations seeking to implement SAP, such as junior consultants, senior consultants, and project managers. The diversity of these roles provided a broad spectrum of perspectives, enriching our study with a blend of technical, operational, and strategic insights. For instance, while some consultants might focus more on the technical intricacies of SAP systems, others might offer insights into the broader organizational and policy impacts of ERP implementations.

Our focus was on consultants from large organizations, which typically have more structured processes and face unique bureaucratic challenges, thereby offering a richer context for exploring ERP implementations in the public sector. We decided to conduct between five to seven interviews, considering this a suitable number to achieve depth without compromising the quality of the analysis. According to Patton (2015), the scope and size of a study should be tailored based on the research objectives, available resources, and the nature of the research question.

After pinpointing the right consultants, we crafted tailored communications in both English and Arabic to reach out to potential respondents. Once interview times were arranged, we sent each participant an overview of the study and our questions and requested their consent for recording the sessions and using their data in our research. This consent helped solidify the

authenticity and reliability of our data. Each interview lasted approximately 30 to 50 minutes, proving to be highly informative. With a total of five interviews completed, our data collection was comprehensive. The participating consultants brought a wealth of experience from various public sector ERP projects, offering nuanced insights into the unique challenges and critical success factors specific to the Egyptian context. These interviews not only enhanced our understanding of ERP implementation dynamics but also contributed valuable perspectives to the broader field of study.

Table 3.1: Summary detailing the respondents Background

Respondent	Company	Country	Position	Experience	Public projects implmentations	Appendix
R1	NDA	Egypt	Solution Architect Associate Manager (SAP sales & distribution consultant)	11 years	1	Appendix Participant 1
R2	NDA	Egypt	Senior SAP Plant Maintenance Functional Consultant	7 years	17	Appendix Participant 2
R3	NDA	Egypt	Senior SAP Finance & controlling Consultant	10 years	4	Appendix Participant 3
R4	NDA	Egypt	Senior SAP Finance & controlling Consultant	5 years	2	Appendix Participant 4
R5	NDA	Egypt	Team Lead in an SAP Partner Company (SAP Fi-nance & controlling Consultant)	11 years	4	Appendix Participant 5

Table 3.2: Summary of Interview Details

Respondent	Communication Channel	Duration (record)	Appendix
R1	Zoom	35 minutes	Appendix Participant 1

R2	Zoom	25 minutes	Appendix Participant 2
R3	Zoom	20 minutes	Appendix Participant 3
R4	Zoom	40 minutes	Appendix Participant 4
R5	Zoom	30 minutes	Appendix Participant 5

Table 3.3: Interview Guide

Categories	Question
Background questions	Can you describe your role and experience?
Background questions	How many SAP implementation projects have you participated in within the Egyptian public sector?
Background questions	how would you define a successful SAP implementation within the Egyptian public sector? In other words, what are your criteria or indicators of a successful implementation in this context?
Background questions	how would you define a failing SAP implementation within the Egyptian public sector? In other words, what are your criteria or indicators of a failed implementation in this context?
Background questions	According to your definition, how many SAP implementations in the public sector would you categorize as successful and how many as failing, and why?
Background questions	What is the implementation methodology typically employed in implementing SAP in the Egyptian public sector, and why? Are there any local adaptations or modifications to standard methodologies that may be unique to the Egyptian public sector context in particular?
Challenges	Based on your experience as an SAP consultant, could you describe the specific challenges you have encountered when implementing SAP systems within the Egyptian public sector? Please consider factors such as regulatory requirements, organizational culture, technology infrastructure, and stakeholder involvement
Challenges	How do these challenges impact the overall implementation process?
Challenges	Can you give real project examples where you faced these challenges in an Egyptian public sector company?
Challenges	what could have been done differently in these projects to enhance outcomes?
Critical success factors	From your perspective as an SAP consultant, what are the critical success factors for successfully implementing SAP systems within the Egyptian public sector? Could you discuss specific factors such

	as stakeholder engagement, alignment with organizational goals, training programs, and technology infrastructure?
Critical success factors	How do these factors contribute to the success of SAP implementations?
Critical success factors	Can you give real project examples where these critical success factors could have saved a failing implementation in an Egyptian public sector company?
Critical success factors	what could have been done differently in these projects to enhance outcomes
Concluding questions	If you were to change the standard implementation methodology to fit the Egyptian public sector how would you go about it? And why?
Concluding questions	Is there anything else you would like to add that we haven't covered regarding ERP implementation challenges or success factors in the Egyptian public sector?

3.4 Data Analysis Method

We have opted for qualitative analysis as the primary method in our research due to its effectiveness in exploratory and contextual investigations, as highlighted by Patton (2015) and Recker (2013). This method is particularly suited to our study, which aims to navigate the complexities of an organizational context and delve into a relatively new domain of knowledge. One inherent challenge in qualitative research is the difficulty in extracting valuable insights from large volumes of data, a task Patton (2015) describes as "distinguishing signal from the noise."

Thematic analysis is a qualitative research method that is pivotal in distilling vast amounts of data into digestible themes that are representative of the collective data. This method is not only flexible but also robust, allowing researchers to derive detailed, rich insights from qualitative data. As noted by Braun and Clarke (2006), thematic analysis provides a structured approach to analysing qualitative data, which is essential in ensuring that the analysis is comprehensive and coherent. The method's utility in identifying patterns and themes across data sets is crucial for understanding complex phenomena, making it an indispensable tool in social sciences research, including studies on organizational processes and technology implementation (Braun & Clarke, 2006). In the context of SAP implementations in the Egyptian public sector, thematic analysis can be particularly effective in unpacking the challenges and critical success factors (CSFs) associated with these complex projects. By applying thematic analysis to qualitative data gathered from various stakeholders involved in SAP projects, researchers can identify recurring themes that may indicate barriers or enablers to successful implementation.

In the first phase, our approach will involve detailed coding, identifying patterns, labelling themes, and developing categories. Coding is a critical process in qualitative analysis, where data is interpreted and units of meaning are systematically assigned across the collected data, as noted by Recker (2013). This process begins with open coding, where we explore the data to uncover hidden concepts. Despite its popularity, open coding can introduce subjectivity and potential biases. To mitigate these biases, qualitative analytical software will be employed.

Following the initial coding, axial coding will be used to establish connections among the identified codes. Patton (2015) emphasizes the human propensity to recognize patterns; as we interact with the data, descriptive findings emerge and coalesce into patterns. These patterns lead to themes that provide deeper interpretations of the data. For instance, a recurring pattern of concern among participants could lead to identifying 'stress' as a significant theme.

In the final stage of coding, selective coding, we concentrate on identifying and elaborating a few central themes by establishing relationships among them. This stage allows us to consolidate the meaning behind the empirical data into coherent themes, fulfilling the purpose of qualitative analysis. The insights derived from this rigorous process will directly uncover the challenges and the CSFs of SAP implementations in the Egyptian public sector. Coding with performed. To analyze and code the data for this study, I used Taguette, an open-source qualitative data analysis tool. Taguette allows researchers to highlight and tag text, making it easier to organize and categorize qualitative data. This tool was instrumental in identifying key themes and patterns in the responses, ensuring a systematic approach to data analysis.

3.5 Ethical Considerations

To ensure the ethical integrity of our qualitative interviews, we are committed to integrating the comprehensive principles for conducting ethical research as described by Oates et al. (2022). These principles encompass five fundamental rights essential for ethical research: the right not to participate, the right to withdraw at any point, the right to informed consent, the right to anonymity, and the right to confidentiality.

Before the commencement of any interviews, participants will be presented with an informed consent form. This document not only outlines the researchers' identities and the objectives of the master's thesis but also details the scope of the interview and the specific uses to which the information will be put. It is crafted in collaboration with the thesis supervisor to ensure all ethical guidelines are meticulously followed. The form is designed to ensure participants are fully aware of their rights and the implications of their participation, allowing them to provide informed consent. Furthermore, it emphasizes the right of participants to withdraw from the study at any stage, a principle strongly advocated by Recker (2013) as a cornerstone of ethical research practice.

At the beginning of each interview, we will reiterate the participants' rights, reinforcing their ability to withdraw at any time without consequence. This reassurance is crucial in maintaining trust and ethical standards throughout the research process.

Regarding the handling of data, all interview recordings will be anonymized immediately after they are obtained. Access to these recordings is strictly limited to the research team, and, upon their request, the participants themselves. This practice aligns with the ethical guidelines provided by Oates et al. (2022) and ensures the confidentiality and anonymity of the data.

3.6 Scientific Quality

In the field of Information Systems (IS), understanding the interaction between humans and technology involves navigating the complexities and ambiguities introduced by the human element. This aligns IS research with the broader social sciences, where maintaining scientific rigor and objectivity is essential (Recker, 2013). To uphold these standards, our study adheres to established scientific principles and methods.

Central to our approach is objectivity, which is considered the strength of the scientific method and is based on the tenets of replicability, independence, precision, and falsification (Patton, 2015). Replicability is crucial, as it allows other researchers to reproduce our work under similar conditions, ensuring the reliability of our results (Bhattacherjee, 2012; Recker, 2013). We achieve this through meticulous documentation of our research processes, from participant selection to the analysis of interviews.

Independence is safeguarded by conducting our coding and analysis without bias, utilizing qualitative analysis software. Precision in our research is attained by clearly defining our research questions, objectives, and the constructs we intend to measure. This clarity extends to our interview guide, designed to align with our research aims and constructed to avoid ambiguity or leading questions, following the best practices suggested by Bryman and Bell (2019).

Finally, falsification is addressed by treating our research as an evolving process. We remain open to revising hypotheses and embracing alternative explanations, thereby adhering to a scientific approach that values logical consistency and allows for our theories to be challenged and disproven if necessary (Bhattacherjee, 2012; Recker, 2013). By integrating these principles, we aim to ensure the rigor and quality of our interpretive research within the dynamic and complex landscape of human-technology interactions.

4 Results

The five participants collectively provided insights into SAP implementation projects within the Egyptian public sector. Participant 1 was involved in one implementation project. Participant 2 participated in three distinct SAP projects, covering a total of 17 companies. Participant 3 was involved in SAP implementations across five companies. Participant 4 worked with two public sector companies, and Participant 5 took part in four SAP projects. Altogether, these participants were involved in SAP implementation projects across 28 public sector companies in Egypt.

The participants reported no major failures in SAP implementation within the Egyptian public sector, though they observed varying degrees of success among the companies. Some SAP modules were implemented more smoothly than others, particularly the more advanced ones.

“I think there's more development than there was before. The first project I worked on in the public sector was different from 4 or 5 years ago. There's a big difference from the last project I worked on. So, I think there's a lot of development. There's a lot of development.”

This results section will provide an in-depth analysis of the SAP implementation in the Egyptian public sector, focusing on project management methodologies, characteristics of successful and failing implementations, and the critical success factors. The analysis begins with an overview of the project management methodologies used, highlighting the mixed observations regarding adherence to the SAP Activate methodology. Participants reported both strict adherence and significant deviations, including long-term hyper care support, division of project phases between vendors, and the use of waterfall instead of agile methodologies.

The section on successful SAP implementation identifies key indicators such as high technology adoption rates, operational efficiency, effective project management, improved communication, accurate data management, and increased organizational control and value. Participants emphasized the importance of reducing paperwork, enhancing process efficiency, and achieving project goals on time and within scope.

Conversely, the characteristics of failing SAP implementations are explored, focusing on low technology adoption, ineffective system utilization, project execution delays, poor data management, and misalignment between user requirements and system performance. Participants noted that these issues lead to increased operational costs, process inefficiencies, and failure to meet project deadlines.

The analysis also addresses the challenges of SAP implementation in the Egyptian public sector, highlighting issues related to leadership and management, resource and infrastructure limitations, organizational culture, communication barriers, operational inefficiencies, skill gaps, regulatory compliance, and technology adoption. Participants provided insights into the difficulties of managing change, ensuring employee engagement, and maintaining effective communication and coordination across different organizational levels.

Finally, the critical success factors for SAP implementation are discussed, emphasizing the importance of coordination and collaboration, comprehensive training and skill development, robust data management strategies, proactive change management, accurate requirement gathering, effective resource allocation, openness to new technologies, and strong financial risk management. Participants highlighted the need for trust and leadership within the organization, advocating for business departments to direct the project and ensuring that the system aligns with existing processes and industry terminologies. These findings offer valuable insights for improving SAP implementation in the Egyptian public sector, providing a clear roadmap for future projects.

4.1 Project Management methodology used in implementing SAP in the Egyptian Public Sector

All participants reported that their respective vendor companies employed Activate, the latest standard SAP methodology, in their implementations. However, there were mixed observations regarding adherence to the Activate methodology during SAP implementation in the Egyptian public sector. Some participants noticed deviations from the methodology, while others found the implementations consistent with it. Additionally, some participants were satisfied with the standard Activate methodology, whereas others proposed modifications to better fit the nature of the Egyptian public sector.

“The Activate methodology on SAP S4 HANA. We use all the Activate methodology that is what we're supposed to use.”

“Agile. Agile methodology. They were trying to apply it using SAP Activate.”

4.1.1 Adaptations and Deviations in SAP Implementation Methodology

This subtheme explores the various adaptations and deviations from the standard SAP implementation methodology observed by participants, including long-term support, division of project phases among vendors, and the use of project management methodologies.

Long-Term Hyper Care Support

Participants observed that long-term hyper care support was provided, which deviates from standard practice where such support is expected to be limited to a certain period.

“The long hyper care support. This is not supposed to be normal, it should be at a certain time.”

Division of the Project Phases between vendors

Participants noted that the project phases were divided among different vendors, which complicated the implementation process and increased the time required. One company handled the exploration phase, while another managed realization, deployment, and running.

"The explore phase was divided between the solution architect in Company A at the same time as the other methodology phases, the exploration phases were in another company. And the realization and deploy and run were under Company B."

"The idea that there are several involved entities, makes things more time-consuming. Our vendor company is implementing and another company designed the solution."

Implementing Activate as if it was a waterfall, not an agile project management methodology

Participants observed that despite discussions about using agile methodology, the implementation followed a more traditional waterfall approach, which deviates from the principles of SAP Activate.

"For me, I think we're talking about agile methodology and such, but I think that everything happens in a waterfall."

Perceived Adherence to Standard SAP Activate Methodology

Some participants felt that the implementation adhered to the standard SAP Activate methodology without significant deviations, following the established phases and methods.

"No, I do not think so. I think they are following the methodology of Activate and they are not deviating from the standard methodology."

"I don't feel that anything was changed. We followed the same phases, the same methods, and all was alright."

4.1.2 Recommendations and Suggested Improvements to SAP Activate Methodology

This subtheme includes recommendations and suggested improvements from participants to enhance the SAP Activate methodology, focusing on adherence, independent data migration, changes in phase order, increased focus on change management, and better stakeholder identification.

Recommendations advocating Adherence to Standard SAP Activate Methodology

Participants emphasized the importance of adhering to the standard SAP Activate methodology, believing it to be well-suited for the public sector without the need for major changes.

"I see the Egyptian public sector should be the one trying to move to SAP, not SAP moving it."

"Recalling the Activate process actually to know what I would like to change. I think no, I wouldn't want to change anything specific to fit the public sector."

“I don't feel that I want to change much. But I mean, honestly, I don't feel that I want to change anything. I think Activate methodology is very good and it will fit in the public sector in Egypt.”

Independent Data Migration Methodology

Participants recommended having a separate, independent methodology specifically for data migration to ensure its effectiveness and manage its complexities.

“Data migration should have a separate methodology.”

Change in phase order or structure

Participants suggested modifying the order or structure of certain phases, such as conducting User Acceptance Testing (UAT) before training and focusing on master data earlier in the process.

“UAT before the training.”

“Make sure that our requirements are correct. And we take new requirements. Because when we reach the training, which is before the cutover, we always have all the requirements.”

“The training is the first. I mean, the key user goes through the system. Then you assign them to do the testing. Here it's the opposite. So what's the purpose of the opposite? We need to make sure that we enter the training with clear requirements. So we can start to live immediately.”

“the master data part should be in the explore phase because the master data part is very important for people to work on it.”

Increased focus on change management

Participants highlighted the need for a stronger focus on change management within the SAP Activate methodology, suggesting it be included more prominently in the explore or prepare phases.

“There was supposed to be a part of the change management. It's an important part of the methodology that's supposed to be more focused on.”

“I can add the change management in methodology because it's not in it. I can add the change management part, and it should be in the explore phase or the prepare phase.”

Independence of the Data Management

Participants recommended that data management be treated as an independent component, running parallel to other project activities, with a dedicated team working on it.

“It is one of the most important things that happens in parallel with everything that happens in the project. The data team is different from the implementation team.”

"The other thing is that the master data needs a big team to work on it."

Better Stakeholder Identification

Participants suggested improving the identification and definition of stakeholders to ensure successful implementation and clear communication throughout the project.

"It's a very good methodology that can be used in the public sector, no problem. With a small focus, on a good definition for the stakeholders, you see that you can work with this definition in the implementation going on."

4.2 Characteristics of Success in SAP implementation in the Egyptian public sector

4.2.1 Technological Integration and Adoption

This subtheme captures the importance of adopting new technology effectively within the public sector, as an indicator of success.

High Rate of Technology Adoption

Participants noted that successful SAP implementation involves a high rate of technology adoption within the organization. This means that users and public organizations effectively use the new technology, with up to 90% of work being done on SAP, significantly reducing paperwork. The adoption of SAP enhances reporting capabilities and involves all organizational levels working on SAP in different roles.

"When the users and the public organization know that they can adopt the new technology implemented in their sector."

"We can say, for example, that 90 percent of his work can be done on SAP. He is not doing paperwork as well as SAP."

"We work in the field of finance. You need to increase the reporting part. You can use the tool in the sense that SAP has a lot of tools."

"All the levels are working on SAP in different roles."

4.2.2 Operational Efficiency and Process Improvement

This subtheme includes codes related to the enhancement of operational processes, focusing on reducing paperwork, increasing efficiency and effectiveness, and eliminating backlogs as indicators of success.

Paperwork Reduction

Participants mentioned that SAP implementation significantly reduces paperwork and bureaucracy within the organization, streamlining processes and improving operational efficiency.

“It reduces paperwork and bureaucracy significantly.”

Increased Efficiency

Participants highlighted that SAP aims to increase the efficiency of work processes. While there might be a temporary decrease in efficiency during the transition, the long-term goal is to make processes more efficient.

“You try to increase the efficiency of people as much as possible by using the tool.”

“Before entering the system, I used to pay this bill and finish the process in 10 minutes. Now, after entering the system, I finish it in 20 minutes. So, I made a 100% decrease in efficiency in this process.”

No Backlog

Participants stressed the importance of having work up to date and in real-time, ensuring there is no backlog in the system, which is crucial for maintaining operational efficiency.

“the work has to be up to date. It has to be real-time. I mean, there has to be no backlog.”

Increased Effectiveness

Participants emphasized the importance of enhancing requirements and increasing the effectiveness of processes, particularly in reporting, to ensure that the system meets the organization's needs.

“You see how you can enhance these requirements. How you can increase the effectiveness of these requirements. And reporting specifically.”

4.2.3 Project Management and Delivery

This subtheme encompasses the successful execution and management of projects, emphasizing timely delivery, adherence to scope, and the overall achievement of project goals as indicators of success.

Timely Delivery

Participants highlighted that a key indicator of success is the project being delivered on time, and meeting the established deadlines.

“it is delivered on time.”

Delivery Within Scope

Participants noted that successful projects adhere to their original scope without significant changes. Implementing all planned modules as intended is crucial for success.

"There are no big changes in scope."

"They were working on their full scope. I mean, all the modules that were supposed to be implemented."

Successful Project Management

Participants emphasized the importance of effective project management, ensuring that the project is managed well and all aspects are executed efficiently.

"The success of the project management of the project itself."

Achievement of Goals

Participants stated that achieving the initial goals of the SAP implementation, such as cost savings and improved financial control, is a clear indicator of success.

"Like for whatever reason we started this implementation, for example, to save money, something that was not financially controlled is now controlled."

4.2.4 Communication and User Engagement

This subtheme highlights changes in communication styles and the importance of engaging users effectively, ensuring their satisfaction, and meeting or exceeding their expectations as indicators of success.

Communication Style Shift

Participants noted that successful SAP implementation leads to a shift in communication styles, where communication relies more on the system rather than traditional methods like emails, phones, and documents. This shift ensures more streamlined and efficient communication within the administration.

"communication within the administration relies more on the system rather than emails, phones, and documents."

User Satisfaction

Participants emphasized that user satisfaction is a key indicator of success. When users can feel the improvements brought by the new system, it signifies successful implementation.

"user can feel the improvement."

Matching or Exceeding the Users' Expectations

Participants highlighted the importance of the system meeting or exceeding users' expectations. Users should be able to generate reports that match or improve upon the previous system, ensuring continuity and enhanced capabilities.

"So, the last thing I need when I enter the data on the system is that I have the same report to look at. Even if they are in a different way or capabilities. But I can see the same report. Or I can provide him with a new better report."

4.2.5 Data Management and Accuracy

This sub-theme focuses on the importance of accurate data management within SAP implementations as an indicator of success.

Increased Accuracy

Participants emphasized that successful SAP implementation brings significant improvements in data accuracy. The system enhances control, ensuring that data is managed accurately and reliably, which is crucial for effective decision-making and operational efficiency.

"The system provides a lot of changes, and this change is in the form of control and accuracy in the data."

4.2.6 Organizational Control and Value

This subtheme captures the increased control over processes and the added value that successful SAP implementation brings to the organization as indicators of success.

Increased Control

Participants emphasized that successful SAP implementation significantly increases control and accuracy in data management. The system allows for better control over various business areas, such as payroll and inventory management, ensuring secure access and process consistency.

"The system provides a lot of changes, and this change is in the form of control and accuracy in the data."

"the third point is the control area. You need it while you are implementing SAP. If you know how to increase control in the business."

"Like, for example, payroll. So, okay, there is a control. But not everyone can enter this GL and see who takes how much in the organization. So, a control like this must be present."

"So, either I increase the controls or at least I keep the same controls as they are."

"the people run the cost estimate every month."

"know which products they lose in and which products they gain from."

"The system provides a lot of changes, and this change is in the form of control and accuracy in the data."

“Before, all these companies were running inventory count on a regular basis and the account manager is the one who enters the inventory code by hand. Of course, this is something that doesn't have any control. But now the system code generation is automatic, so it's controlled.”

“The system provides a lot of changes, and this change is in the form of control and accuracy in the data.”

Value Addition

Participants noted that successful implementation leads to actual improvements in business processes, adding value without unnecessarily elongating cycles.

“Exactly, like there is an actual improvement in the cycle. It was not elongated with no added value.”

4.3 Characteristics of failure in SAP implementation in the Egyptian public sector

4.3.1 Technological Integration and Adoption

This subtheme captures the issue of low technology adoption rates, which is a key factor in failing SAP implementations as indicators of failure.

Low Rate of Technology Adoption

Participants noted that a low rate of technology adoption is a significant indicator of failure. Users find the new technology complex and challenging to work with, leading to reluctance to use SAP. Additionally, there are levels within the organization that do not contribute to the project or perform their roles within SAP.

“The user can't work on SAP or the new technology because it's complex in terms of its capabilities.”

“There have to be levels that didn't contribute to the project. I mean, there has to be a person from the company that had a role in the project or a role in the business that he didn't do on SAP.”

4.3.2 System Utilization and Performance

This subtheme includes problems related to the ineffective use of the ERP system and its features, such as underutilized reports and an ERP system that does not fulfil its intended purpose as indicators of failure.

Hollow ERP System

Participants noted that a failing implementation often results in an ERP system that is not fully utilized. Employees continue to rely on old systems and manual processes, bypassing the ERP system entirely.

“They depend on the old system. So, there's an ERP system running, and they talk to each other on the phone to finish or pass a paper.”

“he opts for finishing his work outside the system, not on the system.”

Underutilization of the System Reports

Participants highlighted that another sign of failure is when the system's reporting capabilities are underutilized. Instead, employees rely on external methods to prepare and manage reports, rendering the ERP system ineffective.

“The third point is reporting. The reporting doesn't depend on what comes out of SAP. They depend on audio reports and the preparation of reports outside the system.”

“The system is a database. People enter entries. They don't benefit from the system's reports. The system works in their way. They don't go to the system.”

4.3.3 Project Execution and Go-Live Issues

This subtheme encompasses challenges in project execution, particularly delays or failures in going live, and issues in gathering and understanding requirements as indicators of failure.

Not Going Live

Participants highlighted that a clear indicator of implementation failure is when the project does not reach the go-live stage.

“the implementation failure that they did not go live.”

Go-live Delay

Participants noted that delays in going live, such as certain modules not being operational on time and requiring extensions, signify project execution issues.

“I mean, there had to be a project or modules that are not always working.”

“All the other modules went live except for this part. It did not go live. They opted for an extension.”

Incomplete Requirement Gathering

Participants emphasized that incomplete requirement gathering, where new requirements arise or remain unclear at the go-live stage, is a significant indicator of failure.

“The first point is the incomplete requirement gathering. For me, if we reach the go-live and there are still requirements arising and are not clear and new.”

4.3.4 Data Management and Accuracy

This sub-theme focuses on the problems of inaccurate data entry and overall data management failures, which can significantly impact the success of SAP implementation as indicators of failure.

Inaccurate Data Entry

Participants noted that errors in data entry are a clear sign of failure, as they lead to incorrect information being processed and used within the system.

“There has to be a fault in the data entry.”

Failure in Data Management

Participants highlighted that issues with master data and the overall data management process, such as discrepancies between user needs and SAP requirements, significantly contribute to implementation failures.

“People had a problem with the master data and they had a problem with the data itself. I mean... They needed to do it in a certain way. And SAP needed to do it in a different way.”

4.3.5 User Requirements and System Alignment

This subtheme highlights the misalignment between what users need and what the system delivers, including ineffective translation of user requirements into system functionality as indicators of failure.

Misalignment Between User Requirements and System Performance

Participants noted that a significant indicator of failure is when users discover around the go-live time that the system delivered does not match their usual workflows or the calculations they use, leading to operational disruptions.

“the users around the go-live time discovered that what we delivered is not the way they normally do work and not the calculations they use.”

Ineffective Translation of the User Requirements

Participants highlighted that losing critical links in business processes during implementation, such as connections between payments, invoices, and vendors, is a sign of failure. This indicates that user requirements were not effectively translated into system functionality.

“The second point is that inside the business process, lost links were present during the implementation itself.”

“For example, you are in the payment process of the other vendors. I was able to connect the payment that was completed from a certain bank, with a certain invoice, from the vendor

himself. This was in the old system. So when I went to the new system, the SAP, which is a more advanced system. If I lost the link between these things."

4.3.6 Operational Efficiency and Cost

This subtheme addresses the negative impact on operational efficiency, increased costs, increased complexity, longer process times, and delays in financial processes as indicators of failure.

Decreased Efficiency

Participants noted that a significant sign of failure is when the implementation results in people being unable to complete tasks in the same time period as before the implementation.

"If I reached the point that after I put the solution, people during their work time can't complete the tasks that they used to do before the implementation at the same time period."

Increased Cost

Participants highlighted that increased costs, such as paying for overtime due to longer task completion times, are indicators of a failing implementation.

"Or people need to work more time to finish the tasks. So this extra time that you have to pay. Is it available for overtime or for the company to pay? I increased the cost. I increased the expenses that may not exist otherwise."

Increased Complexity

Participants mentioned that a failing implementation often results in more complex processes, making them difficult to execute.

"So the process itself became difficult."

Increased Process Time

Participants noted that longer process times, such as delayed vendor payments compared to the old system, indicate failure.

"The vendors don't take their payment at the right time, as it happened in the old system."

Delayed Financial Closing

Participants emphasized that a system that requires double the effort and lacks sufficient resources leads to difficulties in closing financial periods on time, marking a significant failure.

"This system takes from me double the effort I used to do. And I don't have enough resources to work. So I come at the end of the month, we don't know how to close the month in finance."

4.4 Challenges of SAP implementation in the Egyptian public sector

4.4.1 Leadership and Management Challenges

This subtheme reflects issues related to the style and effectiveness of leadership, including attitudes toward management, centralization of decision-making, and the influence of IT personnel.

Firefighting Attitude

Participants noted that changes in plans at critical times, such as go-live, without following the established methodology, create significant disruptions.

“They were going with a certain plan. And at the go-live time, they changed the plan. This is not something that is part of the methodology.”

Lack of Micromanagement

Participants highlighted that high-level management often neglects the details and leaves all the work to lower-level managerial roles. This disconnect can lead to overlooked issues and gaps in the solution.

“This is my opinion. Because the high-level management spend a very long time in their roles to the extent that they don't take into account the details. They don't have micromanagement. They leave all the work entirely to the lower-level managerial roles. There is a difference between the high-level managerial roles compared to the low-level managerial roles in the day-to-day experiences.”

“The cycles or solutions that were done. There were key users or end users that you need to take their opinion or present them so that you identify missing points, and missing requirements that can make big problems later on in the solution. So you should not only depend on the manager.”

“The cycles or solutions that were done. There were key users or end users that you need to take their opinion or present them so that you identify missing points, and missing requirements that can make big problems later on in the solution. So you should not only depend on the manager.”

Autocratic Leadership

Participants mentioned that decisions made by top-level management are often not open to objections or discussion, which can lead to poor implementation and a lack of buy-in from lower levels.

“The decisions, sometimes decisions are made, not subject to objections because they were made from the top level. So I can't challenge its reasoning. I will follow it. It will be applied without a lot of talk.”

"But what happens is that the government makes decisions or people working for the government make decisions without returning to the company of the private sector that implements them."

Abuse of Power

Participants noted that there is sometimes discrimination and threats against resources based on attitudes, leading to an unhealthy work environment.

"Sometimes there is discrimination against some resources based on their attitude. Sometimes there is discrimination against some resources. Sometimes there is a threat of not letting the resources in government organizations. The reasoning behind it is the attitude."

Centralization of Decision Making

Participants highlighted that decision-making is often overly centralized, with operational levels not involved in strategic meetings, leading to inefficiencies and bottlenecks.

"From the perspective of the SAP partner or from the perspective of the organization, the public sector, both did not involve their operational level with the managerial meetings or the strategic decision meetings."

"Every time you go, for example, you ask them about something, you will always find in the workplace that there is someone who has all of the responsibilities centred."

"Although you have inside the department areas. Or sub-departments and these sub-areas. Each one of them has a manager. But at the end of the day, each department tries to push the responsibility to one person."

Lack of Consequences

Participants noted that there is often a lack of consequences for not meeting project goals or KPIs, leading to a lack of accountability.

"There's a policy of reward and punishment. It's not necessarily punishment and punishment, but it's KPIs."

IT Personnel Control the Project

Participants emphasized that the project manager should come from the business side, not IT, as ERP is primarily a business project.

"The project manager is supposed to be from the business side, not the IT. Because the ERP is a business project. It is just an arm."

4.4.2 Resources and Infrastructure Issues

This subtheme captures challenges related to the availability and quality of resources and infrastructure, such as internet connectivity, hardware availability, and general infrastructure reliability.

Long Absences

Participants noted that long absences of employees, sometimes lasting up to two months, significantly disrupt the continuity and progress of the project.

“The second thing is the cuts and the long absences. That can take up to two months. One month and two months. For some employees.”

“The second thing is the cuts and the long absences. That can take up to two months. One month and two months. For some employees.”

Resources Replacement Difficulty

Participants highlighted the difficulty in replacing unqualified resources, which hampers the effectiveness and progress of the implementation.

“Yes. The difficulty, for example, the unqualified resources. It's hard to get them replaced.”

No Free Wi-Fi

Participants pointed out that the lack of free Wi-Fi, relying only on Ethernet, limits the flexibility and mobility of employees.

“No free Wi-Fi or local Wi-Fi. It was all Ethernet.”

No Laptops

Participants noted that the absence of laptops constrained employees' mobility during training and meetings, reducing overall flexibility.

“And they all should have worked on PCs instead of laptops so that could have been more freedom of movement for the employees in training or a movement for employees during the discussions that take place in the meeting rooms.”

Underdeveloped Resources

Participants mentioned that some employees lack necessary skills, such as accounting knowledge, requiring additional training and development to catch up with project demands.

“Some people are not good at accounting. I'm not saying all people are not good at it, but some people are good at one thing. Okay. They're not good at other fields, so they need IFRS courses like refreshments.”

“Catching up with the development. Some people are far away. And some are skilled. But they're not the most.”

Lack of Network Stability

Participants highlighted issues with network stability, noting that poor network connectivity frequently disrupts work across various project locations.

“There's not always a good network and this problem is happening all over the project. So the stability of the network is not the best thing for the upcoming projects.”

“Infrastructure is one of the things that we face, there are challenges in the public sector because the networks and infrastructure of the companies we work with can be in very far places.”

“So the branch of Y didn't work a lot in the day because it could not work as a network for a day. So the users travel to another city.”

Unreliable Infrastructure

Participants pointed out that infrastructure reliability is a significant issue, with frequent network and electricity disruptions impacting project continuity.

“So during the revolution, there was no network there. And now, for example, today, a certain number of hours then it is disconnected. So electricity and the internet remain cut off all the time.”

4.4.3 Organizational Culture and Employee Engagement

This subtheme reflects issues related to the organizational culture and how employees are engaged, motivated, and inspired within the organization.

Fear of Responsibility

Participants noted that there is a widespread fear of taking responsibility within the public sector. This fear leads to delays and inefficiencies, as employees avoid making decisions and prefer to pass the responsibility to others.

“It shouldn't have happened like this. If there is an absent person, there should be a delegate. But what happens is that there is fear from taking the decision from his side.”

“Second thing, this is general to all the public sector companies. We could be wasting huge time because no one wants to take responsibility.”

“Maybe in a certain area, the area that people sometimes don't like to take responsibility.”

Excessive Division of Labor

Participants mentioned that the division of labour is often excessive, leading to unnecessary bureaucracy and inefficiencies. This excessive segregation of duties complicates processes and delays decision-making.

"Although, someone else could have given me the confirmation. From the manager, for example. Or the manager of the manager. But, then, we can call it segregation of duties, but it was, I mean, exaggerated. Exaggerated more than needed."

Lack of Competitiveness Among Employees

Participants highlighted a lack of competitiveness among employees, which can lead to complacency and reduced motivation to excel in their roles.

"Because they do not deal with people who are competitive with each other."

Lack of Trust

Participants noted that a lack of trust among stakeholders was a significant challenge, hindering effective collaboration and project success.

"The challenge was that the rest of the stakeholders did not trust this team."

Bureaucracy

Participants mentioned that bureaucratic regulations within the public sector create obstacles and slow down processes, impacting the efficiency of SAP implementation.

"The bureaucracy is related, I think, to their regulations."

Resistance to Change

Participants highlighted that many employees resist change and prefer to stick to traditional methods and systems. This resistance creates barriers to adopting new technologies and processes.

"They are working on the same strategy and the same manual things. And the same notebook and the same papers. And these things become a part of them."

"The key users want the same steps that used to happen in ECC. They have a great issue with change."

"There are many people who like the system in the old way, so they start to create problems and make conversations out of nothing because they don't want to switch to a new system and like the old system."

"I will create a solution for you. That is nothing related to SAP. And I should put it and be working inside SAP. And the system itself sometimes becomes a little difficult."

No Motivation

Participants noted a lack of motivation among employees, which can hinder the successful implementation of SAP. Employees resistant to change often prefer to work in familiar ways and show little interest in development.

"You find that there are people who have resistance to the system and want to work in the same way and they don't like development."

No Example to Inspire

Participants suggested that providing examples of successful implementations could inspire employees and help them visualize the benefits of the new system.

"They should stay with these companies for a week or two to see how things work, take an orientation. Things like that. That would be nice."

4.4.4 Communication and Coordination Problems

This subtheme highlights difficulties in effective communication and coordination among different parts of the organization, leading to inconsistencies and silos.

Information Inconsistency

Participants noted contradictions in the information provided by different managerial levels during data migration. High-level managers gave specific data and instructions that differed from the details provided by mid-level and low-level staff.

"Sorry. Contradictions between the, for example, during data migration, the high-level managerial roles gave me specific data and instructions. The mid-level and low-level, when I was talking to them about the details, they gave me different information."

Complex Communication Matrix

Participants mentioned that the communication process is often overly complex, even for simple tasks. This complexity makes it difficult to reach all necessary stakeholders to make clear decisions.

"Even if this thing is a very simple thing, it does not need all of this communication."

"You can't reach all the stakeholders you need to make a clear decision in a solution."

Language Barriers

Participants highlighted the issue of language barriers, noting that employees often need English courses and there is resistance to working in English instead of Arabic, which complicates communication.

"People should be prepared before we implement such a thing. For example, English courses."

"They have the part of the... No, I have to work. I don't have to work in English. I have to work in Arabic. So, this part always meets us. Language too."

Administrative Silos

Participants pointed out that each administration operates independently, organizing work based on its own perspective, resulting in a lack of dynamics and integration between administrations.

“Each administration is located in a place where every administration organizes its work based on its view. There are no dynamics between the administrations. There is no integration between the administrations.”

4.4.5 Operational Inefficiencies

This subtheme identifies inefficiencies in operational processes, such as backlogs, uneven workload distribution, and time-intensive maintenance tasks.

Large Backlog

Participants highlighted the issue of large backlogs, where data entry is significantly delayed, causing employees to enter data from months ago and extending the cycle to six months or up to a year.

“Instead of them entering the data today that was supposed to be entered two months ago and they enter this cycle for six months and a year.”

Uneven Workload Distribution

Participants noted that workload distribution is often uneven, with some phases being light and manageable, while others are extremely pressured, leading to inefficiencies and stress.

“You find that there is a certain phase where you have time, and the work is light and fun. And then another phase where you suddenly feel very pressured. So you feel that the load is not distributed to the phases that could have made things easier.”

Time-Intensive Data Governance

Participants mentioned that preparing master data is a time-consuming process. It requires extensive preparation, feedback, development, and unification, contributing to operational inefficiencies.

“Master data takes a lot of time to prepare, and it's one of the things that you have to go through, and give feedback, and then take a little time to develop and it needs unification.”

4.4.6 Skills and Competence Gaps

This subtheme addresses gaps in the skills and competencies of employees, including computer literacy and clear job responsibilities.

Computer Illiteracy

Participants noted that a significant challenge is the lack of computer literacy among some employees. Many users require basic training on how to use computers, laptops, and common software applications like Windows, Word, Excel, and Office.

“Some people don't know how to use the computer. That's a big problem.”

“The user needs training to use the computer, the laptop, the windows, the Word, the Excel, the office in general.”

Unclear Job Responsibilities Definition

Participants highlighted that job responsibilities are often unclear, making it difficult to determine key users in each area from the beginning. Sometimes, the same person handles multiple tasks, leading to confusion about their exact role and department.

“There's no way to determine key users in each area from the beginning.”

“Sometimes the same person works on several things to the extent that it is not clear what exactly he is doing, or in any department.”

4.4.7 Regulatory and Compliance Challenges

This subtheme highlights challenges related to meeting regulatory requirements and aligning with industry best practices.

Regulatory Requirements That Deviate from Industry Best Practices

Participants mentioned facing challenges when regulatory requirements conflicted with standard SAP processes. For example, inventory had to be moved at zero cost and evaluated monthly, necessitating time-consuming workarounds and custom solutions.

“So, we faced challenges in the inventory movement, for example. We had regulatory requirements that all the inventory should be moving at zero cost. So, this is not from the standard process. But we had to apply it with workarounds and so on. And it took time and effort. And it was also required that the inventory should be evaluated at the end of the month only.”

“Okay, there are things that were required to be a custom solution. It took time and effort and cost in implementation. And this was due to the regulatory requirements.”

Regulatory Alignment Hurdles

Participants highlighted the difficulty of aligning SAP implementation with long-standing organizational laws and regulations, requiring significant adjustments to ensure compliance.

“We work within the limits of the laws. The laws that the organization or the institution has been working on since its inception. We try to make the SAP part of the law.”

4.4.8 Technology Adoption Issues

This subtheme captures the reluctance related to adopting new technologies, such as cloud computing.

Cloud Aversion

Participants highlighted the challenges of cloud aversion, noting that reluctance to adopt cloud computing led to the need for on-premises servers. This resulted in increased time and costs, as well as reduced flexibility.

“You have to bring the servers on premises and this took more time and more costs, and there was a little inflexibility.”

4.5 Critical success factors of SAP implementation in the Egyptian public sector

4.5.1 Coordination and Collaboration

This subtheme reflects the importance of effective coordination and collaboration among stakeholders, including early identification of stakeholders, hierarchical communication, and decentralized decision-making.

High degree of coordination and collaboration

Participants emphasized the need for strong coordination and collaboration between the public sector organization and the SAP partner. Regular reporting and meetings help align strategic decisions with operational tasks.

“First of all, there must be coordination and collaboration between the public sector organization and the SAP partner.”

“The reporting must be done in a monthly or weekly meeting to achieve a good alignment between the higher-level decisions or strategic decisions with the operational and consultant and the people who implement with their hands.”

Early Stakeholders Identification

Participants noted the importance of identifying stakeholders early in the process. This includes defining key users in each area and ensuring that the right end users are involved in the implementation.

“First thing, the stakeholders who I will make from the start, the stakeholder from the client.”

“In the inventory. In the sales. In each area, there must be key users.”

“Clarify who will be involved in the implementation.”

“End users' definition. Some people were not supposed to use a system. It was a disaster.”

“Overall, I feel that one of the most important factors, in terms of the stakeholder definition. That it should be planned in a good way. Planned in a logical and realistic way. Within the planned time of the project.”

Creation of a Hierarchical Communication Matrix

Participants highlighted the need for a clear and simple communication matrix, with decision categories that streamline the approval process. This can save time and ensure efficient communication.

“Maybe from the beginning, there should be clear communication, like a communication matrix, and it should not be complicated. Like to get one step done, it should be simple. And it would be nice if it had categories. Like, for example, I do not have to follow through all the communication matrix for a simple decision. We can make the decision categories that in case of you want a decision in a certain area that is considered simple, this needs level one of approval. But if something is complicated or we are transferring a request on the production or something like that, it needs more complicated approval and so on. This could also save time in the project.”

Decentralized Decision Making

Participants stressed the importance of decentralized decision-making to speed up processes and avoid bottlenecks.

“No one has to refer to multiple people above him.”

Effective Management of Employee Vacation Plans

Participants noted the need to manage employee vacation plans effectively to avoid conflicts with training, testing, or go-live schedules.

“I want to take the expected vacation plans of all the employees of the public sector so that I know there is no conflict with the existing plan, whether for training or testing or go-live.”

4.5.2 Training and Skill Development

This subtheme encompasses various aspects of training, including the quality and the contextualization of the training content, objective selection of participants, and the importance of interactive and example-based learning.

Detailed Training

Participants emphasized that training should establish clear processes and steps for each key user or end user to follow, ensuring they understand and can use the system effectively.

“The training should establish clear processes and clear steps for each key user or end user who will use the system so he can follow a process because he is used to following a process.”

Quality Training

Participants highlighted that the quality of training is crucial and can determine the success or failure of the project. Consistent and high-quality training is essential.

“The training part. Quality. This is very important in training. Sometimes this is the main factor in success or failure of the project.”

“So the consistency and quality of the training is very important.”

Objective Selection of the Training Participants

Participants noted that it is important to select the right participants for training. Managers often attend training, but the actual users who perform the tasks should be the ones trained.

“The managers feel they are the ones entitled to attend the trainings, while I am not the user that performs the action or the cycle on the ground. But I will just go because I am the manager.”

Testing After Training

Participants stressed that testing should be conducted after the training to ensure users can apply what they have learned effectively.

“In testing, testing is supposed to be done after the training, not before it.”

Business-Specific Training Content

Participants emphasized the importance of using real business cases in training to make it relevant and practical for the users.

“When I give them training, they must be cases from the business itself that they meet every day.”

Interactive Learning

Participants highlighted the need for interactive learning, where attendees actively engage with the instructor, rather than passively receiving information.

“A contribution between the attendees and the instructor in the training. It's not just the instructor who gives them the information and they must memorize it and repeat it.”

Leading By Example in Training

Participants noted that when stakeholders attend training, their subordinates pay more attention, making it crucial for leaders to lead by example.

“Because the stakeholders when they attend, their subordinates pay attention.”

4.5.3 Data Management and Migration

This subtheme highlights the critical role of data management, including strategies for data cleansing, incremental and technical data migration, and early data collection.

Clear Data Cleansing Strategy

Participants emphasized that data cleaning and cleansing should only be done after establishing clear criteria to ensure the process is effective and accurate.

“Data cleaning data cleansing should only be done after setting a clear criteria for the way of cleansing that will happen.”

Incremental Data Migration

Participants noted that data migration should be done incrementally, using mocks or trials to ensure accuracy and functionality at each stage before full implementation.

“And also, once the data migration is not done in one bulk, it should be done in mocks or trials.”

Technical and Functional Data Migration

Participants highlighted the importance of both technical and functional data migration, ensuring that data is not only transferred correctly but also operates and integrates with other systems as expected.

“The first trial, that got migrated from a technical perspective. The data was transferred correctly. From a functional perspective, in the second trial, from a functional perspective, the data is operating and integrating with other solutions correctly. And in the third mock, it is a simulation.”

Starting the Data Collection and Analysis as Early as Possible

Participants stressed the importance of starting data collection and analysis early, allowing adequate time for planning and decision-making regarding data migration.

“I want them to look at their data from the start and make sure that their data they start to plan their data, whether they will migrate it in the same form or the new SAP nature or what exactly they will do and how will they take their decisions. And start to do analysis before the implementation.”

Field Mapping Between Systems

Participants noted that a field mapping table should be created during data cleansing to ensure clear mapping between fields in the legacy system and the new SAP system.

“In the data cleanings, a field mapping table should be done. All the fields that were in the legacy system and will be in the new system, there should be clear mapping between them.”

4.5.4 Change Management and Business Readiness

This subtheme captures the need for effective change management, comprehensive documentation and reengineering of business processes, and overall readiness for SAP implementation.

Change Management

Participants emphasized the importance of effective change management to facilitate a smooth transition to SAP. This includes preparing and supporting employees through the changes.

“They should care for the change management.”

Business Process Documentation

Participants noted the importance of documenting current business processes in the form of diagrams to provide a clear understanding and foundation for implementing SAP.

“They start to make documentation for their current process in the form of diagrams.”

Business Process Reengineering

Participants highlighted the need to adjust and improve existing business processes before implementing SAP. This involves revising long-standing practices and addressing any identified issues.

“So, he has to adjust his business as much as possible before he does anything on SAP. To change his understanding. He has an understanding. He's been working with it for 20 years.”

“They make documentation and internal meetings are held in the public sector to explain to them the current process. And if anyone sees that there is a mistake in the current process that has been drawn in the form of diagrams, they start to talk about it and start to change these diagrams.”

Clear Definition of Job Responsibilities

Participants stressed the importance of clearly defining job roles and responsibilities from the beginning to ensure everyone knows their role in the project.

“He needs to know his role from the start, the structure of the project, and the process of the project, and the best practice, and the standard process that he should work on from early on.”

Business Readiness for SAP Implementation

Participants emphasized the need to ensure the organization's readiness for SAP implementation from all perspectives, including technological, procedural, and human resources.

“The readiness of the business. It must be focused on, readiness from all areas. You must make sure that the company is really ready to work on SAP from the perspectives**.”**

Pain Points Identification

Participants noted the importance of documenting and addressing pain points in existing processes to ensure they are resolved before implementing SAP.

“Make documentation for the pain points they have in each process.”

4.5.5 User Engagement and Expectations

This subtheme emphasizes the significance of understanding user needs through research, managing expectations, and maintaining motivation.

User Research

Participants stressed that the SAP partner must have a clear understanding of the challenges faced by public sector organizations to effectively address their needs.

“The SAP partner must have a clear understanding of the challenges of the public sector organizations”

Expectations Management

Participants noted the importance of managing user expectations realistically, emphasizing that SAP's primary goal is control and efficiency, not merely facilitating employees' lives.

“I didn't send a message that the goal of SAP is to facilitate people's lives. No, SAP is not here to facilitate people's lives. SAP is here to take control. No one invests millions to facilitate the life of employees.”

Motivation

Participants highlighted the need for motivating employees through a combination of rewards and accountability. They suggested using key performance indicators (KPIs) and communicating the consequences of project success or failure. Additionally, orientation programs and showcasing successful implementations can help increase user interest and commitment.

“If he doesn't participate, there will be punishments and penalties.”

“The SAP partner must be aware of this so that they can look for motivation and ways to make these employees implement the project in a good way and respond to changes.”

“The second thing, as I said, in each area from the beginning of the project, we have to find key users and make KPIs. And there will be rewards, and there will be rewards. And it is communicated that if the project is not going well, people will be held accountable.”

“They should stay with these companies for a week or two to see how things work, take an orientation. Things like that. That would be nice.”

“I will make the users see successful implementations to be interested in the system before they start the implementation so they can imagine how it could turn out and so on.”

4.5.6 Process and Scope Management

This subtheme focuses on the accurate gathering of requirements, managing the scope of the project, and ensuring that time is allocated effectively for the project.

Scope Management

Participants emphasized the importance of managing the project scope carefully, starting with essential modules that fit the requirements and deferring others to ensure a correct and manageable digital transformation process.

"So we can start the first stage in the digital transformation in a correct way. Some modules we might actually need and it fits our requirements, but we say no, we will not buy now."

Accurate Requirement Gathering

Participants highlighted the need to involve business users correctly to gather accurate requirements, which is crucial for a successful go-live.

"You involve the business users correctly so you take the right requirements, you will be able to go live."

Freeing Up Time for The Project

Participants noted the necessity of freeing up time for team members by offloading other responsibilities, allowing them to focus fully on the project.

"Want to back up for you to take away the responsibility of your business work. So you can be free for the project."

4.5.7 Resource Allocation and Flexibility

This subtheme highlights the importance of developing resources, providing flexibility of movement through laptops, and placing employees in roles that match their skills.

Development of Resources

Participants emphasized the need to focus on the development of resources, including providing employees with courses to enhance their skills.

"What I can do, number one, focus on the development of the resource."

"I will give the employees some courses."

Laptop Provision for Enhanced Flexibility

Participants highlighted the importance of providing each employee with a laptop to increase flexibility, allowing them to work from various locations, not just the office.

"At least every employee should have a laptop. Not just a computer with a SAP. This will invite more flexibility. People can work on a laptop, not just working from the office."

Skill-Based Job Placement

Participants stressed the importance of placing employees in roles that match their skills and backgrounds, and also suggested reducing the pension age to allow older employees to work in roles that require less technological engagement.

"I have to reduce the pension age. People don't have to work for 60 years or they can work in certain jobs that would not need the computer and network and the technology."

"I choose the people who are graduates in the field that they should be working in. I mean, I don't bring anyone from agriculture and I make him work in inventory."

Learning From the Past

Participants noted the importance of learning from past decisions and mistakes to avoid repeating them, ensuring better planning and execution in future sprints.

"know where they are, what are they doing, and what is the timeline, and what are the delays and what they need to focus on. The decisions that were made in the past and the mistakes that were solved in the past to avoid repeating it in the next sprint."

4.5.8 Technological Adoption and Tools

This subtheme highlights the openness to using external tools and technologies, including cloud adoption and a suggestion for working with a single vendor.

Openness to External Tools

Participants emphasized the need for flexibility in using external tools and solutions, including cloud-related tools and complementary software like Excel, to enhance functionality and efficiency.

"Sometimes you need to be flexible. You can use other tools that are related to the cloud. You can use other solutions. Not just the same solutions inside SAP itself."

"Sometimes we had in some processes. For example, we had reports that have to be combined. So you can't work without Excel. As simple as this. It needs too much flexibility. It's impossible to be implemented inside the system itself."

Cloud Adoption

Participants noted that adopting cloud technology increases efficiency and reduces costs, making it a critical factor for successful SAP implementation.

"Start using the cloud. It will be more efficient. It will reduce the cost."

Single Vendor Company

Participants suggested that having the same company design and implement the solution can avoid handover issues, save time, and increase the likelihood of a successful implementation.

“If I can from the get-go make the company that designs the solution to be the same company that implements to avoid the issue of the handover.”

“If I can from the start make who design the same as who implement, I think this will be more successful and will save time.”

4.5.9 Risk and Financial Management

This subtheme covers the importance of managing financial risks associated with the project.

Financial Risk Management

Participants emphasized the need for effective financial risk management to ensure project continuity. Having a backup cost plan is crucial to avoid getting stuck due to unforeseen expenses.

“Backup cost if it is really needed. So that you don't get stuck in the middle.”

4.5.10 Trust and Leadership

These subtheme highlights the importance of trust within the organization and leadership by providing a positive example.

Trust

Participants emphasized that trust between the project team and management is crucial. Gaining the trust of key managers contributes significantly to project success.

“Trust with the people's manager. If you have gained the trust of the person who is in control in the area you are in, this will contribute to the success of the project.”

Business Departments Direct the Project

Participants noted that it is preferable for the business departments, rather than IT, to manage the project. This ensures that the project aligns closely with business needs and goals.

“It is preferred that the project management is from the business, not from IT.”

Using Industry Terminologies

Participants highlighted the importance of using industry-specific language to ensure that the new system steps match the old processes. This helps consultants communicate effectively with key users and public sector employees.

“The consultant can see in front of his eyes that the new steps on the system will match the steps on the old system or the old process. So he can speak the same language as the key user or the public sector employee.”

Table 4.1: Findings of my thematic analysis

Theme	Subtheme	Code
Project management methodology used in implementing SAP in the Egyptian public sector	Adaptations and Deviations in SAP Implementation Methodology	Long-Term Hyper Care Support
		Division of the Project Phases between vendors
		Implementing Activate as if it was a waterfall not an agile project management methodology
		Perceived Adherence to Standard SAP Activate Methodology
	Recommendations and Suggested Improvements to SAP Activate Methodology	Recommendations advocating Adherence to Standard SAP Activate Methodology
		Independent Data Migration Methodology
		Change in phases order or structure
		Increased focus on change management
		Independence of the Data Management
		Better Stakeholder Identification
Characteristics of a Successful SAP implementation in the Egyptian public sector	Technological Integration and Adoption	High Rate of Technology Adoption
	Operational Efficiency and Process Improvement	Paperwork Reduction
		Increased Efficiency
		No Backlog
		Increased Effectiveness
	Project Management and Delivery	Timely Delivery
		Delivery Within Scope
		Successful Project Management
		Achievement of Goals
	Communication and User Engagement	Communication Style Shift
		User Satisfaction
		Matching or Exceeding the Users' Expectations
	Data Management and Accuracy	Increased Accuracy
	Organizational Control and Value	Increased Control
		Value Addition

Characteristics of failure in SAP implementation in the Egyptian public sector	Technological Integration and Adoption	Low Rate of Technology Adoption
	System Utilization and Performance	Hollow ERP System
		Underutilization of the System Reports
	Project Execution and Go-Live Issues	Not Going Live
		Go-live Delay
		Incomplete Requirement Gathering
	Data Management and Accuracy	Inaccurate Data Entry
		Failure in Data Management
	User Requirements and System Alignment	Misalignment Between User Requirements and System Performance
		Ineffective Translation of the User Requirements
	Operational Efficiency and Cost	Decreased Efficiency
		Increased Cost
		Increased Complexity
		Increased Process Time
		Delayed Financial Closing
Challenges of SAP implementation in the Egyptian public sector	Leadership and Management Challenges	Firefighting Attitude
		Lack of Micromanagement
		Autocratic Leadership
		Abuse of Power
		Centralization of Decision Making
		Lack of Consequences
		IT Personnel Control the Project
	Resources and Infrastructure Issues	Long Absences
		Resources Replacement Difficulty
		No Free Wi-Fi___33
		No Laptops
		Underdeveloped Resources
		Lack of Network Stability
		Unreliable Infrastructure

	Organizational Culture and Employee Engagement	Fear of Responsibility
		Excessive Division of Labor
		Lack of Competitiveness Among Employees
		Lack of Trust
		Bureaucracy
		Resistance to Change
		No Motivation
		No Example to Inspire
	Communication and Coordination Problems	Information Inconsistency
		Complex Communication Matrix
		Language Barriers
		Administrative Silos
	Operational Inefficiencies	Large Backlog
		Uneven Workload Distribution
		Time-Intensive Data Governance
	Skills and Competence Gaps	Computer Illiteracy
		Unclear Job Responsibilities Definition
	Regulatory and Compliance Challenges	Regulatory Requirements That Deviate from Industry Best Practices
		Regulatory Alignment Hurdles
	Technology Adoption Issues	Cloud Aversion
Critical success factors of SAP implementation in the Egyptian public sector	Coordination and Collaboration	High degree of coordination and collaboration
		Early Stakeholders Identification
		Creation of a Hierarchical Communication Matrix
		Decentralized Decision Making
		Effective Management of Employee Vacation Plans
	Training and Skill Development	Detailed Training
		Quality Training
		Objective Selection of the Training Participants

		Testing After Training
		Business-Specific Training Content
		Interactive Learning
		Leading By Example in Training
	Data Management and Migration	Clear Data Cleansing Strategy
		Incremental Data Migration
		Technical and Functional Data Migration
		Starting the Data Collection and Analysis as Early as Possible
		Field Mapping Between Systems
	Change Management and Business Readiness	Change Management
		Business Process Documentation
		Business Process Reengineering
		Clear Definition of Job Responsibilities
		Business Readiness for SAP Implementation
		Pain Points Identification
	User Engagement and Expectations	User Research
		Expectations Management
		Motivation
	Process and Scope Management	Scope Management
		Accurate Requirement Gathering
		Freeing Up Time for The Project
	Resource Allocation and Flexibility	Development of Resources
		Laptop Provision for Enhanced Flexibility
		Skill-Based Job Placement
		Learning From the Past
	Technological Adoption and Tools	Openness to External Tools
		Cloud Adoption
		Single Vendor Company
	Risk and Financial Management	Financial Risk Management

	Trust and Leadership	Trust
		Business Departments Direct the Project
		Using Industry Terminologies

5 Discussion

This discussion section aims to elucidate the unique contributions of this study by comparing the findings with the existing literature on the implementation of ERP systems, particularly SAP, in the Egyptian public sector. While the literature on ERP implementation extensively covers various challenges and critical success factors (CSFs), this study has identified several novel insights that enhance our understanding of the specific dynamics within the Egyptian public sector. By conducting qualitative thematic analysis and interviewing SAP consultants who have worked in this sector, we uncovered unique themes and codes that shed light on the particularities of ERP implementation in this context.

One of the unique contributions of this study is the identification of issues such as long-term hyper care support and the division of project phases among different vendors as deviations from the standard SAP Activate implementation methodology. These deviations underscore the specific challenges faced in the Egyptian public sector, highlighting the need for prolonged post-implementation support and the strategic distribution of implementation phases to navigate complex bureaucratic structures. Additionally, the adaptation of the SAP Activate methodology to function more like a waterfall approach rather than an agile one reveals the difficulties in fully adopting modern project management methodologies in this context. These findings illustrate the necessity for flexibility and customization in ERP implementation strategies to address the unique operational realities of the Egyptian public sector.

Moreover, this study reveals the critical role of robust data management and comprehensive change management strategies in ensuring the success of ERP implementations. The literature has extensively discussed the importance of data integrity and accuracy; however, this research emphasizes the need for meticulous data migration and cleansing strategies to mitigate the risks associated with these processes. Furthermore, the findings stress the significance of managing organizational change, with a particular focus on preparing employees, managing resistance, and ensuring a smooth transition.

Another novel insight pertains to the crucial aspect of business readiness, which involves ensuring that the organization is prepared from technological, procedural, and human resource perspectives. The research highlights the need for tailored training programs that focus on practical applications of the ERP system, ensuring that staff are adequately equipped to utilize the new technology effectively from the light of real business cases that the users face on daily basis.

The study also underscores the importance of strong coordination between the implementing organization and external partners. The early identification of stakeholders and the establishment of clear communication channels are identified as pivotal for the successful deployment of ERP systems. The research reveals that in the Egyptian public sector, job descriptions and responsibilities are often not clearly defined or documented. Additionally, there is a notable absence of a formal communication matrix, which hampers decision-making and reporting relationships. These deficiencies contribute to challenges in effectively managing and implementing ERP systems within this context. This research further contributes to the understanding of compliance with regulatory requirements, emphasizing its critical role in ERP implementation success within the Egyptian public sector.

Lastly, the lack of skilled personnel emerges as a significant barrier to successful ERP implementation. This study highlights the necessity for continuous training and development programs to build local expertise and reduce dependency on external consultants. By addressing these unique challenges and critical success factors, this research provides valuable insights that can inform future ERP implementation projects in similar contexts.

In summary, this study contributes to the existing body of knowledge by highlighting specific strategies and considerations that are essential for the successful implementation of ERP systems in the Egyptian public sector. The findings offer practical implications for practitioners and policymakers, emphasizing the need for tailored approaches that address the unique challenges and leverage the critical success factors identified in this research.

5.1 Project Management Methodology Used in Implementing SAP in the Egyptian Public Sector

The findings reveal that while the SAP Activate methodology is generally employed in SAP implementations in the Egyptian public sector, there are significant deviations and adaptations observed. This reflects the necessity to tailor global methodologies to fit the specific needs and constraints of local contexts, a theme echoed in the broader literature on ICT4D and ERP implementation (Walsham, 2017; Kholeif et al., 2007).

5.1.1 Adaptations and Deviations

Participants reported various adaptations, such as long-term hyper care support and the division of project phases among different vendors. These deviations underscore the challenge of rigidly adhering to standard methodologies in environments characterized by complex bureaucracies and unique operational needs. For instance, the practice of treating the SAP Activate methodology as a waterfall approach rather than an agile one illustrates the difficulty in fully adopting modern project management methodologies in the public sector as previously noted by Fernandez et al. (2018).

The literature supports the need for flexibility in ERP implementation methodologies to accommodate local specificities (Al-Mashari et al., 2006). This includes recognizing the importance of adapting methodologies to better fit organizational cultures and operational realities, which can significantly impact the success of implementation efforts (Al-Mashari et al., 2006).

5.1.2 Recommendations and Suggested Improvements

Participants recommended several improvements to the SAP Activate methodology, including the creation of an independent data migration methodology, increased focus on change management, and better stakeholder identification. These recommendations align with the literature emphasizing the importance of robust data management and comprehensive change management strategies (Hawking et al., 2007; Colmenares & Otieno, 2005). The need for a separate data migration methodology highlights the complexities involved in ensuring data

integrity and accuracy, which is crucial for the effective functioning of ERP systems (Nah et al., 2001; Ziemba & Oblak, 2013).

Moreover, the suggestion to increase the focus on change management reflects the broader recognition in the literature that managing organizational change is critical to the success of ERP implementations (Al-Mashari et al., 2006). Effective change management can mitigate resistance and enhance user acceptance, which are essential for realizing the full benefits of ERP systems (Colmenares & Otieno, 2005).

5.2 Characteristics of Success in SAP Implementation in the Egyptian Public Sector

Successful SAP implementations were characterized by high technology adoption rates, operational efficiency, effective project management, improved communication, accurate data management, and increased organizational control and value. These findings are consistent with the critical success factors identified in the literature.

5.2.1 Technological Integration and Adoption

A high rate of technology adoption was a significant indicator of success. Participants reported that companies that effectively utilized SAP, significantly reducing paperwork and enhancing reporting capabilities were the ones which they considered successful. This aligns with the literature, which emphasizes the importance of user acceptance and effective utilization of ERP systems (Ranjan et al., 2016). High adoption rates suggest that the system meets user needs and integrates well with existing workflows, which is critical for achieving operational efficiency (Waheed & Abbas, 2023).

5.2.2 Operational Efficiency and Process Improvement

Participants highlighted that a SAP implementation that led to significant reductions in paperwork, increased operational efficiency, and elimination of backlogs were the ones they considered successful. These outcomes reflect the well-documented benefits of ERP systems in streamlining processes and improving operational efficiency (Waheed & Abbas, 2023). However, the initial decrease in efficiency during the transition period underscores the need for robust change management and training programs to mitigate initial disruptions (Colmenares & Otieno, 2005).

5.2.3 Project Management and Delivery

Projects the participants categorized as successful had effective project management that ensured projects were delivered on time, within scope, and met the established goals. This finding is consistent with the literature, which identifies effective project management as a critical success factor in ERP implementations (Françoise et al., 2009). Thus the ability to manage scope, timelines, and resources effectively is crucial for the successful delivery of ERP projects.

5.2.4 Communication and User Engagement

Improved communication and high user satisfaction were noted as indicators of successful implementation. Shifting communication reliance onto the system rather than traditional methods improved efficiency and user satisfaction. This finding aligns with the literature, which emphasizes the importance of effective communication and user engagement in ERP implementation (Jagoda & Samaranayake, 2017).

5.2.5 Data Management and Accuracy

Accurate data management was highlighted as a critical factor for successful implementation. Participants emphasized that increased data accuracy and control were essential for effective decision-making and operational efficiency. This finding is supported by the literature, which underscores the importance of data integrity in ERP systems (Nah et al., 2001).

5.2.6 Organizational Control and Value

Increased organizational control and added value were significant indicators of success. Participants noted improvements in business processes and value addition without unnecessary elongation of cycles. This finding aligns with the literature, which highlights the role of ERP systems in enhancing organizational control and delivering value (Botta-Genoulaz & Millet, 2006).

5.3 Characteristics of Failure in SAP Implementation in the Egyptian Public Sector

The characteristics of failure included low technology adoption rates, ineffective system utilization, project execution delays, poor data management, and misalignment between user requirements and system performance. These findings are consistent with the challenges identified in the literature (Hawking et al., 2007; Salimi & Dankbaar, 2008).

5.3.1 Technological Integration and Adoption

Low technology adoption rates were a significant indicator of failure. Participants reported that users found SAP complex and challenging, leading to reluctance in using the system. This reflects the literature's emphasis on the importance of user acceptance and the challenges of adopting new technologies in developing countries (Otieno, 2008).

5.3.2 System Utilization and Performance

Ineffective use of the ERP system and underutilized reporting capabilities were noted as indicators of failure. Participants reported that employees continued to rely on old systems and manual processes, bypassing the ERP system. This finding aligns with the literature, which highlights the challenges of ensuring effective system utilization and the need for

comprehensive training (Nah et al., 2001). But the literature does not discuss in details the points mentioned and the hollow ERP systems trend in developing nations reflecting unique aspects of their culture.

5.3.3 Project Execution and Go-Live Issues

Delays in going live and incomplete requirement gathering were significant indicators of failure. Participants noted that incomplete requirement gathering led to new requirements arising around the go-live time, disrupting the project. Thorough requirement gathering is crucial for ERP success; however, the literature did not discuss this important aspect but rather emphasized the importance of effective project management only (Françoise et al., 2009).

5.3.4 Data Management and Accuracy

Inaccurate data entry and overall data management failures significantly impacted the success of SAP implementation and was a major indicator of failure. Participants highlighted issues with master data and data migration, reflecting the importance of data management as documented in the literature (Ziemba & Oblak, 2013).

5.3.5 User Requirements and System Alignment

Misalignment between user requirements and system performance was a significant indicator of failure. Participants noted that the system delivered did not match users' usual workflows or calculations, leading to operational disruptions. This finding is consistent with the literature, which emphasizes the importance of aligning ERP systems with business processes (Chaushi et al., 2016).

5.4 Operational Efficiency and Cost

Increased operational costs, complexity, and longer process times were indicators of failure. Participants reported that the implementation resulted in decreased efficiency and increased costs due to overtime and longer task completion times. This finding aligns with the literature, which highlights the challenges of managing costs and maintaining operational efficiency in ERP implementations (Salimi & Dankbaar, 2008).

5.5 Challenges of SAP Implementation in the Egyptian Public Sector

The challenges identified include leadership and management issues, resource and infrastructure limitations, organizational culture, communication barriers, operational inefficiencies, skill gaps, regulatory compliance, and technology adoption.

5.5.1 Leadership and Management Challenges

Leadership and management challenges, such as firefighting attitudes, lack of micromanagement, and centralized decision-making, were significant obstacles. These issues reflect the broader challenges of managing change in bureaucratic environments, as documented in the literature (Fernandez et al., 2018).

The literature highlights the importance of effective leadership and change management in ERP implementations (Colmenares & Otieno, 2005). In the Egyptian public sector, leadership issues such as a lack of micromanagement and centralized decision-making exacerbate the challenges of implementing complex systems like SAP specifically in this context. Therefore, Effective leadership is essential for driving the project forward, ensuring alignment with strategic goals, and managing resistance to change.

5.5.2 Resources and Infrastructure Issues

Resource and infrastructure limitations, such as long absences, lack of free Wi-Fi, and underdeveloped resources, were major challenges. These findings align with the literature, which highlights the importance of adequate resources and infrastructure for successful ERP implementation (Huang & Palvia, 2001; Otieno, 2008).

The lack of reliable IT infrastructure, including stable internet connectivity and modern hardware, poses significant hurdles to SAP implementation in the Egyptian public sector. Addressing these issues requires substantial investment in infrastructure and training to ensure that the technological environment supports the new system (Ghosh, 2002).

5.5.3 Organizational Culture and Employee Engagement

Organizational culture issues, such as fear of responsibility, excessive division of labour, and resistance to change, were significant challenges. These challenges are consistent with the literature, which emphasizes the importance of managing organizational culture and employee engagement in ERP implementations.

The literature highlights the critical role of organizational culture in the success of ERP implementations (Al-Mashari et al., 2006).The literature does not address the fear of responsibility and excessive division of labour, challenges that are particularly unique to the Egyptian work culture. These issues are especially prevalent in public sector companies that were developed under the communist regime in the 1960s. In these organizations, the legacy of centralized control and rigid hierarchies has led to a work environment where employees often avoid taking responsibility and where tasks are excessively fragmented. This cultural context significantly impacts the efficiency and effectiveness of ERP implementations, but it is not discussed in the existing literature.

5.5.4 Communication and Coordination Problems

Communication and coordination problems, such as information inconsistency and complex communication matrices, were major obstacles. These findings align with the literature, which

highlights the importance of effective communication and coordination for successful ERP implementation.

Effective communication is crucial for aligning all stakeholders and ensuring that everyone is on the same page throughout the implementation process (Ziemba & Oblak, 2013). Inconsistent information and complex communication processes can lead to misunderstandings, delays, and ultimately project failure.

5.5.5 Operational Inefficiencies

Operational inefficiencies, such as large backlogs and uneven workload distribution, were significant challenges observed during ERP implementations. These issues highlight the broader difficulties in managing operational efficiency, which are critical for the successful adoption and functioning of ERP systems. However, the literature did not document these operational challenges, often overlooking the practical hurdles faced during real-world implementations. This gap suggests a need for more comprehensive studies that address these inefficiencies to provide better guidance for future ERP projects.

5.5.6 Skills and Competence Gaps

Skill gaps, such as computer illiteracy and unclear job responsibilities, were major challenges. These findings align with the literature, which emphasizes the importance of adequate training for successful ERP implementation.

The lack of skilled personnel is a significant barrier to successful ERP implementation (Otieno, 2008). Comprehensive training programs are essential to equip employees with the necessary skills and knowledge to effectively use the new system (Nah et al., 2001). However, the literature does not mention the clear definition of job responsibilities.

5.5.7 Regulatory and Compliance Challenges

Regulatory and compliance challenges, such as regulatory requirements that deviate from industry best practices and alignment hurdles, were significant obstacles. These issues reflect the broader challenges of aligning ERP systems with regulatory requirements, as documented in the literature.

Compliance with regulatory requirements is critical for the successful implementation of ERP systems in the public sector (Ziemba & Oblak, 2013). Ensuring that the system aligns with local regulations while also adhering to industry best practices requires careful planning and coordination, but this was not mentioned in the literature.

5.5.8 Technology Adoption Issues

Reluctance to adopt new technologies, such as cloud computing, was a major challenge. This finding aligns with the literature, which highlights the challenges of adopting new technologies in developing countries.

The adoption of new technologies like cloud computing can significantly enhance the capabilities of ERP systems (Dziembek, 2021). However, the literature does not discuss the resistance to change and concerns about data security and privacy that often hinder the adoption of such technologies in the public sector.

5.6 Critical Success Factors of SAP Implementation in the Egyptian Public Sector

The critical success factors identified include coordination and collaboration, comprehensive training and skill development, robust data management strategies, proactive change management, accurate requirement gathering, effective resource allocation, openness to new technologies, and strong financial risk management. These findings are consistent with the critical success factors identified in the literature.

5.6.1 Coordination and Collaboration

Effective coordination and collaboration among stakeholders, including early identification of stakeholders and decentralized decision-making, were crucial for success. These findings align with the literature, which emphasizes the importance of coordination and collaboration in ERP implementations in general.

Ziemba & Oblak (2013) noted that clear communication channels are essential for aligning strategic goals and operational tasks. However, the literature does not highlight the need for strong coordination between the implementing organization and external partners to ensure the successful deployment of ERP systems. Furthermore, it fails to address managing the relationship between the client and the SAP partner company, which is crucial for a successful implementation. Also The literature does not address the early identification of stakeholders, which is crucial for the successful deployment of ERP systems.

5.6.2 Training and Skill Development

Comprehensive training and skill development, including detailed and quality training, were critical for success. These findings are consistent with the literature, which highlights the importance of training for successful ERP implementation.

Ensuring that employees are well-prepared to use the new system is essential for maximizing its benefits and minimizing resistance to change (Reitsma & Hilletofth, 2018; Ziemba & Oblak, 2013). On the other hand the literature on training programs for ERP systems often fails to emphasize the importance of tailoring these programs to the specific needs of the organization and focusing on practical applications. This omission is largely due to the predominant focus on users' perspectives, neglecting the valuable insights of consultants, such as the inclusion of business cases in training preparation.

5.6.3 Data Management and Migration

Robust data management strategies, including clear data cleansing strategies and incremental data migration, were crucial for success. These findings align with the literature, which emphasizes the importance of data management in ERP implementations.

Effective data management is critical for ensuring the accuracy and reliability of information processed by the ERP system (Nah et al., 2001). The literature on data migration largely overlooks the role of incremental data migration and comprehensive data cleansing strategies, as it predominantly focuses on users' perspectives and often neglects the insights and experiences of consultants.

5.6.4 Change Management and Business Readiness

Proactive change management and ensuring business readiness for SAP implementation were critical for success. These findings are consistent with the literature, which highlights the importance of change management and business readiness in ERP implementations.

Change management strategies should focus on preparing employees for the new system, managing resistance, and ensuring a smooth transition (Colmenares & Otieno, 2005). Business readiness involves ensuring that the organization is prepared from all perspectives, including technological, procedural, and human resources which was discussed in literature under the change management theme.

5.6.5 User Engagement and Expectations

Effective user engagement and managing expectations were crucial for success. These findings align with the literature, which emphasizes the importance of user engagement and expectation management in ERP implementations.

Engaging users early in the implementation process and managing their expectations can help mitigate resistance and ensure a smoother transition which was overlooked as a factor in western literature with less autocratic leadership styles. Clear communication about the benefits and challenges of the new system is essential for gaining user buy-in and support (Ranjan et al., 2016).

5.6.6 Process and Scope Management

Accurate requirement gathering and effective scope management were critical for success. These findings are consistent with the literature, which highlights the importance of requirement gathering and scope management in ERP implementations (Al-Mashari et al., 2006).

Accurate requirement gathering ensures that the system meets the specific needs of the organization and avoids costly changes later in the implementation process (Asemi & Jazi, 2010). Effective scope management helps keep the project on track and within budget (Françoise et al., 2009).

5.6.7 Resource Allocation and Flexibility

Effective resource allocation and providing flexibility for employees were crucial for success. These findings align with the literature, which emphasizes the importance of resource allocation and flexibility in ERP implementations.

Allocating sufficient resources, including time, budget, and personnel, is essential for the successful implementation of ERP systems (Françoise et al., 2009). Providing flexibility for employees, such as remote work options and modern equipment, can enhance productivity and engagement.

5.6.8 Technological Adoption and Tools

Openness to using external tools and technologies, including cloud adoption, is critical for success. These findings are consistent with the literature, which highlights the importance of adopting new technologies in ERP implementations.

Adopting new technologies, such as cloud computing and advanced analytics, can significantly enhance the capabilities and flexibility of ERP systems (Dziembek, 2021). However, careful consideration of data security and privacy concerns is essential for successful technology adoption.

5.6.9 Risk and Financial Management

Effective financial risk management was crucial for success. These findings align with the literature, which emphasizes the importance of financial risk management in ERP implementations (Salimi & Dankbaar, 2008).

Managing financial risks, such as budget overruns and unforeseen costs, is essential for maintaining project viability and ensuring successful implementation (Françoise et al., 2009). Having a backup cost plan can help mitigate financial risks and ensure project continuity (Salimi & Dankbaar, 2008).

5.6.10 Trust and Leadership

Building trust and providing strong leadership were critical for success. These findings are consistent with the literature, which highlights the importance of trust and leadership in ERP implementations.

Effective project management is essential for effective collaboration and project success (Françoise et al., 2009). Thus, Strong leadership is necessary for driving the project forward, ensuring alignment with strategic goals, and managing resistance to change (Epizitone & Olugbara, 2019).

6 Conclusion

This research has provided an in-depth exploration of the challenges and critical success factors (CSFs) of SAP implementation in the Egyptian public sector, revealing both significant hurdles and essential strategies for success. The findings highlight several key challenges, including leadership and management issues, resource and infrastructure limitations, organizational culture and employee engagement difficulties, communication and coordination problems, operational inefficiencies, skills and competence gaps, regulatory and compliance challenges, and technology adoption issues. These challenges underscore the complex and multifaceted nature of ERP implementations in this context.

Leadership and management issues, such as firefighting attitudes, lack of detailed planning, autocratic leadership, and centralized decision-making, significantly impact the success of SAP implementations. Effective leadership and comprehensive change management are crucial to navigating these challenges and ensuring alignment with strategic goals. Resource constraints, including long employee absences, lack of free Wi-Fi, inadequate hardware, and underdeveloped IT infrastructure, pose substantial hurdles that hinder the effective operation and reliability of ERP systems. Addressing these limitations is essential for maintaining continuity and efficiency during the implementation process.

Cultural challenges, such as fear of responsibility, excessive division of labour, lack of competitiveness among employees, and resistance to change, create significant barriers to successful implementation. These deeply ingrained issues require comprehensive change management strategies and efforts to foster a culture of accountability and continuous improvement. Ineffective communication and coordination, marked by information inconsistency, complex communication matrices, and language barriers, lead to misunderstandings and delays. Clear, consistent, and straightforward communication channels are essential for aligning all stakeholders and ensuring smooth project progression.

Operational inefficiencies, such as large backlogs, uneven workload distribution between project phases, and time-intensive maintenance tasks, undermine the effectiveness of SAP implementations. Streamlining operational processes and ensuring even workload distribution throughout the project are critical for maintaining efficiency and productivity. Skill gaps, including computer illiteracy, language barriers and lack of specialized domain knowledge, also pose significant challenges. Comprehensive training programs and clear definitions of job roles are essential to equip employees with the necessary skills and knowledge for effective system use. Aligning SAP systems with local regulatory requirements and long-standing organizational laws presents additional hurdles. Ensuring compliance while adhering to industry best practices requires careful planning and coordination.

Reluctance to adopt new technologies, such as cloud computing, hampers the potential benefits of modern ERP systems. Addressing concerns about data security and privacy is essential for successful technology adoption. Despite these challenges, the study identifies several critical success factors that can enhance the success of SAP implementations in the Egyptian public sector.

Effective coordination and collaboration among stakeholders, including early identification of stakeholders and decentralized decision-making, are crucial. Regular reporting and meetings help align strategic decisions with operational tasks, ensuring that all parties are on the same page. High-quality, detailed training programs tailored to the specific needs of the organization are essential. Ensuring that employees understand and can effectively use the new system reduces resistance and enhances user acceptance.

Robust data management strategies, including clear data cleansing strategies and incremental data migration, are crucial for maintaining data integrity and accuracy. Effective data management ensures that the system functions correctly and supports decision-making. Proactive change management strategies are vital for managing resistance and ensuring a smooth transition. Preparing and supporting employees through the changes is essential for successful implementation. Accurate requirement gathering and effective scope management help avoid costly changes and keep the project on track. Involving operational level business users in the requirement gathering process ensures that the system meets the organization's needs.

Allocating sufficient resources, including time, budget, and personnel, is crucial for successful implementation. Providing flexibility for employees, such as remote work options and modern equipment, enhances productivity and engagement. Adopting new technologies, such as cloud computing and advanced analytics, can significantly enhance the capabilities of ERP systems. Addressing data security and privacy concerns is essential for successful adoption of such technologies. Effective financial risk management, including having a backup cost plan, helps mitigate financial risks and ensures project continuity.

Building trust between project teams from the vendor side and management and providing strong leadership from both the client and vendor sides are crucial for effective collaboration and project success. Leaders must drive the project forward, align it with strategic goals, and manage resistance to change. In conclusion, the successful implementation of SAP in the Egyptian public sector requires a holistic approach that considers the unique needs and constraints of the local context. By addressing the identified challenges and leveraging the critical success factors, organizations can enhance the likelihood of successful SAP implementations, leading to improved operational efficiency, data management, and organizational control.

6.1 Further work

Future research directions should build upon the findings of this study to deepen the understanding of ERP implementation in the Egyptian public sector. One promising area for further investigation is exploring user perspectives. Understanding how end-users perceive ERP systems can provide valuable insights into the challenges and successes of ERP adoption, particularly regarding user acceptance, training effectiveness, and the impact on daily workflows. This could be combined with the findings of this study that focused on SAP consultants' perspectives.

Another critical area for future research is exploring project manager perspectives. Project managers play a pivotal role in the implementation process, and their insights can shed light on the strategic and operational challenges faced during ERP deployment. This includes their

experiences with managing stakeholder expectations, handling project complexities, and navigating organizational resistance.

Additionally, future studies could examine the structural and procedural deficiencies identified in this research and use design science methodologies to formulate a solution, such as the lack of clearly defined job descriptions and responsibilities, and the absence of a formal communication matrix. Investigating these issues further could lead to the development of more effective frameworks for managing ERP projects in the public sector, ensuring that roles are clearly defined, and communication is streamlined.

Overall, these future research directions can contribute to a more comprehensive understanding of ERP implementation in the public sector, leading to improved strategies and practices that enhance the effectiveness and sustainability of these systems.

7 Appendix

Table 6.1: Challenges of ERP implementations as identified in my literature review.

Challenges identified	Sources	Geographical focus	Sector focus
Change Management	(Ranjan et al., 2016)	None	None
Alignment with Business Processes	(Hawking et al., 2007)	None	None
Training and Competency Development	(Nah et al., 2001)	None	None
Cost Overruns and Budget Management	(Salimi & Dank-baar, 2008)	None	None
Technical Challenges and Integration	(Arachchi et al., 2019)	None	None
User Adoption and Utiliza-tion	(Annamalai & Ra-mayah, 2011)	None	None
Economic Constraints	(Huang & Palvia, 2001)	Developing nations	None
Infrastructure Limitations	(Ghosh, 2002)	Developing nations	None
Skill Gaps	(Otieno, 2008)	Developing nations	None
Complex Bureaucratic Structures	(Fernandez et al., 2018)	None	Public sector
Management Support and Staffing	(Crisostomo, 2008)	None	Public sector
Cultural and Organiza-tional Resistance	(Nah et al., 2001)	None	Public sector

Power dynamics	(Kholeif et al., 2007)	Egypt	Public sector
Market forces	(Kholeif et al., 2007)	Egypt	Public sector
Alignment with accounting practices	(Kholeif et al., 2007)	Egypt	Public sector
Skepticism	(Emam & Hassan, 2021).	Egypt	Public sector

Table 6.2: Critical success factors (CSFs) of ERP implementations as identified by the literature review.

CSF identified	**Sources**	**Geographical focus**	**Sector focus**
Top management support	(Epizitone & Olugbara, 2019).	None	None
Effective training program	(Reitsma & Hil-letofth, 2018).	None	None
Effective project manage-ment	(Françoise et al., 2009)	None	None
Change management	(Colmenares & Otieno, 2005).	None	None
Alignment of the business processes	(Chaushi et al.,2016)	None	None
Data management	(Nah et al., 2001)	None	None
Clear goal setting	(Epizitone & Olugbara, 2019)	None	None

Top Management Support	(Al-Mashari et al., 2006)	Developing nations	None
Effective Project Management	(Al-Mashari et al., 2006)	Developing nations	None
Change Management	(Al-Mashari et al., 2006)	Developing nations	None
Cultural Fit	(Al-Mashari et al., 2006)	Developing nations	None
National culture	(Asemi & Jazi, 2010)	Developing nations	None
Over-reliance on vendors	(Asemi & Jazi, 2010)	Developing nations	None
Business process reengineering	(Asemi & Jazi, 2010)	Developing nations	None
Top management support	(Ziemba & Oblak, 2013)	None	Public sector
Effective project management	(Ziemba & Oblak, 2013)	None	Public sector
User training and support	(Ziemba & Oblak, 2013)	None	Public sector
Change management	(Ziemba & Oblak, 2013)	None	Public sector
Clear communication	(Ziemba & Oblak, 2013)	None	Public sector
Engagement strategy	(Ziemba & Oblak, 2013)	None	Public sector

Business process engineering	(Ziemba & Oblak, 2013)	None	Public sector
Data management	(Ziemba & Oblak, 2013)	None	Public sector
Data quality	(Ziemba & Oblak, 2013)	None	Public sector
Vendor selection	(Ziemba & Oblak, 2013)	None	Public sector

7.1 Informed Consent Form

Title of Research: ICT4D: Exploring the challenges and CSFs of SAP implementation in the Egyptian public sector

Principal Investigator: Rowan Elsharnouby, Rowanmohamed201@gmial.com

Institutional Contact: Lund University

1. **Introduction and Purpose of the Study:**

This study aims to explore the challenges and critical success factors associated with the implementation of ERP systems within the Egyptian public sector. The purpose is to gather insights from experienced SAP functional consultants to better understand this unique context.

2. **Description of the Research:**

Participation in this study involves an in-depth interview where you will be asked about your experiences with the ERP implementations. The interview will last between 30 and 50 minutes, during which you will discuss various aspects of ERP projects, including challenges faced and success factors identified.

3. **Subject Participation:**

I am looking to engage about 5 SAP functional consultants who have experience with public sector ERP implementations in Egypt. Participants should have direct involvement in such projects and be able to discuss their experiences comprehensively.

4. **Potential Risks and Discomforts:**

There are no known risks involved in participating in this study. However, should any discomfort arise from discussing professional experiences, participants may choose to pause or stop the interview at any time.

5. **Potential Benefits:**

Participants may gain a deeper understanding of the ERP implementation landscape within the public sector, potentially enhancing their professional knowledge and practices.

6. **Confidentiality:**

All information provided during the interview will be anonymized. No personal identifying information will be used in any reports or publications resulting from this research. Data will be securely stored and, once analyzed, will be appropriately destroyed to ensure confidentiality.

7. **Authorization:**

By signing this form, you authorize the use of your anonymized responses for educational and publication purposes related to this research within Lund university and other research institutions.

8. **Compensation:**

Participants will not receive monetary compensation for their involvement in this study.

9. **Voluntary Participation and Authorization:**

Your participation is entirely voluntary. Choosing not to participate will not affect any current or future relations with the researcher or the institution.

10. **Withdrawal from the Study and/or Withdrawal of Authorization:**

You may withdraw your participation at any time without penalty. Should you choose to withdraw, any data collected before your withdrawal will still be used in the study unless you request otherwise.

Authorization:

- I voluntarily agree to participate in this research program.

- I understand that I will be given a copy of this signed Consent Form.

Name of Participant :

Signature:

Date:

Name of Witness (print):

Signature:

Date:

Person Obtaining Consent: Rowan Elsharnouby

Signature:

Date:

7.2 AI Contribution Statement

ChatGPT was used In the completion of this master's thesis, I utilized the AI-based tool ChatGPT to support various aspects of the research and writing process. ChatGPT was used to generate ideas and provide structural guidance for the thesis. This included brainstorming research questions, outlining the main themes and subthemes, and organizing the overall structure of the thesis. The tool helped refine the research focus and ensure a logical progression of arguments throughout the chapters.

No AI-based tools were used for original data generation, analysis, or coding. All data analysis, empirical research, and substantive content creation were conducted independently by the author. The AI-based tool was used solely for supplementary purposes to enhance the writing and structuring process.

7.3 Author Contribution Statement

I have solely undertaken all aspects of this master's thesis. This includes the development of the research design and methodology, the collection and analysis of data, and the comprehensive literature review. I conducted all interviews, transcribed and coded the data, and synthesized the findings. Additionally, I wrote all sections of the thesis, including the introduction, literature review, methodology, results, discussion, and conclusion. Multiple rounds of review and refinement were conducted independently by me to ensure high standards of academic writing and presentation. This thesis represents my independent work and effort.

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