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Analysis of critical success factors for cloud ERP implementation in large companies – a comparison between consultants' and client-side project managers' perceptions

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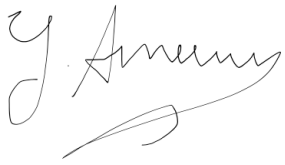

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Abstract

Background: ERP systems constitute the technological 'backbone' for organisations since all business process are mapped within the system. In the recent years, there is a transition to cloud-based ERP systems that large companies consider following. The implementation of a CERP system is a joint effort between the adopting company and the consultancy. Therefore, CSFs need to be defined that are essential for the success of the CERP project from both the consultant and client-side project manager perspective.

Purpose: The purpose of this thesis is to analyse how consultants and client-side project managers perceive CSFs for the successful implementation of a cloud-based ERP system in large companies. Herein, commonalties in perception as well as perception gaps were analysed.

Method: This study adopted an abductive qualitative approach. A multiple case study including seven cases was carried out. The empirical data was collected through semi-structured interviews. A cross-case analysis was carried out to shed light on commonalties in perceptions as well as perception gap and the reasoning behind it. The findings were then compared to existing literature.

Conclusion: The findings of these study discovered that there are commonalties in perceptions as well as perception gaps of the CSFs. Most importantly, the CSFs 'Communication', 'Involvement of users and training' as well as 'System testing' are deemed as critical by both consultants and client-side project managers.

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List of Abbreviations

CSF	Critical Success Factor
Cloud ERP	CERP
BPR	Business Process Reengineering
ERP	Enterprise Resource Planning

1. Introduction

This chapter introduces the reader to background of cloud ERP implementation. It outlines the reasons behind the research on critical success factors for cloud ERP implementation in large companies whereby the challenges are described. Further, the purpose of this research including the research questions are explained. This is followed by the delimitation and scope of the research. The chapter finishes with on outline of the research.

1.1 Background

The term enterprise resource planning (ERP) describes the use of information systems within an organization that enhance process efficiency through providing real time data (Holland & Light, 1999). ERP systems are software packages which offer integrated business solutions for the organizations' most important business activities as well as administrative functions based on a common IT infrastructure (Klaus et al., 2000). This enables the effective use of resources such a materials, human resources and finances alongside the supply chain (Coyle et al., 2013). Hence, as stated by Cox & Watson (2000), ERP systems are the "backbone" of an organization that support the accelerated response to supply chain partners. Due to globalization and the associated increased competition, the need for efficient and seamless information exchange with supply chain partners including suppliers, distributors and customers was the major driver for ERP implementation (Saade & Nijher, 2016). Therefore, well-operating ERP systems have become a competitive advantage in order to retain a firm's competitiveness on global and local markets (Beheshti & Beheshti, 2010; Helo et al., 2008).

As a matter of fact, in order to retain the competitive advantage in the long run, companies are required to implement cutting-edge technologies to grasp their potential. Currently, cloud-based ERP (CERP) systems are substantially expanding and will impact significantly the current business model (Shatat & Shatat, 2021). Companies need to move forward from the in-house (on-premise) ERP system to a new CERP system. On-

premise system include software or hardware components that run locally on a company's own IT infrastructure, while CERP systems are cloud-based software solutions that are completely hosted by cloud providers (Sabiri & Benabbou, 2017). Since IT-infrastrucure is outsourced, CERP systems have lower costs associated with ERP infrastructure, including expenses related to software licenses, updates, application operation, hardware, consulting and maintenance (Elgaral & El Kommos, 2012).

Moreover, for the implementation of a CERP system, organisations reach out to software consulting services. Organisations usually do not possess the expertise to evaluate the fit of their organisational structures and processes with CERP capabilities as this knowledge can only stem from carried out projects (Xin & Choudhary, 2019). For a holistic evaluation of this fit organisations hire external consultants that are already experienced in implementing CERP systems (Jæger, et al., 2020). Therefore, consultants are major external stakeholders in CERP implementation projects since clients rely on their expertise (Lapiedra et al., 2011). Subsequently, clients enter a collaborative partnership with the consultants who serve as key implementers of the new cloud technologies and, in turn, substantially impact the successful execution of the project (Lech, 2013).

1.2 Problem statement

Firms not only highlight the fact that is critical to have a well-operating CERP system, but also underline the need for an effective and successful implementation of such a system (Yu, 2005). Despite being widely used, ERP systems have continually a high rate of implementation failure (Chakravorty, et al., 2016; Beheshti & Beheshti, 2010). Herein, implementation failure refers to exceeded project budgets or schedule overruns (Lyytinen & Hirschheim, 1987). According to Panorama Consulting (2022), 41% of the global ERP implementation projects go over budget and 36% did not stay on schedule.

These high failure rates are linked with the high complexity of a CERP system. Given their integrative the implementation is associated with technological and organisational risks (Hong & Kim, 2002). Umble et al. (2003) point out that the implementation process cannot be compared to a simple installation of a new software package. Regarding the technological risks, adopting organizations emphasize security concerns as the hosting of confidential data is completely controlled by the cloud vendors. Preventing data leakage

is therefore the highest priority for adopting organization (Gupta & Misra, 2016a). Furthermore, network latency poses another risk as it decreases the performance of the CERP. When vast amounts of data are processed through the network, cloud users may retrieve data which is not on real-time basis. Hence, the user experience of the system is not unsatisfactory (Gupta & Misra, 2016b).

Regarding the organisational risks, organisation generally encounter a comprehensive revamp of its business procedures (Gerhardter & Ortner, 2013; Alharthi et al., 2019) in terms of tasks, roles and responsibilities when a CERP system is implemented (Koh et al., 2011). Hence, it requires change management across the organization to reduce the risk of organisational resistance and system rejection (Reitsma & Hilletofth, 2017). Above that, proper project management is essential as the length of CERP projects can vary from six months to several years. Unclear project scopes result in prolonged schedules and greater costs which overrun budget and time. Subsequently, CERP implementation projects pose a financial risk (Umble, et al., 2003).

Due to the mentioned risks, practitioners and researchers have investigated ways of reducing the above-mentioned challenges associated with ERP system implementation. The experience of various organizations that have implemented on-premise ERP systems in the past decades have been well documented by multiple scholars (Jæger, et al., 2020). These findings have led to a general understanding of factors that are essential for a successful implementation (Haines & Goodhue, 2003).

This set of factors are commonly referred to as critical success factors (CSF). There is a consensus in research that, if certain CSFs are addressed properly during the ERP project, the chances of a successful implementation are significantly enhanced (Finney & Corbett, 2007; Ram et al., 2013 Saade & Nijher, 2016; Sun et al., 2005). However, the current proposed CSFs must be revaluated under the aspect of the growing demand for cloud ERP systems (Shatat & Shatat, 2021). The perception on CSFs for CERP is especially important for the stakeholders in a CERP project, who intend to implement or switch to a CERP system as focusing on the right CSFs supports in defining a strategy for the implementation procedure.

However, the current literature on CSFs regarding CERP implementation is scarce and fragmented. Therefore, two explicit gaps could be identified from literature. Firstly, as this research field is still in its infancy, the research only proposes sets of CSFs for CERP implementation, focusing on the categories organisational, human-related and technological factors. As reinforced by Huang et al. (2021) the actual criticality of the current CSFs is not sufficiently investigated yet, meaning that a distinction between stronger and weaker CSFs is lacking in research. It is essential for the clients and consultants in a CERP implementation project to understand which of the CSFs strongly drive the performance of a successful implementation in order to prioritize them (Finney & Corbett, 2007).

Further given the different roles and attitudes of clients and consultants in a CERP project, the perceived criticality of CSFs is likely to differ (Ram et al., 2013). For instance, external consultants will have a different outlook on the success of a CERP implementation project compared to the clients (Alsulami et al., 2016). Therefore, it is worthwhile to investigate the different perceptions on the criticality of CSFs for CERP implementation of consultants and clients. Elaborating a mutual understanding of the perceptions on CSFs fosters a better collaboration between the consultants and clients during the project (Soja, 2009).

Considering the client-side, mostly the user's perception was investigated so far (Gupta et al., 2018; Adeboye, 2016; Lewandowski et al., 2013). However, the client-side project managers' perception was not examined yet. Especially the client-side project managers play an important role during the implementation phase as their tasks are manifold. They not only represent the main point of contact between consultants and the adopting company, but they are also in charge of managing the project scope and quality together with consultancy (Liao et al., 2018).

Therefore, the literature lacks a comprehensive comparison between the consultants' and client-side project managers' perceptions on CSFs for CERP implementation that can shed light on contrasting views. Based on mutual understanding, consultants and client-side project managers can define collaboratively which CSFs are explicitly critical for their CERP project and need to be addressed explicitly during the implementation phase

(Abanda & Lee, 2020). Thus, comparing the perceptions of consultants and client-side project managers is worthwhile for investigating how their perceptions change the conceptualization of CSFs for CERP implementation (Alsulami et al., 2016).

Secondly, most scholars on cloud ERP CSFs have mainly focused on the implementation of CERP systems in small and middle-sized companies (SMEs). However, the organization's size is a relevant factor when it comes to investigation of cloud ERP implementation as requirements and expectations of SMEs compared to large organizations with more than 250 people are distinct (Huang et al., 2021). For instance, large organizations operate on a larger and more complex level regarding the IT-infrastructure, thus the migration from an on-premise ERP system to a CERP system is more challenging (Gupta et al., 2017). As opinionated by Huang et al. (2021), future research needs to focus on large organizations and how the CSFs considering the categories organizational, human-related and technological factors support the successful project outcome of CERP implementations in large organizations.

In fact, especially large companies face the challenge of being obliged to transition to a hybrid or fully cloud-based ERP system until 2027. SAP, one of the biggest system vendors, has encouraged its customers to transition to the S4/HANA platform as they will not support older SAP Business Suite platform in the future (Lünendok, 2020). 92% of the Forbes Global 2000 companies use SAP systems (SAP, 2020).

1.3 Purpose and research question

The purpose of this research is to understand the consultants' and the client-side project managers' perceptions considering the criticality of CSFs for CERP during the implementation phase at large companies. Herein, the client-side project managers' perceptions are investigated through the viewpoints of the consultants to shed light on both the commonalities in perceptions and perception gaps.

Consultants should demonstrate the capability to empathize with clients' perceptions on CSFs for CERP implementation (Lech, 2013). It is an imperative for consultants to understand the client's business context and functional requirements for the CERP systems as it reflects on the perception of the CSFs (Lech, 2013). On the other hand,

client-side project managers are required to demonstrate their commitment by providing competent project supervision which entails a high level of commitment as well as having the right skills and resources put in place in order to manage the CERP implementation in an effective way (Somers & Nelson, 2004).

Since the implementation of a CERP system is a joint effort between the consultancy and the adopting client organization, it is worthwhile to define which CSFs are essential for both the consultants as well as client-side project managers. Subsequently, this lays a groundwork for the collaboration that thrives the CERP project.

In addition, this study focuses on CERP implementation project in large companies during the actual implementation phase as this was not explored extensively by previous research yet. To serve the research purpose, the following research question was developed:

RQ: *How are the critical success factors for cloud-based ERP implementation at large companies perceived by consultants compared to the client-side project manager?*

1.4 Delimitations

As with every research, there are some limitations to this study. The study only investigates the perceptions of consultants and the client-side project manager. The perceptions of cloud vendors or users, who also present stakeholders in CERP projects, were excluded. Further, the clients' perceptions were investigated through the viewpoints of the consultants which can be prone to bias. Moreover, other implementation phases of the CERP lifecycle are excluded, namely the pre- and post-implementation phase. Above that, no ranking of the CSFs is provided.

1.5 Outline

The study is structured in seven chapters. Chapter two outlines the frame of reference including a literature review on CSFs for CERP implementation. Further, the CERP lifecycle is introduced. Chapter three describes the used methodology. In chapter four, the empirical findings are presented which are analysed in chapter five. Chapter six compares and discusses the findings to the existing literature. This is followed by the final

chapter seven which finishes with a conclusion. The conclusion provides the answer to the research question as well as the contributions, limitation and suggestions for further research.

2. Frame of reference

The purpose of this chapter is to provide the theoretical background to the research topic of CERP implementation. At first, the current literature is reviewed with regards to categories of CSFs for CERP implementation. Then, the different phases of the CERP lifecycle are explained briefly.

2.1 Critical success factors in CERP implementation

A systematic literature review was conducted in order to identify the CSFs for CERP implementation that have been proposed by the literature. The systematic literature procedure was adopted from Huang et al. (2021). For this purpose, Web of Science, an electronic database was utilized. Herein, several criteria were applied. For the first step, keywords were combined. The keywords ”Cloud ERP” yielded 186 results indicating that this field of research is gradually emerging. To narrow down the research, the keyword ”implementation” was added since this research focuses only on the implementation phase. That reduced the results to 59 articles. Then, the keywords ”CSF”* OR ”success”* OR ”critical success factor” were combined resulting in 37 relevant articles. The publication years ranged from 2013-2022 as in 2013 the first CERP article with the mentioned keywords was published. These articles were filtered according to their rank in the 2021 ABS list, which means that only articles published in a journal with a rank higher than 2 were included. This was done to ensure a high scientific quality of the articles.

The remaining articles were exported into a Microsoft Excel spreadsheet including the columns authors, article title, abstract, date of publication and article abstract. From the abstract the decision was made whether the article was relevant or not. Since this study focuses on the implementation phase of CERP, articles that focused on the adoption, pre- or post-implementation phase or were too IT-centric were excluded. Also, the articles had to explicitly state CSFs.

These articles further served as the ”focal point” of the literature. In order to include more

relevant articles, snowball-method was used to find other papers that represent CSFs for CERP implementation. For this approach, citations were traced backwards and forwards from the initial articles (Machi & McEvoy, 2016). This supported in identifying other relevant articles which were not found in the initial search. In addition, this ensured that the literature review is comprehensive by incorporating current articles which reveal the gradual development of CSFs for CERP conceptualization over the last decade. Since the research field is rather new, many citations referred to conference papers, which were included for the literature review as well. This resulted in 11 articles of high relevance that state CSFs for CERP implementation. Naturally, many articles referred to previous CSFs literature that focuses on on-premise ERP systems, hence they are also referred to in the subsequent sections as there are overlaps.

Through studying the 11 articles of high relevance, it became apparent that CSFs for CERP implementation often have the same meaning, however they are named differently. Therefore, a further categorization was done in order to condense the articles. For instance, ”Business case”, ”Process quality”, ”Reorganization of business processes”, ”Business process reengineering” and ”alignment of IT with business” were summarized as the CSF ”Business process reengineering”. A list of the condensed CSFs is attached in Appendix 1.

Further, the CSFs were categorized based on the taxonomy of Gupta et al. (2018) as it is frequently used in the literature. Gupta et al (2018) classify the CSFs in different categories including organizational, human related and technological CSFs. For the purpose of this study, only CSFs that can be addressed by the consultants and the clients during the implementation phase were included. Therefore, extrinsic CSFs that are fully controlled by the cloud vendor were excluded as this perception was not investigated in this study. Table 1 which is on the next page, represents the CSFs that emerged from the 11 articles of high relevance and are grouped into the aforementioned categories. Based on the CSFs in Table 1, a framework of CSFs for CERP implementation was developed for this study. The framework can be found in Appendix 2 whereby a brief explanation for each CSF is given. The in-depth analysis of the CSFs will be represented in the following chapters.

Table 1: CSF papers and frequency of identified CSFs

	Category	Organisational					Human related		Technological		
	CSFs for CERP implementation / **Authors**	**Project management**	**Top management commitment**	**Business process reengineering**	**Communication**	**Change management**	**Involvement and training of users**	**Project team**	**Data management**	**CERP package selection and IT-infrastucture**	**System testing**
1	Emam (2013)	x		x		x		x	x	x	
2	Gerhardter & Ortner (2013)	x	x	x			x			x	
3	Gupta & Misra (2015)	x		x	x	x					
4	Gupta & Misra (2016a)		x				x	x			
5	Gupta & Misra (2016b)	x			x		x	x	x	x	x
6	Gupta et al. (2018)	x		x	x	x	x	x	x	x	x
7	Gupta et al. (2019)	x	x	x	x	x	x	x	x	x	x
8	Alharthi et al. (2019)	x	x	x					x		
9	Huang et al. (2021)	x	x	x	x	x			x	x	x
10	Shatat and Shtatat (2021)	x	x	x			x				
11	Radhakrishnan et al. (2022)	x	x		x		x				
	Frequency	**10**	**7**	**8**	**6**	**5**	**7**	**5**	**6**	**4**	**4**

2.1.1 Organisational CSFs

The subsequent section provides a more detailed description of the organisational CSFs that were extracted from the literature.

Project management

The first organisational CSF and most cited one is project management (Alharthi et al., 2019; Gupta et al., 2018). Project management encompasses the initiation, planning, execution, and control of various resources within a firm in order to ensure the completion of a project in time. Hence, defining the right implementation strategy for the successful execution of the implementation considers a cost-benefit analysis with the aim of achieving the objectives within a given time frame (Gupta et al., 2018; Gupta & Misra, 2016b; Ram et al., 2013; Umble et al., 2003;). Moreover, the implementation strategy determines which CERP package will be selected and subsequently the level of customization. For instance, an organization can choose whether to adopt a standardized CERP system or have CERP package customized by the software consultancy (Chou & Chang, 2008). Thereby the project budget needs to be aligned with the implementation strategy in order to not overshoot budget constraints (Hasibuan & Dantes, 2012). As a matter of fact, unforeseen incidents can happen during the implementation phase that can lead to increasing costs, hence it is vital to have a flexible budget policy (Holland & Light, 1999; Gupta & Misra, 2016b). Various project management techniques and methodologies can be applied by the project team members including project managers of the client organization and CERP consultants in order to support the project management team when challenges are faced (Alharthi et al., 2019).

Top management support

The second organisational CSF is top management support (Gerhardter & Ortner, 2013 Alharthi et al., 2019; Gupta, et al., 2019; Huang, et al., 2021) The top management establishes the environment for the CERP project (Alharthi et al., 2019) by communicating the goals of the CERP project which gives a clear guidance to the employees (Gerhardter & Ortner, 2013; Gupta & Misra, 2016b). Above that, it is an imperative for the top management to determine and allocate the right resources in terms of qualified employees and financial resources for the project (Gupta et al., 2019).

Further, the top management facilitates the change management which associated with the new CERP systems and encourages the employees to approach new process with a collaborative mindset (Alharthi et al., 2019). Overall, employees within the client organisation should get the feeling of being supported and empowered by the top management during the project (Saade & Nijher, 2016). Moreover, in case of upcoming conflicts during the implementation, the top management is required to tackle these conflicts with appropriate methods (Alharthi, et al., 2019). Besides empowering the project team and employees, Gupta et al. (2019) stresses the top management responsibility to effectively monitor the CERP project.

Business process reengineering

The third organisational CSF is business process reengineering (BPR) (Gerhardter & Ortner, 2013; Alharthi, et al., 2019; Shatat & Shatat, 2021). BPR aims to ensure the coherence between the requirement of the CERP system and those of the client organization (Alharthi et al., 2019). Thus, the successful implementation of a CERP system requires a thorough examination of the persisting processes regarding efficiency and effectiveness as well as the execution of organisational restructuring where necessary. This is deemed critical since CERP systems often come with predefined business processes and hence carrying organizational change measures is indispensable (Gerhardter & Ortner, 2013). However, most companies lack the expertise in evaluating the compatibility of their organizational structures and processes with CERP capabilities, organizations often require the knowledge gained from previous CERP implementation projects (Xin & Choudhary, 2019). To conduct a comprehensive evaluation, external consultants with experience in ERP system implementation are usually hired (Jæger et al., 2020). As underlined by previous research, the greater a clients organization's ability to change through BPR, the more impactful can be its CERP systems (Gupta et al., 2019).

Communication

The fourth organizational CSF is communication (Gupta & Misra, 2015; Gupta et al., 2019; Huang et al., 2021; Radhakrishnan et al. 2022). Communication needs to be effective and synchronized with the project management in order to ensure a clear understanding of roles and responsibilities between the project team members as well as the associated tasks in a CERP implementation project. As a matter of fact, many CERP

projects failed due to miscommunication in the past (Gupta, et al., 2019). Moreover, the knowledge and information that is generated during the execution of the project should be well documented as it can be utilized to communicate the progress and promote the project in general (Gupta, et al., 2018; Hasibuan & Dantes, 2012; Ram, et al., 2013;). As reinforced by Lech (2013), the communication between the consultants and the users is deemed critical and should be facilitated through the project manager at the client organization. Subsequently, the employee's ambiguity towards the project is reduced (Gupta & Misra, 2016b; Huang et al., 2021) and the collaboration is strengthened (Gupta, et al., 2019).

Change management

The fifth organisational CSF is organisational resistance and readiness (Emam, 2013; Gupta et al., 2018; Huang, et al., 2021). The successful implementation of CERP systems also depends on how client organizations react to transition towards a new CERP system. Eventually, client organizations are likely to encounter challenges from their employees who may have less knowledge about the proclaimed benefits of CERP systems or are reluctant to change their existing work habits or business processes (Gupta & Misra, 2016b; Huang, et al., 2021). Consequently, resistance among the employees can be triggered (Gupta, et al., 2018; Gupta & Misra, 2015). It is therefore suggested that a progressive organizational culture should be created where employees are not reluctant to learn new ways of doing the same work (Gupta & Misra, 2016b). Additionally, as mentioned before, good communication between all the project team members supports the mitigation of organizational resistance (Huang et al., 2021).

2.1.2 Human related CSFs

The subsequent section provides a more detailed description of the human related CSFs that were extracted from the literature.

Involvement and training of users

The first human related CSF is the involvement and training of users (Gerhardter & Ortner, 2013; Gupta & Misra, 2016a; Gupta & Misra, 2016b; Gupta et al., 2018; Gupta, et al., 2019; Shatat & Shatat, 2021; Radhakrishnan, et al., 2022). The user's involvement during the implementation phase of a CERP is crucial as it facilitates their familiarity

with the new system. To fully benefit from the functionality of a CERP system, the user must understand its advantages. The user should possess both business and technical skills to become proficient in using the system and to provide feedback that can be used to improve or customize it (Gupta & Misra, 2016a). Herein, active participation of users in decision making processes about which requirements are important as the user gets attached to the new system from the beginning of the implementation (Gupta et al., 2019). Subsequently, reduced time delays in work execution can be achieved through the ease of use of a CERP system (Gerhardter & Ortner, 2013; Gupta & Misra, 2016b). It is therefore recommended to provide regular hands-on training during the implementation phase to ensure that users learn the right techniques (Gupta & Misra, 2016a). This further results in mitigating the risk of organizational resistance (Huang et al., 2021).

Project team

The second human related CSF is project team (Emam, 2013; Gupta & Misra, 2016a; Gupta & Misra, 2016b; Gupta et al., 2018; Gupta et al., 2019). It refers to the knowledge and skills of team members that facilitate the implementation of a CERP system. It is suggested that project teams should consist of cross-functional members with different sets of skills, excellent reputations for past accomplishments and decision-making authority considering both internal and external members (Gupta et al., 2019; Gupta & Misra, 2016a; Gupta & Misra, 2016b; Nah & Delgado, 2006). An internal CERP team at the adopting company typically includes project managers and team leaders from various departments who contribute to the development of business processes and strategies. Users also provide operational process knowledge, while IT staff provide technical expertise. External experts, such as consultants are included in the project team as well in order to provide implementation strategies and techniques to assist with maintenance, customization and user training (Reitsma & Hilletofth, 2017). The literature recognizes the importance of trust between internal and external project team members such as consultants, hence the establishment of trust is vital for a smooth collaboration (Gupta & Misra, 2015; Lapiedra et al., 2011).

2.1.3 Technological CSFs

The subsequent section provides a more detailed description of the technological CSFs that were extracted from the literature.

Data management

The first technological CSF is data management (Emam, 2013; Gupta et al., 2019; Gupta & Misra, 2016b; Alharthi et al., 2019). Effective management of data is critical in ensuring the smooth functioning of an information system as data is biggest asset in an information system (Alharthi et al., 2019). To achieve this, policies and processes must be in place to ensure that data quality is maintained, especially during the implementation phase of CERP system where data quality can affect system functionality and overall productivity (Gupta et al., 2018; Alharthi et al., 2019; Gupta et al., 2019). Evaluating data quality using dimensions such as accuracy, validity, completeness and integrity is vital. To facilitate the process, a clear data migration strategy must be developed, considering these dimensions. Both internal and external project members need to evaluate and commit to the migration strategy (Alharthi et al., 2019; Gupta & Misra, 2016b).

CERP package selection and IT-infrastructure

The second technological CSF is selection of the CERP package (Gupta et al., 2018; Gupta et al., 2019; Gupta & Misra, 2016b; Huang et al., 2012). The selection of a vendor is a crucial step towards implementing a new CERP system. Choosing an CERP package from a vendor should be approached strategically in order to align with client organization's required business processes. Clients can choose their CERP system based on different cloud layers, which are namely Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS). SaaS provides web-based software applications, on PaaS delivers a platform on which software developers can code their own applications and IaaS provides an infrastructure solely including servers for hosting, network and storage capacity (Mell & Grace, 2011). Further clients can choose between the deployment models which are public, private or hybrid clouds. Public clouds and its software applications and infrastructure can be accessed by the public, private clouds are used within one single organization and cannot be accessed by the public, community clouds are shared between organizations and hybrid clouds are a combination of public clouds (Mell & Grace, 2011). In addition, it is vital that these decisions are carefully evaluated within the confines of the project budget (Gupta et al., 2018). Thereby, the opinion of CERP consultants is crucial in guiding client organizations as they often rely on their advice and follow it (Gupta & Misra, 2016b).

System testing

The third technological CSF is system testing (Gupta & Misra, 2016b; Gupta et al., 2018; Gupta et al., 2019; Huang et al., 2021). The implementation of a CERP system can be affected by system testing as the accuracy and validity of data during the conversion process can impact the system's performance and lead delays during the implementation phase (Gupta & Misra, 2016b). Testing of the selected ERP package can reveal persisting bugs in software that can be removed quickly (Gupta et al., 2018). It is important to note that all the various stakeholders in the project team, including ERP consultants, project managers and users are required to engage in testing the system (Motiwalla & Thompson, 2012). While CERP consultants prepare, supervise and document the system testing (Lech, 2013), the users and project managers from the adopting organization can familiarize themselves with the new system and provide valuable feedback (Gupta & Misra, 2016b).

2.2 CERP lifecycle

CERP systems undergo, similar to on-premise systems, a lifecycle. Since this study focuses specifically on the implementation phase, the CERP lifecycle is introduced. This supports the reader in understanding why the focus in this study lies explicitly on the implementation phase and hence other phases were excluded.

The literature proposes several lifecycle models that are currently investigated with regards to the transition toward CERP systems (Kachur & Kleinsmith, 2013). The different lifecycle models are split into different phases which are often found to overlap. As cited Kachur & Kleinsmith (2013) the most common and generally accepted models is presented by Markus & Tanis (2000) and will be explained in the following.

Their lifecycle encompasses four stages which are chartering, project, shakedown and onward and upward. The initial phase starts with the pre-implementation process and is known as the chartering stage. The catering stage entails all aspects regarding the initial adoption of a CERP system and includes feasibility studies. Further, the project team is established including project leaders and CERP consultants. This is followed by the actual implementation phase on which this study focuses. The implementation phase considers two stages, namely project and shakedown. In the project stage, the installation of the

system is done, and users are trained to test the system along with data conversion and integration activities with legacy systems. The shakedown stage marks the beginning when users start to operate with the system daily to carry out their process, whereby remaining issues with the systems are solved. In the post-implementation phase, which includes the onward and upward stage. In this stage, the users of the CERP system have established a routine for their operational processes. Herein, perceived benefits from the implementation can be assessed (Markus & Tanis 2000; Kachur & Kleinsmith 2013).

When considering a CERP systems, organizations can choose to use the model by Markus & Tanis (2000) and adjust it. The adapted lifecycle model by Tanis and Markus (2000) is shown in Figure 1.

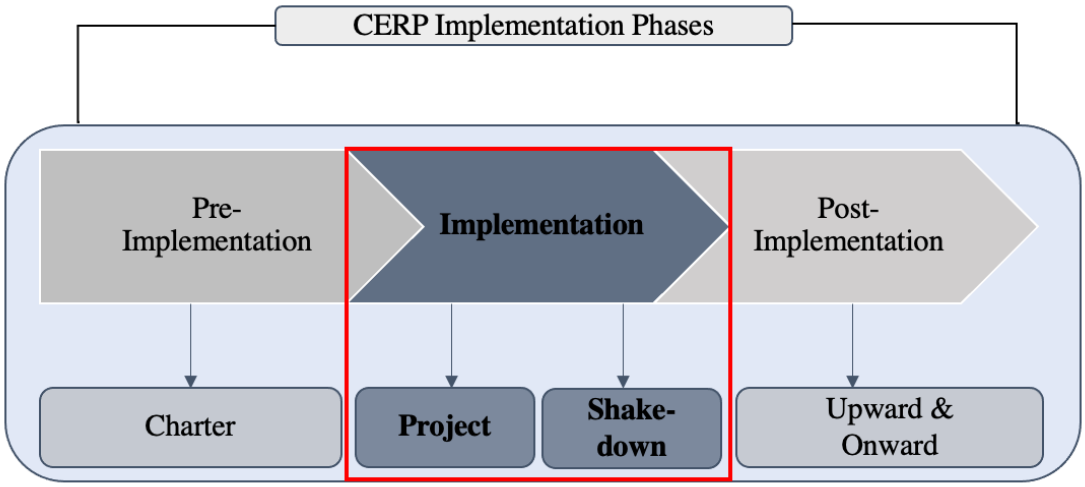


Figure 1: CERP implementation phases adapted from Markus & Tanis (2000)

In this research, the implementation phase was explicitly chosen since during this phase the consultants play the essential role in rolling out the CERP system to the client organization.

Further, during this phase, the collaboration between the consultants and the client-side project manager is the most intense as it marks the transition from the planning stage to the actual implementation of the new CERP system. As aforementioned, this phase is the most complex and comes along with many activities that need to be assigned and carried out by both the client and the consultants (Somers & Nelson, 2004).

2.3 Research model

The current state of literature is fragmented considering the perception of the criticality of CSFs for CERP implementation. The literature proposes lists of CSFs considering the categories organisational, human related and technological factors, however it was not investigated how strong certain CSFs drive the successful outcome of the project. The criticality of the CSFs needs to be validated by both the client-side project manager and the consultant to establish a common understanding of which CSFs should be significantly addressed during the implementation. In this study, the client-side project managers' perceptions are investigated through the viewpoints of the consultants. As the consultants empathizes with the clients' perceptions, it can discover perception gaps between the consultants and the clients which need to be investigated considering their origin.

Additionally, the literature only investigates the persisting CSFs for CERP in small and medium-sized companies but lacks the investigations on large companies. As aforementioned, large companies are required to transition to either to hybrid or fully CERP systems as their legacy system from big cloud vendors expire. As large companies operate on a larger IT infrastructure, their requirements for CERP systems are distinct. Therefore, this research aims to combine the existing gaps in research with the depicted research model in Figure 2.

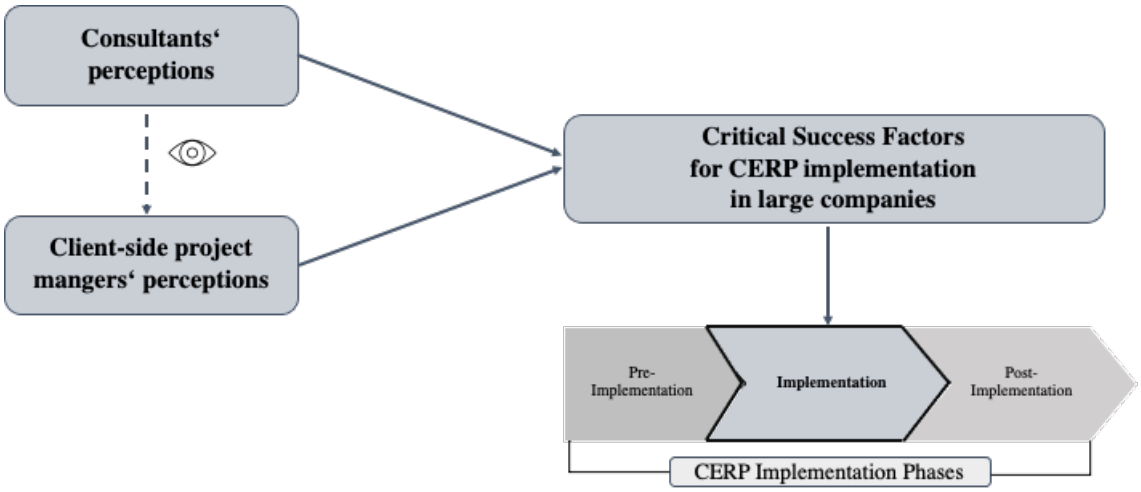


Figure 2: Research model representing the scope and purpose of this research.

3. Methodology

This chapter describes the research process that was followed in this study. It describes the underlying research philosophy, research approach and research design. This is followed by the data sampling and collection process. Then, the steps of the data analysis are outlined. Further, it is described how the research quality is ensured. Finally, the applied research ethics are explained.

3.1 Research philosophy

Researchers are required to comprehend the philosophy that underlies their research since it shapes the approach taken in conducting the study that subsequently influence the results. The research philosophy consists of two interrelated concepts which are ontology and epistemology (Easterby-Smith et al., 2018). In the following, the underpinned ontological and epistemological views of this research are explained.

Ontology denotes the fundamental assumptions made by researchers regarding the nature of reality. In a CERP implementation project, the perspectives of the criticality on certain CSFs are likely to differ between consultant and clients as they have had different experiences from former CERP implementation projects at large client companies. Therefore, it can be assumed that the perceptions are unique and hence that no single truth exists. Accordingly, this research adopts the ontological view of relativism which suggests that social phenomena are shaped by the varying perceptions of the observer. In this research, the perspectives of consultants and client-side project manager on CSF for CERP implementation are explored, as seen both through the viewpoints of the consultants (Easterby-Smith et al., 2018).

Moreover, the epistemology is chosen in accordance with the ontology. The epistemology deals with the methods by which knowledge about the reality is obtained (Gómez & Mouselli, 2018). This research intends to understand how consultants construct their different perceptions on criticality of CSFs for CERP implementation in large companies, therefore the epistemological view of social constructionism was followed. Herein,

consultants are involved as social actors in this research who provide subjective insights into their interpretations and actions related to the research phenomena (Creswell, 2002; Easterby-Smith et al., 2018). As the consultants not only refer to their own perception but also provide insights through their eyes on how clients construct their views on the criticality of CSFs for CERP implementation, an in-depth understanding of the context can be achieved.

3.2 Research approach

The research approach establishes the connection between theory and data. The present research investigates the perceptions of consultants and clients on CSF for CERP implementation at large companies. The phenomena of CSFs for ERP implementation have been studied before in the literature; however, CSFs have been less studied in the context of the newly emerging cloud technologies since especially clients from large companies are now obliged to implement CERP systems.

Therefore, this research follows an abductive approach since the aim is to discover new concepts and phenomena through examining the perceptions on CSFs for CERP implementation from the viewpoint of consultants. This aligns with the process of abduction as it requires a back-and forth interaction between collecting and analysing new data and combining data with existing theories from prior research whereby established concepts are critically examined and unexpected insights are possible (Saunders et al., 2012). In this research, the framework of CSFs for CERP implementation (Appendix 2) was built upon existing theories which are enriched with new insights that enabled to redefine the proposed framework (Saunders et al., 2012).

Following the approach, the method for the present research is chosen. As this research aims to gain an in-depth understanding of the different perceptions of consultants on CSFs for CERP implementation, concepts and theories need to be developed from the data. This requires the researcher to engage in gathering rich data in a non-numerical way from which insights can be derived (Easterby-Smith et al., 2018). This aligns with qualitative research methods since the main emphasis lies in analysing words and images that enables a profound comprehension of the phenomena (Bryman, 2016; Easterby-Smith et al., 2018). Therefore, this research follows a qualitative method in order to understand how

the respondents construct and interpret their perception of CSFs for CERP implementation within the context of large companies (Easterby-Smith et al., 2018).

3.3 Research design

The research design defines the approach for conducting the study in order to fulfil the research purpose (Hair et al., 2019). The present study applies an explorative research design as it aims to examine in-depth the reasons behind the consultants' perceptions on the criticality of certain CSF for CERP implementation and how the consultants construct these perceptions (Aboujaoude et al., 2018). Additionally, the concept of CSFs for CERP implementation at large companies is a rather newly occurring research phenomena due to the ongoing transition to cloud technologies. Thus, an exploratory research design is appropriate since it explores novel insights into the perception of CSFs which are presented by the interviewed consultants (Hair, et al., 2019).

Pursuant to the nature of an exploratory research design, a multiple case study was selected to fulfil the research purpose. The aim of a multiple case study is to gain a deeper understanding of a certain research phenomena (Morris & Wood, 1991) by enabling a descriptive research approach that illustrates situation (Robson & McCartan, 2016). Since a multiple case study allows for the investigation of more than one case, patterns and themes can be identified across the cases and be evaluated holistically. Additionally, this also allows for the triangulation (Yin, 2018).

Further, multiple case studies are particularly used in providing insights into nuances of specific research phenomena since the respondents can answer to questions beginning with "why", "how" and "what" (Saunders et al., 2018). Moreover, in order to craft qualitative data from the respondents, semi-structured interviews with the respondents were perceived as the most suitable method as it is coherent with the nature of an explorative research design. Herein, the researcher can develop an understanding of the interviewed consultant's "world", meaning the underlying opinions and beliefs as to why certain CSFs for CERP implementation are perceived as critical or not (Easterby-Smith, et al., 2018).

3.4 Data sampling

The cases that were chosen for the multiple case approach followed the combination of different sampling techniques, namely purposive, convenience and snowball sampling. Purposive sampling selects respondents based on specific criteria that the respondents must meet in order to obtain valuable and detailed data that are relevant for the research question (Saunders et al., 2018). In this study, the sampling criteria for the selection of consultants were that they work in software consultancy that sells and implements CERP software solutions. Further, the interviewed consultants had to be staffed in a CERP software implementation project in the past or they are required to be involved in an ongoing CERP project at large companies so that they can refer to a certain project in the interviews. Above that, the consultants had to demonstrate two years of experience within the field of CERP systems to ensure that they could sufficiently answer the questions. For finding software consultancies that employ consultants with the mentioned criteria research in LinkedIn and Xing was done. These are social networking platforms that are primarily used for professional networking and job searching. Herein, consultants were contacted that meet the criteria.

Furthermore, convenience sampling was applied. Convenience sampling selects participants based on their accessibility (Easterby-Smith, et al., 2018). As the researcher of this study works in a software consultancy, colleagues and project leaders were asked to provide access to suitable consultants that meet the criteria both at the own company as well as at the parent company. However, convenience sampling is prone to bias (Bryman, 2016). Following the recommendation by Bryman (2016), bias was reduced by recruiting consultants from different CERP implementation project across the own company and parent company. This allows for a diverse and representative sample, that is based on multiple sources.

The last sampling technique applied was snowball sampling. Through snowball sampling more respondents could be recruited by referrals from initial participants (Bryman, 2016). This helped to gain access to more consultants that work in other consultancies with a variety of different projects outside of the researcher's company and parent company. The subsequent participants were screened carefully in order to ensure that they meet the

criteria for this study.

Table 2 represents an overview of the case and respondents. The respondents worked in different consultancies that all implement CERP systems or components (e.g. marketing, finance, logistics) in large client companies. The case projects refer to the CERP projects in which the respondents were involved.

Table 2: Overview of cases and respondents.

Case project	Respondent	Consultancy	CERP experience	Interview date	Duration
A	Respondent 1	Consultancy 1	2 years	2023-04-12	80 minutes
B	Respondent 2	Consultancy 2	7 years	2023-04-13	90 minutes
C	Respondent 3	Consultancy 3	4 years	2023-04-13	70 minutes
D	Respondent 4	Consultancy 1	2 years	2023-04-17	90 minutes
E	Respondent 5	Consultancy 4	4 years	2023-04-18	75 minutes
F	Respondent 6	Consultancy 1	3 years	2023-04-20	75 minutes
G	Respondent 7	Consultancy 2	8 years	2023-04-21	110 minutes

3.5 Data collection

Data can be collected as primary and secondary data. Primary data refers to data that is gathered by the researcher whereas secondary data stems from already existing data bases (Easterby-Smith et al., 2018). As previously mentioned, this research applied semi-structured interviews in order to obtain primary data from the respondents. Coherent to the explorative study design, the semi-structured interviews entailed open-ended questions. This enabled to gain in-depth understanding of how the participants construct their perspectives on the criticality of CSF for CERP implementation projects .

Before the interviews were conducted, the participants received a brief explanation of each CSFs to facilitate a common understanding. It included a short explanation of all 10 CSFs that were derived from literature and were developed into a framework (Appendix

2). Since all of the participants were German, the developed framework was translated in German and given to the respondents.

The interviews started with a short introduction to research topic. Then, an interview guideline was followed which consists of two parts. The first part comprises general questions considering the role, background and experience of the respondent within the field CERP implementation in order to contextualize the answers. The second part comprises the main questions which were based on the developed framework of CSFs for CERP implementation. The main questions were further divided into subsections. The questions of the first subsection focus on understanding the consultant's very own perceived criticality of each of the CSFs. The questions of the second subsection focus on understanding the clients perceived criticality of each of the CSFs through the eyes of the consultants. Generally, the questions about the CSFs were asked in similar manner.

Further, the questions were open-ended allowing the respondents to express their thoughts and perspectives on the CSFs freely since they are not limited to pre-determined response options. In addition, the respondents can share detailed descriptions of their viewpoints that supports the researcher in exploring new insights of the research phenomena (Flick, 2007). An abstract of the interview guideline is represented in Appendix 3

The interviews were held in German as the researcher of this study is German and the native language of all participants was German, hence any language barriers could be avoided. This helped in mitigating the risk of misunderstandings and allowed the participants to express their opinions with rich and detailed insights. The interviews were conducted via Microsoft Teams. This was deemed the most efficient way to gather data from a larger sample size across Germany from consultants that work in different consultancies and on different projects in various industries. Additionally, Microsoft Teams provides the functionality for direct transcription, hence this was seen as the most time-saving method. Further, all respondents agreed to the transcription of the interviews.

Considering secondary data, this study followed a systematic literature approach which is presented in chapter 2.2. Above that, corporate material such as status reports, project

plans and power point presentations were provided to the researcher which was examined thoroughly as it provided further insights to CERP implementation.

3.6 Data analysis

As this study applies a qualitative research, content analysis was performed which is commonly used to extract concepts from semi-structured interviews. Content analysis is the appropriate choice for this study as it enables to systematically derive insights from the qualitative data which has been organized by pre-existing set of ideas or concepts (Easterby-Smith, et al., 2018). Three different types of content analysis can be utilized, namely conventional, directed and summative. In general, the difference between the approaches concerns the techniques of how the codes are established (Hsieh & Shannon, 2005). For this study, directed content analysis was adopted since its approach is theory-driven meaning it begins with a set of pre-existing concepts or theoretical framework that led to development of categories and codes. For this study a framework of CSFs was derived from the literature with the intention to validate and further develop the framework by understanding the perceptions of the consultants and the client-side project manager (Neuendorf, 2016).

After the interviews were conducted, transcribed and translated directed content analysis was applied according to the approach of Gioia et al., (2013). The process included three steps that organizes and examines the raw data in terms of quotes retrieved from the interviews. The first step is to identify the 1st-order concepts from the collected data. These themes, topics and codes are very basic as it helps the researcher in becoming familiar with the data. The second-order dimensions are higher-level concepts that stem from comparing the first-order concepts. Finally, second-order aggregated concepts are established through combining and aggregating several second-order concepts. In this study, the second-order aggregated concepts were already established in advance as they refer to the CSFs of the framework presented in Appendix 2 that was developed from the literature review. Thus, 2nd order aggregated dimensions are the building bridge to the literature.

The empirical findings from the directed content analysis were then analysed with regards to the perspective of the consultant and the client-side project managers' perspective from

through the lens of the consultants. This is followed by a cross case analysis of the empirical findings that compares the perspectives of the different cases. This approach includes detecting similarities and differences between the perspectives and engages the researcher in exploring how strong the perspectives contradict or complement each other (Maxwell, 2020). Finally, the empirical findings were compared with the existing literature. This helped to discuss the contributions of this study to the current literature (Hsieh & Shannon, 2005)

3.7 Research quality

As this research follows a constructionist philosophy, it relies on the experiences and expertise of the respondents. For ensuring the quality of this study, the researcher adhered to Guba and Lincoln's (1982) framework that entails four criteria which, given an appropriately application, establish the trustworthiness of a qualitative study. These criteria comprise credibility, transferability, dependability and confirmability.

The credibility of this research is defined by presenting "true" findings (Lincoln & Guba, 1982). To ensure the credibility of this study, multiple cases were examined which allowed for triangulation. The sample included participants who were actively involved in implementing CERP systems in large organisations. While the interviews were semi-structured, the researcher attempted to minimise the influence by using open-ended questions.

The transferability of this study refers to the degree to which the results of this study can be applied to other research contexts (Lincoln & Guba, 1982). The researcher outlined how the findings and conclusions of this study were drawn. Moreover, the data was gathered from individuals who have been involved in implementing CERP systems in large companies in different industries. Together with the substantial volume of interview data, the data can be generalised into a wider context (Shenton, 2004).

The dependability describes the reproducibility of this study (Lincoln & Guba, 1982). This indicates that if this research would be repeated within another research context, the results would show similarities (Shenton, 2004). The interviews were transcribed and

processed by using systematic approaches including direct content analysis in order to draw trustworthy results.

The confirmability of this study refers to its objectivity, indicating that the findings should reflect the gathered data and not on the researcher's own assumptions (Lincoln & Guba, 1982). In order to ensure this, the researcher of this study aimed to involve a diverse range of respondents with varying perspectives in the sampling and data collection process. Also, interviews were conducted by using a framework derived from literature in a systematic manner. Further, comprehensive codes and citations that were obtained from the interviews were represented in order to clarify how the findings were analysed.

3.8 Research ethics

The researcher has to ensure the appropriateness of this study considering the rights of the participants. To ensure the research ethics, the ten key principles by Bell & Bryman (2007) were applied throughout the study, as shown in the Table below. Furthermore, a letter of consent was provided to the participants prior to the study and is attached in Appendix 4.

Table 3: Applied key princples according to Bell & Bryman (2007)

#	Key Principle	Application in this study
1	Protecting respondents from harm	Personal data of the participants was disclosed and anonymised to ensure that no social or economic harm comes to the respondent.
2	Ensuring the dignity of the respondents	The dignity of the participants was respected at all times.
3	Fully informed consent by respondents	An informed consent for participation was sent to the respondent beforehand. It was communicated that respondent can withdraw from the interviews.
4	Privacy protecting of respondents	No details regarding the identification of the respondent will be shared.

5	Ensuring the confidentiality of research data	The collected data was disclosed from the general public and other third parties.
6	Protecting the anonymity of respondents as well as organizations	The names of the respondents and organisations were anonymised and disclosed. The transcriptions were destroyed after the research was done.
7	Avoiding deception about the purpose of the research	A description regarding the research topic and purpose was provided to every respondent.
8	Declaration of affiliations, funding sources and conflicts of interest	The researcher did not have any affiliations nor funding sources.
9	Honesty and transparency in communicating about the research	The research purpose was communicated to the respondents. Follow-up questions were explained in detail.
10	Avoidance of any misleading or false reporting of research findings	The findings were deducted according to commonly used systematic approaches within research.

4. Findings

This chapter shows the summarized findings for every case which emerged from the interviews with the respondents. The findings are structured as follows. At first, every case is introduced by summarizing the key facts about the respective CERP implementation project. Then, for each case, a table is provided comparing the consultants' and client-side project managers' perceptions regarding the criticality of every CSFs. This is followed by a reasoning that justifies the perceived criticality of the CSFs. The reasoning was derived by coding the interviews. For an easier readability, concepts that emerged from the coding are highlighted in bold.

An abstract of the coding procedure according to the Gioia method is attached in Appendix 5.

4.1 Case A

In case A, a CERP system was implemented in a German battery production company. The company manufactures batteries for the automotive market and required a CERP system for a new production site. The focus was especially on integrating finance and marketing components. The implementation took 26 months, and the system is live since November 2022.

Table 4 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 4: Perceived criticality of CSFs by the respondent in case A.

CSFs	**Perceived Criticality (Yes/No)**	
	Consultants' perceptions	**Client-side PMs' perceptions**
Project management	Yes	Yes
Top management commitment	No	No

Business process reengineering	No	No
Communication	Yes	Yes
Change management	No	No
Involvement and training of users	No	No
Project team	Yes	Yes
Data management	Yes	No
Selection of CERP package and IT-infrastructure	No	No
System testing	No	No

Project management

According to the **consultants' perceptions**, project management of users was seen as critical during the implementation phase. A clear **project plan** is required that formulates the overall objectives from the beginning in order to create a common understanding of the CERP project on both sides. Further, the project plan should define milestones which represent the manageable stages as well as the timeframe for achieving the CERP project's objectives.

According to the **client-side project managers' perceptions**, project management was seen as critical during the implementation phase. It was affirmed that a **project plan** is regarded as essential part of the project management.

Top management commitment

According to the **consultants'** and **client-side project managers' perceptions**, top management commitment was **not** seen as critical during the implementation phase. It was stated that there was no contact with the top management nor commitment was demanded. Thus, it was argued that it did not appear to be vital during the implementation phase as the top management commits to the CERP in the pre-implementation phase.

Business process reengineering

According to the **consultants' and client-side project manager perceptions** business process reengineering was **not** seen as critical during the implementation phase. It was

stated, that explicitly for this CERP project, business process reengineering **was done in the pre-implementation phase** and therefore it was already finalized.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. A clear **project coordination** whereby the tasks and responsibilities of each project team member are communicated is essential. It further ensures that the project team member's tasks are aligned with the project timeline.

According to the **client-side project manager perceptions,** communication was seen as critical during the implementation phase. It was stated that in **regular team meetings** the communication is fostered as the current state of the CERP project is discussed and evaluated.

Change management

According to the **consultants' and client-side project manager perceptions** change management was **not** seen as critical during the implementation phase. It was further mentioned that change management was done beforehand when the project was in the pre-implementation phase, and the employees were open towards the change.

Involvement and training of users

According to the **consultants' and client-side project manager perceptions** involvement and training of users was **not** seen as critical during the implementation phase. Users were not actively involved or trained during the implementation phase as it was seen as part of the post-implementation phase.

Project team

According to the **consultants' perceptions**, the project team was seen as critical during the implementation phase. It was argued that a well-working project team is characterized by **flexibility**. Since the process of implementing a CERP system can take several years, the project team has to react quickly to challenges that arise during the implementation phase. For instance, this includes the coordination and communication of changing processes.

According to the **client-side project manager perceptions,** the project team was seen as critical during the implementation phase. The **planning and the coordination** of the CERP implementation is jointly managed within the project team. Thus, it is therefore vital, that milestones are identified together, and the progress is continuously tracked.

Data management

According to the **consultants' perceptions**, data management was seen as critical during the CERP implementation phase. During the implementation, consultants are responsible for the **data quality** which ensures that only complete, correct and consistent data is displayed in the system.

According to the **client-side project managers' perceptions**, data management was **not** seen as critical during the CERP implementation phase. Since the IT-infrastructure is outsourced in the cloud, the client does not have to manage it within their local infrastructure. In effect, complexity is reduced for the client and the responsibility is shifted to the cloud service provider.

Selection of CERP-package and IT-infrastructure

According to the **consultants' and client-side project managers' perceptions** selection of CERP-System and IT-infrastructure was not seen as critical during the CERP implementation phase. The CERP package and the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the **consultants'** and **client-side project managers' perceptions**, system testing was **not** seen as critical during the implementation phase. System testing was neither actively managed nor carried out. As mentioned by the respondent, it is part of the post-implementation phase.

4.2 Case B

In case project B, a CERP system was implemented in an oil refinery with a special focus on the integration of their logistical rail processes as it represents the core of their business processes. The CERP system offers specialized industry-oriented functionalities for holistic execution of railway processes. The implementation took 3 years and the system is live since January 2023.

Table 5 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 5: Perceived criticality of CSFs by the respondent in case B.

CSFs	Perceived Criticality (Yes/No)	
	Consultants' perception	Client-side PM' perception
Project management	Yes	Yes
Top management commitment	Yes	Yes
Business process reengineering	No	No
Communication	Yes	Yes
Change management	Yes	Yes
Involvement and training of users	Yes	Yes
Project team	Yes	Yes
Data management	Yes	Yes
Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to the consultants' perceptions, project management was seen as critical during the implementation phase. Project management incorporates a clear **project plan** that defines milestones for achieving the Go-Live date.

It was highlighted that as keeping the proposed the Go-Live date is essential since a postponement would potentially lead to exceeding the **project budget** as the project team members would be involved for a prolonged period.

> *"Postponing the Go-Live date could result in spending more money on the project than originally planned (...) some employees are occupied for a longer period." – Respondent 2*

According to the **client-side project managers'** perceptions, project management was seen as critical during the implementation phase. **Assigning tasks and responsibilities** was viewed as another important part of project management. Further, tracking the **project performance** constitutes another task within project management. Referring to regular team meetings, the assigned tasks can be tracked during the meetings and, if required, some details jointly with the client-side project manager.

Top management commitment

According to the **consultants' perceptions**, top management commitment was seen as critical during the implementation phase. Clear and open communication towards the employees by the top management generates transparency about the CERP project which maintains the **motivation of users.**

According to the **client-side project managers' perceptions,** top management was seen as critical during the implementation phase. During the implementation phase of Case project B, the project faced resource problems on the client-side which jeopardized the progress of the project. The client-side project manager had to report this situation to the top management. Consequently, the top management was involved that had to counteract staff shortages with appropriate **risk management** measures in terms of involving temporary employees within a short period of time.

Business process reengineering

According to the **consultants' and client-side project manager perceptions** business process reengineering was not seen as critical during the implementation phase. It was stated, that explicitly for this project, business process reengineering was done in the **pre-**

implementation phase and therefore it was already finalized.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. It was reported the communication with the project team members on the client-side had to be proactively fostered in order enhance the **collaboration.** Further, as a matter of fact, it was emphasized that the project team members on the client-side are usually staffed in multiple other projects and even have daily business on top. Therefore, the **project coordination** needed to be accurate in assigning tasks and responsibilities project. On top of that, the project should be **well documented** in a shared folder or common platform to ensure that everyone has access to the same information.

According to the **client-side project-managers' perceptions**, communication was seen critical during the implementation phase. Besides the communication within the project team, the client-side project manager also must **report project updates** to their top management. Thereby, the top management additionally ensures that the project does not exceed budget or the scope.

Change management

According to the **consultants' perceptions**, change management was seen as critical during the implementation phase. It was mentioned, that change management should start in the very beginning of the project. Change management has interdependencies with other success factors, such as communication and business process reengineering that altogether led to **system acceptance**. In effect, this improves the interaction with the users as they are aware and ideally prepared for the upcoming change.

> *"Change management shouldn't start during the implementation phase. It must start already in the pre-implementation phase. In my opinion, change management brings together communication and business process reengineering (...) in the end, we need the user acceptance who work with the system. Acceptance is only there, when change management is done properly." – Respondent 2*

According to the **client-side project-managers' perceptions**, change management was seen as critical during the implementation phase. The client-side actively involved key users who served as **change champions** that drive the change within the client company.

Involvement and training of users

According to the **consultants' perceptions**, involvement and training of users was seen as critical during the implementation phase. The consultants supported the knowledge-transfer by providing **training materials**, such as system guides, manuals and concepts, so that the users can get familiar with the system.

According to the **client-side project-managers' perceptions**, involvement and training of users was seen as critical during the implementation phase. As aforementioned, the key users played an essential role as they were involved at the beginning. The key users at the client-side could conduct **developmental training** without the consultants being involved as material were given to them.

Project team

According to the **consultants' perceptions**, the project team was seen as critical during the implementation phase. It was highlighted that the project team should be **composed heterogeneously** to ensure that all needed skills are covered. Subsequently, given the different expertise and skillsets, decisions can be considered from different perspectives.

According to the **client-side project-managers' perceptions**, project team was seen as critical during the implementation phase. The client-side should also demonstrate a clear **commitment** to the project and get involved.

Data management

According to the **consultants' perceptions**, the data management was seen as critical during the implementation phase. In this CERP-project, the client experienced their first cloud-migration, which means that they migrated data from on-premise systems to the cloud. Considering the data migration, a complete migration was done. Thereby, all data is transferred from the old into the new CERP system to check if the **data mapping** was

correct. Herein, the consultants need to ensure that the new CERP system can interpret the data from the new system correctly. Additionally, consultants are responsible for the **data quality** which ensures that only complete, correct and consistent data is displayed in the system. Otherwise, the new CERP system cannot be used appropriately resulting into system errors.

According to the **client-side project managers' perceptions**, data management was seen as critical during the implementation phase. Since the new CERP system offered new functionalities in terms of **reporting,** it was regarded as vital that the data management was carried out appropriately during the implementation phase. Only when data is mapped correctly and of high quality, the client-side project can make use of reporting analytics.

Selection of CERP-System and IT-infrastructure

According to the **consultants' and client-side project manager perceptions** business selection of CERP-System and IT-infrastructure was not seen as critical during the implementation phase as it is part of the pre-implementation phase and was finalized before starting with the implementation.

System testing

According to the consultants' perceptions, the system testing was seen as critical during the implementation phase. The consultants prepared **test concepts** and materials that guided the client in executing functional system tests which ensured that the system testing was carried out in an appropriate manner.

> *"(...) we developed test concepts which were given to the client as well. It ensured that the components of the CERP system are tested comprehensively by the customer." – Respondent 2*

According to the client-side project-managers' perceptions, system testing was seen as critical during the implementation phase. System testing is an appropriate tool for the **quality assurance.** The client can check whether the features work properly and the data quality sufficient and how the data is processed. Further, the **performance of the system**

can be tested. This, for instance, includes the response time of the system when the users interact with the components of the system.

4.3 Case C

In case project C, a CERP system was implemented in a pharmaceutical wholesaler. The company supplies pharmacies and other medical facilities with medical supplies and drugs. The driver for implementing a CERP system was the requirement for more standardized processes and the establishment of interfaces to the various suppliers of the wholesaler. The implementation took 18 months, and the system is live since June 2022.

Table 6 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 6: Perceived criticality of CSFs by the respondent in case C.

CSFs	Perceived Criticality (Yes/No)	
	Consultants' perception	Client-side PMs' perception
Project management	Yes	Yes
Top management commitment	Yes	Yes
Business process reengineering	No	Yes
Communication	Yes	Yes
Change management	No	Yes
Involvement and training of users	Yes	Yes
Project team	Yes	Yes
Data management	Not stated	Not stated
Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to the **consultant's perceptions**, project management was seen as critical during the implementation phase. The choice of an appropriate **project management framework** is essential. A project management framework is a structured method that

uses best practices and tools which support the planning, implementation and tracking of project. The respondent stated that they used a web-based application lifecycle management tool that also could be accessed by the client-side project manager. The lifecycle management application supports the project management it supports the project management in executing the relevant tasks related to the implementation phase. This includes bug fixing, testing, deployment and monitoring of the system. Above that, **clear task and responsibilities** can be assigned which are compiled in a task package. The task package refers to the client's business case and all the features that are needed in the CERP system.

According to the **client-side project-managers' perceptions**, project management was seen as critical during the implementation phase. Since task packages were assigned ('scope-items') in the shared lifecycle management application it was easier to keep track of the tasks and their current status which supported in measuring the **project performance.**

Top management commitment

According to the **consultants' and client-side project manager perceptions'** top management commitment was **not** seen as critical during the implementation phase. It was argued that it is a given circumstance when the implementation phase starts. In case of project C, it was perceived that there was no active involvement of the top management which added to progress of the CERP project.

Business process reengineering

According to the **consultant's perceptions**, business process reengineering was **not** seen as critical during the implementation phase. It was highlighted that using CERP systems is assigned with a high-level of **standardization.** CERP systems are developed as a software product that cover standard business processes of the clients. As a result, the client did not receive a custom-tailored system that covered all specialties of their specific business process. Hence, business process reengineering was not an extensive part of their consulting service during the implementation and not in the pre-implementation phase.

> *"It is important to understand that in the cloud standardized solutions are offered. A detailed process mapping or processes analysis of the customers processes was not done by us consultants." - Respondent 3*

In contrast to the consultant's perceptions, business process reengineering was seen as critical during the implementation phase by **the client-side project manager**. The high-level of standardization results potential **process adaptions** for the users on the client-side which often come into effect for the customer during the implementation. Special processes cannot be integrated into the system. Consequently, users need to accept the given features in the system.

Communication

According to the **consultant's perceptions**, communication was seen as critical during the implementation phase. It was mentioned that communication is particularly important when issues with the systems or other challenges occur in the project. Early identification and addressing of issues support **risk minimization.**

Additionally, when issues with the new system are early enough identified and addressed, the consultants can further **provide active assistance**. This entails clarifying the new processes and features in the system, guiding the user in-depth through the system as well as fixing bugs in the system.

According to the **client-side project-managers' perceptions**, communication was seen as critical during the implementation phase. It was mentioned that for the client-side project-manager it is vital to **receive project updates** on a regular basis. While in this project, the lifecycle management application was used to check status of the projects on an operational level, it was seen as important to have regular **team meetings** to talk about the current progress of the project.

Change management

According to the **consultant's perceptions**, change management was **not** seen as critical during the implementation phase. Change management was seen within the

responsibilities of the client, hence change management was not actively managed or supported by the consultant.

> *"Change management was not a special topic in this project. Us consultants did not have any point of contact with change management besides training the users. I felt that there was a general acceptance amongst the users when the system was tested." - Respondent 3*

In contrast to the consultant's perceptions, change management was seen as critical during the implementation phase by **the client-side project manager**. It was emphasized that client-side project manager **communicated clearly** to future users about the switch to the CERP system as well as the. In this project, the **way of how users execute** their tasks changed with the switch to the new CERP system. For instance, the features of the CERP system allow for new analytic capabilities that evaluate the performance of the business processes (e.g. delay of trucks).

Involvement and training of users

According to the **consultant's perceptions**, involvement and training of users was seen as critical during the implementation phase. The consultants actively encourage the users to get involved with the system. Herein, the users were offered **developmental training** were the users get attached to the system and learn the appropriate use of it. Consequently, a sense of ownership is created.

According to the **client-side project-managers' perceptions**, involvement and training of users was seen as critical during the implementation phase. (End-)users are the employees who will use the system daily, thus early involvement of the users was regarded as vital since they have the domain expertise. Subsequently, they can **identify potential gaps** in the system and provide feedback the internal project management as well as to the consultants.

Project team

According to the consultant's perceptions, the project team was seen as critical during the CERP implementation phase. It was highlighted that the project team should be **composed heterogeneously** to ensure that all needed skills are covered.

According to the client-side project managers perceptions', the project team was seen as critical during the CERP implementation phase. It was affirmed that a **heterogenous project team** in terms of skill level is essential.

Data management

The respondent preferred to not give a statement as the respondent mentioned that a sufficient answer and justification about the criticality of this CSFs could not be given.

Selection of CERP-package and IT-infrastructure

According to the **consultants' and client-side project manager perceptions** business selection of CERP-System and IT-infrastructure was not seen as critical during the implementation phase. As mentioned before, the task packages ('scope-items') represent the clients' business case that mirror the functions of the CERP packages. In addition, the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the consultant's perceptions, system testing was seen as critical during the implementation phase. The respondent stated that test concepts were developed by the consultants. On top of that, **test sessions** were done with the users.

According to the **client-side project-managers' perceptions,** system testing was seen as critical during the implementation phase. The statement above was affirmed again.

4.4 Case D

In case project D, selected components of a CERP-system at a German construction company were implemented. The CERP system was implemented to unify the fragmented IT-landscape. The CERP system is live since August 2022 and the implementation took

3.5 years.

Table 7 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 7: Perceived criticality of CSFs by the respondent in case D.

CSFs	Perceived Criticality (Yes/No)	
	Consultants' perception	**Client-side PMs' perception**
Project management	Yes	No
Top management commitment	No	Yes
Business process reengineering	No	No
Communication	Yes	Yes
Change management	No	No
Involvement and training of users	No	No
Project team	Yes	No
Data management	Not stated	Not stated
Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to the **consultants' perceptions**, project management of users was seen as critical during the implementation phase. A clear **project plan** is required that formulates the overall objectives from the beginning in order to create a common understanding of the CERP project on both sides. Further, the project plan should define milestones which represent the manageable stages as well as the timeframe for achieving the CERP project's objectives. Proper project management further helps to **track the project performance** and reveals potentials issues such as delays which can then be handled adequality adequately and timely. Moreover, proper project management also entails managing the **project budget.**

In contrast to the consultants' perceptions, project management was **not** seen as critical during the implementation phase by the **client-side project managers' perceptions.** Clients expect project management to be a part of the consulting services and hence see the responsibility for project governance lies with the consultants.

Top management commitment

According to the **consultants' perceptions**, top management commitment was not seen as critical during the implementation phase. It was stated that there was almost no interaction with the top management on the consultant's side and there were no issues which have arisen. More importantly was the **client-side project managers influence and commitment** to the project.

In contrast to the consultants' perceptions, top management commitment was seen as critical during the implementation phase by the **client-side project managers' perceptions**. Particularly in large companies, there are many projects that run at the same time. The client-side project manager therefore must make sure that the CERP project is **prioritized** since the top management can decide about both financial and human resources.

Business process reengineering

According to the **consultants' and client-side project manager perceptions** business process reengineering was not seen as critical during the implementation phase. It was stated, that explicitly for this project, business process reengineering **was done in the pre-implementation phase** and therefore it was already finalized.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. It was mentioned that proactive information sharing about the project status, timelines, expectations and the next steps allows for a better **collaboration** amongst the project team members. By sharing information, project team members avoid misunderstandings and can work together efficiently.

According to the **client-side project-managers' perceptions,** communication was seen as critical during the implementation phase. Regular **team meetings** were seen as an adequate information channel to exchange information about the project status. Thereby potential issues can be addressed before it impacts the project timeline. As a consequence, this led to risk minimization.

Change management

According to the **consultants' and client-side project manager perceptions** change management was **not** seen as critical during the implementation phase. It was stated that change management was not perceived as a task that was not actively managed nor posed an issue during the implementation. It was further mentioned that change management was done beforehand when the project was in the pre-implementation phase, and the employees were open towards the change.

Involvement and training of users

According to the **consultants' and client-side project manager perceptions** involvement and training of users was not seen as critical during the implementation phase. It was mentioned that users were not actively involved or trained during the implementation phase, but more regarded as part of the post-implementation phase.

Project team

According to the **consultants' perceptions**, the project team was seen as critical during the implementation phase. The **collaboration** between the consultants and the client-side project manager has to be effective and goal-oriented as the project manager represents the interface to the project team.

In contrast to the consultants' perceptions, the project was not seen as critical during the implementation phase by the **client-side project managers' perceptions**. On the client-side, the project team consisted mainly of the client-side project manager hence a dedicates project team did not exist. This was due to time constraints since other employees were occupied in their daily business.

Data management

The respondent preferred to not give a statement as the respondent mentioned that a sufficient answer and justification about the criticality of this CSFs could not be given.

Selection of CERP-package and IT-infrastructure

According to the **consultant's and client-side project managers' perceptions** business selection of CERP-System and IT-infrastructure was not seen as critical during the implementation phase. The CERP package and the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the **consultants' perceptions**, system testing was seen as critical during the implementation phase. It was highlighted that, although the users were not actively involved during the implementation phase, tests were done together few days before the final Go-Live. **Test concepts** were developed by the consultants which included the exact steps of how the users will use the new CERP system in their daily business.

According to the **client-side project-managers' perceptions,** system testing was seen as critical during the implementation phase. During the testing, users had to **e**nsure the documentation system bugs by giving a detailed description how the bug appeared. In turn, this facilitated a quick **bug fixing** which was done by the developers.

4.5 Case E

In case project E, a hybrid CERP system was implemented at a dairy company. This indicates that only some components are fully hosted in the cloud while the client still uses systems within their own IT-landscape. It was mentioned that the implementation faced several challenges and hence the implementation took 4.5 years. The CERP system is live September 2022.

Table 8 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 8: Perceived criticality of CSFs by the respondent in case E.

CSFs	Perceived Criticality (Yes/No)	
	Consultants' perception	**Client-side PMs' perception**
Project management	Yes	Yes
Top management commitment	No	Yes
Business process reengineering	Yes	Yes
Communication	Yes	Yes
Change management	No	No
Involvement and training of users	Yes	Yes
Project team	Yes	Yes
Data management	Yes	Yes
Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to the **consultants' perceptions**, project management was seen as critical during the implementation phase. The choice of an appropriate **project management framework** is essential as it defines the approach for the whole project. In this project a framework called SAP Activate was used which provides a clear methodology for implementing CERP systems. SAP Activate is mostly used for agile project management however it can include elements of the conventional waterfall methods which was the case in this project.

> *"The choice of the approach sets the basis for the project. It is a difference if you do your project with an agile scrum framework or the conventional waterfall methods." - Respondent 5*

Further, **clear tasks and responsibilities** need to be **assigned in order to** involve and provide transparency to all project team members.

According to the **client-side project managers' perceptions,** project management was seen as critical during the implementation phase. Since this project used an agile scrum framework for the project management, employees with a special skillset (e.g. Scrum Masters) needed to be put in place so that the project management can run smoothly which, in turn, needs to be financially supported and approved. Therefore, with appropriate project management, the **project budget** is not exceeded.

Top management commitment

According to the **consultants' perceptions**, top management commitment was **not** seen as critical during the implementation phase. It was stated that there was no contact between the consultants and the top management. Moreover, it was regarded as a responsibility that lies within the client-side project manager.

In contrast to the consultants' perceptions, top management was seen as critical during the implementation phase by the **client-side project managers' perceptions**. It was mentioned that the client-side project manager is required to obtain the commitment from the top management constantly to prove that the project is progressing. Since in large companies, many projects are running at the same time, the CERP project could be **deprioritized** leading into resource withdrawal.

> *"In large companies like this, a project ranking is often done by the top management. The project managers always have to fight for their projects to get the funds (...)." – Respondent 5*

Business process reengineering

According to the **consultants' perceptions**, business process reengineering was seen as critical during the implementation phase. Although business process reengineering plays more significant role during the pre-implementation phase, the new processes that were defined beforehand, will be proven in the actual implementation phase. This is due to the fact that the users will experience the **process adaptions** when the system is tested together with the consultants.

According to the **client-side project managers' perceptions,** business process

reengineering was seen as critical during the implementation phase. Especially for the client-side project manager it is of vital importance that the **user acceptance** is given for the new processes in order to avoid resistance by the employees.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. It was highlighted, that regular **team meetings** are an integral part of the communication. For instance, so-called "Dailys" were done which are 15 minutes meetings in which the project team members give a quick update about their tasks every day. Thereby potential challenges can be identified which leads to **risk minimization.**

According to the **client-side project managers' perceptions,** communication was seen as critical during the implementation phase. The client-side project manager has to communicate **project status updates** to the higher management on a regular basis in order to provide transparency about the CERP project's progress.

Change management

According to the **consultants' perceptions**, change management was **not** seen as critical during the implementation phase. It was stated that change management was not actively managed during the implementation phase. Additionally, it was seen as part of the **post-implementation phase** when the users finally get to work on the new CERP system.

According to the **client-side project-managers' perceptions,** change management was **not** seen as critical during the implementation phase. The statement from above was affirmed.

Involvement and training of users

According to the **consultants' perceptions**, involvement and training of users was seen as critical during the implementation phase. The consultants prepared **training materials** for the key users which represented a guideline on how to execute each of the process steps.

According to the **client-side project-managers' perceptions,** involvement and training of users was seen as critical during the implementation phase. In this project, key users were utilized for a 'Train-and-Trainer' concept whereby the consultants would train the key users and the key users. Subsequently, the key users can conduct **developmental training** to the users. Thus, it is of the client-side project managers interest that users can work with the new CERP system properly resulting in user acceptance.

Project team

According to the **consultants' perceptions**, project team was seen as critical during the implementation phase. It is vital for the project team to be **composed heterogeneously** to cover all skillsets which are needed for the project.

According to the **client-side project-managers' perceptions,** project team was seen as critical during the implementation phase. As highlighted by the respondent, a project team should be **stable**. This means that a constant switching of team members can hinder the project as expertise and potentially impacts the progress of the project negatively.

Data management

According to the **consultants' and client-side project managers' perceptions** data management was seen as critical during the implementation phase. In this CERP-project, the client experienced their first cloud-migration, which means that they migrated data from on-premise systems to the cloud. Considering the data migration, a partial selective migration was done. This means that only selected data was transferred from the old to the new CERP system. Herein, unnecessary data was eliminated which allowed for a better **data quality.**

Selection of CERP-package and IT-infrastructure

According to the **consultants' and client-side project managers' perceptions** selection of CERP-System and IT-infrastructure was not seen as critical during the implementation phase. The CERP package and the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the **consultants' perceptions**, system testing was seen as critical during the implementation phase. **Test concepts** were regarded as vital. The test concepts were developed by the consultants which covered the end-to-end process, including all the steps which needed to be tested by the users.

According to the **client-side project-managers' perceptions,** system testing was seen as critical during the implementation phase. As the users get the opportunity to test the system, a proper **quality assurance** is done. The data quality as well as detecting bugs can be ensured since

4.6 Case F

In case F, CERP system was implemented at a German automotive metal gods factory. The company provides heavy steel components for several industries. The implementation took 2 years and the CERP system is live since October 2021.

Table 9 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 9: Perceived criticality of CSFs by the respondent in case F.

CSFs	Perceived Criticality (Yes/No)	
	Consultant's perceptions	Client-side PMs' perception
Project management	Yes	No
Top management commitment	No	No
Business process reengineering	No	No
Communication	Yes	Yes
Change management	No	Yes
Involvement and training of users	No	No
Project team	Yes	Yes
Data management	Yes	Yes

Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to the **consultants' perceptions**, project management was seen as critical during the implementation phase. As a part of the project management, a clear **project plan** is crucial for defining how the CERP system will be implemented. Herein, it is important to define milestones as well as responsibilities and tasks of each project member which allows for transparency.

In contrast to the consultants' perceptions, project management was seen as critical during the implementation phase by the **client-side project managers' perceptions**. Clients expect project management to be a part of the consulting services and hence see the responsibility for project governance on the consultant's side.

Top management commitment

According to the **consultants' and client-side project managers' perceptions**, top management commitment was not seen as critical during the implementation phase. It was stated that there was almost no interaction with the top management.

Business process reengineering

According to the **consultants' and client-side project managers' perceptions** business process reengineering was not seen as critical during the implementation phase. It was stated that business process reengineering was done in the **pre-implementation phase** and therefore it was already finalized.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. A clear **project coordination** that entails the communication and assignment of tasks and responsibilities to each project team member is essential for the success of the CERP project. This achieves that team members understand their roles

and associated responsibility. Further, it is ensured that the tasks are aligned with the project timeline.

According to the **client-side project managers' perceptions,** communication was seen as critical during the implementation phase. It was argued that the **project coordination** is equally important for the client-side project manager since he/she needs to sufficiently support as it enhances the success of the CERP project.

Change management

According to the **consultants' perceptions**, change management was **not** seen as critical during the implementation phase. The change management was not actively managed by the consultants since it was regarded as responsibility of client-side project manager.

In contrast to the consultants' perceptions, change management was seen as critical during the implementation phase by the **client-side project managers' perceptions**. It is vital for the client-side project manager to have a **communication strategy** in order to inform the users about the upcoming change.

Involvement and training of users

According to the **consultants' and client-side project managers' perceptions,** the involvement and training was **not** seen as critical during the implementation phase. It was seen as a part of the post-implementation phase.

Project team

According to the **consultants' perceptions**, the project team was seen as critical during the implementation phase. A project team should be **composed heterogeneously** whereby different skills and experiences are covered. It is further regarded as important, that the involved consultants are already experienced in implementing CERP systems.

According to the **client-side project managers' perceptions**, the project team was seen as critical during the implementation phase. The **planning and the coordination** of the CERP implementation is jointly managed within the project team. Hence, the level of commitment of the project team member impacts the progress of the CERP project

substantially. Conversely, if the commitment of the project team members is low in terms of taking on responsibilities for certain tasks, the CERP project might face delays.

Data management

According to the **consultants' perceptions**, data management was seen as critical during the implementation phase. Proper data management ensures the **quality of the data** which is displayed in the new CERP system. Hereby, the consultants have to ensure that only complete, correct and consistent data is displayed in the system. Otherwise, the new CERP system cannot be used appropriately resulting into system errors.

According to the **client-side project managers' perceptions,** data management was seen as critical during the implementation phase. It was affirmed the data management is of crucial importance as it ensures the **data quality**.

Selection of CERP-package and IT-infrastructure

According to the **consultants' and client-side project managers' perceptions** selection of CERP-System and IT-infrastructure was not seen as critical during the implementation phase. The CERP package and the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the **consultants' perceptions,** system testing was seen as critical. The consultants carried out the system testing according to internal **test concepts** in order to ensure that essential functions of the system run properly without bugs. Thereby, major issues can be identified by the consultants and fixed quickly.

According to the **client-side project managers' perceptions**, system testing was seen as critical during the implementation phase. Although it was carried out by the consultants, it was affirmed that proper system testing which discovers bugs in the system is important for success of the CERP project.

4.7 Case G

In case G, CERP system was implemented at a pharmaceutical company. The CERP system was introduced at a new production site, hence it was a pilot project. The implementation took 1.5 years and the system is live since April 2021.

Table 10 provides an overview of the perceived criticality of each CSFs during the CERP implementation considering the perceptions of both the consultants and the project managers on the client-side.

Table 10: Perceived criticality of CSFs by the respondent in case G.

CSFs	Perceived Criticality (Yes/No)	
	Consultants' perception	Client-side PMs' perception
Project management	Yes	Yes
Top management commitment	No	Yes
Business process reengineering	No	No
Communication	Yes	Yes
Change management	Yes	No
Involvement and training of users	Yes	Yes
Project team	Yes	No
Data management	Yes	No
Selection of CERP package and IT-infrastructure	No	No
System testing	Yes	Yes

Project management

According to **the consultants' perceptions**, project management seen as critical during the implementation phase. A clear **project plan** is required that formulates the overall objectives as well as the milestones. It further entails the items to be delivered at a certain time, for instance in terms of software components, that represent a specific functionality of the CERP system. Moreover, tracking the **project performance** was also stated to be an important part of the project management as it ensures the accountability considering the responsibilities of each project team member.

According to the **client-side project managers' perceptions,** project management was seen as critical during the implementation phase. It was affirmed that a **project plan** is regarded as essential part of the project management. Furthermore, the **project budget** was especially a topic for the client-side project manager as resources needed to be allocated effectively for the duration of the project.

Top management commitment

According to the **consultants' perceptions**, top management commitment was **not** seen as critical during the implementation phase. It was stated that there was no contact between the consultants and the top management. Moreover, it was regarded as a responsibility that lies within the client-side project manager.

In contrast to the consultants' perceptions, top management was seen as critical during the implementation phase by the **client-side project managers' perceptions**. It was mentioned that the client-side project manager is required to obtain the commitment from the top management constantly to prove that the project is progressing. Since in large companies, many projects are running at the same time, the CERP project could be **deprioritized** leading into resource withdrawal.

Business process reengineering

According to the **consultants' and client-side project manager perceptions** business process reengineering was not seen as critical during the implementation phase. It was stated that business process reengineering was done in the pre-implementation phase and therefore it was already finalized.

Communication

According to the **consultants' perceptions**, communication was seen as critical during the implementation phase. In this project, the most communication happened during regular **team meetings**. During team meetings, the project performance can be tracked when the team members give updates about their task. Above that, an **escalation matrix** was defined. An escalation matrix defines who has to be informed when a certain level of escalation occurs, for instance project delays or budget problems. It further specifies

the information exchange about the escalation between the project team members to ensure that the right information is shared with the right persons at the right time. For instance, when the Go-Live date of the CERP project will be postponed for several months, then the top management needs to be informed by client-side project manager in consultation with a (senior) consultant.

According to the **client-side project managers' perceptions**, communication was seen as critical during the implementation phase. The client-side project manager also must **report project updates** to their top management.

Change management

According to the **consultants' perceptions**, change management was seen as critical during the implementation phase. It was stated, that change management requires **planning for the change** jointly with the client**,** therefore it should be a part of the project plan. For instance, the affected users are to be identified in order to understand their requirements. Subsequently a **communication strategy** adds to the change management as it builds the awareness among the users that they will encounter the change.

According to the **client-side project managers' perceptions**, change management was not seen as critical during the implementation phase. Although it was part of the project plan, there was no proactive management considering measures for the change management. For instance, less communication was done towards the users about the upcoming changes in the future.

Involvement and training of users

According to the **consultants' perceptions**, involvement and training of users was seen as critical during the CERP implementation phase. The consultants involved the users by providing **training materials** as well as **developmental training.**

According to the **client-side project managers' perceptions**, involvement and training of users was seen as critical during the CERP implementation phase. It was affirmed that training materials as well as developmental training offered by the consultants are vital.

Project team

According to the **consultants' perceptions**, the project team was seen as critical during the CERP implementation phase. It was highlighted that the project team should be **composed heterogeneously** to ensure that all needed skills including both technical and functional are covered.

According to the **client-side project managers' perceptions**, the project team was **not** seen as critical during the CERP implementation phase. It was argued that the project team members from the client side were reduced to a minimum due to **budget restrictions**. Subsequently there was a lack of resources which compromised led to delays considering the scheduled project plan.

Data management

According to the **consultants' perceptions**, data management was seen as critical during the CERP implementation phase. During the course of the implementation, consultants are responsible for the **data quality** which ensures that only complete, correct and consistent data is displayed in the system.

According to the **client-side project managers' perceptions**, data management was **not** seen as critical during the CERP implementation phase. Since the IT-infrastructure is outsourced in the cloud, the client does not have to manage it within their local infrastructure. In effect, complexity is reduced for the client and the responsibility is shifted to the cloud service provider.

Selection of CERP-package and IT-infrastructure

According to the **consultants' and client-side project managers' perceptions** selection of CERP-System and IT-infrastructure was not seen as critical during the CERP implementation phase. The CERP package and the IT-infrastructure (deployment and hosting models) is selected beforehand and should be clear by reaching the implementation phase.

System testing

According to the **consultants' perceptions**, system testing was seen as critical during the CERP implementation phase. It was emphasized that system testing should be an integral part of the project plan which needs to be actively managed and tracked. Further, **test concepts** were developed by the consultants which helped both the key users and end users to thoroughly test the system and its components.

According to the **client-side project managers' perceptions**, system testing was seen as critical during the CERP implementation phase. The system testing allows for quality assurance carried out by the key users and end users to discover bugs in the CERP system.

5. Analysis

In this chapter, the cross-case analysis is conducted. Commonalties and perception gaps between perceptions of the consultants and client-side manager referring to the CSFs of each case are analysed.

Appendix 6 provides an overview of all cases and the stated perceived criticality of the CSFs considering the consultants' and client-side project managers' perceptions. The underlying reasoning behind the perceptions are analysed across the cases in the following chapters.

5.1 Organizational CSFs

Project management

The CSF 'Project management' was found to be critical during the CERP implementation phase in all the cases according to the **consultants' perceptions**. Creating a project plan was considered as an essential part of the project management by most of the cases except for case C and E. It provides guidance in terms of milestones, assigned task as well as responsibilities throughout the CERP project which support the successful outcome of the CERP project. Above that, case E emphasized that the choice of the project framework is essential as CERP projects can be carried out by following different approaches such as waterfall or agile frameworks. Subsequently, the chosen approach provides structure to the CERP project which assists in defining tasks, timelines and responsibilities. Further, a common perception between case G and B was shared that the project budget needs to be aligned with the project plan and objectives to ensure sufficient resource allocation.

Surprisingly, the CSF 'Project management' was not found to be critical during the CERP implementation phase in all the cases according to **client-side project managers' perceptions**. In project cases A and D it is seen as a part of the consulting service that was bought. Therefore, the project management is lies within the consultants' responsibilities and was not proactively managed by the client-side project manager.

Conversely, it was argued in case C that tracking the project performance is part of the project management as it reveals whether the CERP project is on a successful path.

Top management commitment

Besides case B, the CSF 'Top management commitment' was not discovered to be critical during the CERP implementation phase according to the **consultants' perceptions**. There was a shared understanding in case A, C, D, E, F and G that the top management commitment was imperceptible during the implementation phase. Thus, from the consultants' perspectives, the top management commitment did not impact the success of CERP project. However, in case B, the top management commitment was more prevalent. Active communication by the top management promotes the motivation of the users and thus can enhance the user acceptance which is essential for the success of the CERP project.

In contrast to the consultants' perceptions, the CSF 'Top management' was found to be critical during the CERP implementation phase in most of the cases **according to client-side project managers' perceptions**. In case D, E and G it was pointed out that the client-side project manager must ensure that the CERP project gets prioritized by the top management as especially in large companies many projects run at the same time. Thereby the progress of the CERP projects needs to be justified otherwise it can result in a resource withdrawal both financially and human resources. This is supported by case B where the top management had to commit quickly to more human resources since the success of the CERP projects was jeopardized. Hence, the top management effectively reduced potential risks in case B. Apart from that, there was a shared perception between consultants' and client-side project manager that top management was not found to be a critical CSF in case A, C, F as the top management commitment was imperceptible and no further interaction was given.

Business process reengineering

Besides case E, the CSF 'Business process reengineering' was not found to be critical during the CERP implementation phase according to the **consultants' perceptions**. There was a common understanding between the cases A, B, D, F and G that business process reengineering needs to be done before the actual implementation phase. It was argued that

it is a part of the pre-implementation phase and should therefore be finalized before the implementation takes place. Further, in case C it was highlighted that using cloud systems is associated with a high level of process standardization. This indicates that the client buys a CERP system that already offers a wide range of pre-defined processes and functionalities. Thus, special processes cannot be integrated which makes business process reengineering obsolete. However, this contrasts with the consultant's perceptions in case E. It was reasoned that process adaptions become present for the users in the implementation phase for the first time. Subsequently, this needs to be proactively managed by the consultants when concerns may arise.

Considering the **client-side project managers' perceptions**, it was affirmed by all cases besides case E, that business process reengineering is a part of the pre-implementation phase. Again, this is opposed by the case E. Although it was affirmed that it plays a bigger role during the pre-implementation phase, the respondent highlighted that the impact of the business process reengineering becomes apparent during the implementation stage when the users interact with the system and provide feedback to the new processes. Herein, it turns out whether the business process reengineering was done appropriately or if processes have to be adjusted afterwards.

Communication

The CSF 'Communication' was found to be critical during the CERP implementation phase in all the cases according to the **consultants' perceptions**. The provided reasonings were manifold. Whereas in case A, B and F it was pointed out that the successful coordination of the project is based on clear communication, case C, B and E highlighted the risk minimization that is associated with communication. The early addressing of challenges leads to risk minimization since issues are made transparent and can be encountered within a timely manner before it unfolds. On top of that, in case B and D, communication is seen as the correct measure to promote collaboration. Continuous sharing information is vital as misunderstandings become less frequent and all project team members are up to date. This is in line with the reasoning by cases E and G that regular team meetings are the right settings for the information exchange. Thereby, also the project performance is discussed which supports to proactively steer the CERP project into the right direction in case it is not sufficient. Above that, as put forward by case G,

proper communication also incorporates a so-called escalation matrix. The escalation matrix serves as a basis for the flow of the communication between the right contact persons when issues occur that could negatively impact the success of the project. Finally, documentation also falls within communication.

Considering the **client-side project managers' perceptions**, it was affirmed by all cases that the CSFs communication is critical for the CERP implementation. **Thus, the perspectives intersect with consultants' viewpoints.** From the perspective of the client-side, team meetings were seen as essential part of a successful communication as well by the respondents in the cases A, C, D and E. Since in large companies the project team members are often occupied with other projects or their daily tasks, it is vital to have a meeting that everyone attends. Furthermore, it was pointed out that in the cases B, C, E and G that communication goes beyond the project team as the client-side project manager is required to report and communicate project status updates to the top management. In this context, it is important to have a clear communication towards the top management including regular reports that outline the relevant project developments.

Change management

The CSF change management was discovered as critical during the CERP implementation phase only in the cases B and G according to the **consultants' perceptions.** In case B, it was outlined that well prepared change management promotes the system acceptance as it fosters the relationship between consultants and users. Additionally, in case G, the importance of a communication strategy change is seen as important since the users' awareness for the change is increased which prepares them for the change. Apart from these two cases, the other cases did not find change management as critical success factor. Cases A and D shared the perspective, that change management is seen as part of the pre-implementation phase, whereas, surprisingly, in case E it was seen as part of the post-implementation phase. In addition, change management is interpreted as a responsibility on the client-side by the respondents of cases C and F.

Conversely, regarding the **client-side project managers' perceptions** change management was only deemed critical in three cases. In case B, change champions were mentioned as the incubator of change. Hence it is vital to have employees at the adopting

company that actively drive change within their own company. Above that, case F provides similar reasoning regarding a communication strategy whereas in case C it is pointed out that the potential change in the execution of tasks becomes finally apparent as new features in the CERP system can be used.

5.2 Human-related CSFs

Involvement and training of users

The CSF 'Involvement and training of users' was deemed as critical during the CERP implementation phase in four cases according to the **consultants' perceptions**. The reasoning was based on collective viewpoints. For instance, the provision of training materials was mentioned by the cases B, F and G since it prepares the users to get familiar with the new CERP system. Combined with developmental trainings (case E and G), a sense of ownership with the new CERP system is created. Therefore, employees are more likely to feel responsible to contribute actively to the success of the CERP project.

Considering the **client-side project managers' perceptions**, there was the shared view in also four cases that involvement and training of users is critical. **Subsequently, the perceptions overlap with the consultants' view**. Case B, E and G agreed on the importance of having developmental training for the users since it encourages the user to use the system in an effective way. Thereby, as stressed in case C, the users can provide feedback to the consultants by discovering potential gaps in the CERP system such as missing or incomplete workflow steps. This allows for continuous improvement of the CERP system that directly comes from the users. However, there were contrasting views in case A and D as there was no active involvement of users as it was not integrated into the project plan and was therefore seen as a part of the post-implementation phase. Herein, the users faced "experimental learning" when the CERP system was finally implemented. However, it became apparent that this is not the preferred way to exclude the users as it might lead to resistance.

Project team

The CSF 'Project team' was viewed as critical during the CERP implementation phase in all cases according to the **consultants' perceptions.** A project team should not only be composed heterogeneously meaning that both different skills and experiences are covered

as reasoned by cases E, F and G but also demonstrate flexibility according to case A. A well-functioning project team is characterized by its resilience. It is a joint effort that, when challenges occur during the implementation, to properly react to it in terms of preventing a negative impact on the success of the CERP project. This includes taking proactive risk management by identifying the challenges and defining mitigation strategies.

However, the project team was only discovered to be critical in five regarding the **client-side project managers perceptions**. Contrastingly, it was argued in case D and G, the project team was not viewed as vital for the success of the CERP project. In large companies, projects often face time constraints due the occupation of client-side project team members as they are involved in other projects as well. Thus, project teams can face understaffing and subsequently the client-side commitment for the CERP project is decreased. In turn, the client-side project manager often functions as the main focal point of contact between the consultancy and the adopting organization as reinforced in case D. On top of that, budget restrictions often hamper the establishment of a project team. Moreover, there were some commonalties in the reasonings provided. Similar to the consultant perspective, a project team that is composed heterogeneously is deemed essential.

5.3 Technological CSFs

Data management

The CSF 'Data management' was regarded as critical in five cases according to **the consultants' perceptions.** However, it is important that only five respondents could provide a sufficient reasoning, whereas the two other respondents preferred not to state the criticality. Yet, in case A, B, D, E and G the same stance was taken that data quality is of crucial importance. If the data quality is poor, wrong or insufficient data is displayed which leads to user resistance which, in turn, hampers the success of the CERP project.

Nonetheless, contrasting views were stated by the client-side project managers' perceptions. In case E and F, it was reinforced that data management capabilities are outsourced in the cloud; hence it lies within the responsibility of the consultants and cloud vendor.

Selection of CERP package and IT-infrastructure

In all cases, the CSF 'Selection of CERP package and IT infrastructure' was not deemed critical according to both the consultants' as well as the **client-side project managers' perceptions**. It was commonly agreed that the selection of CERP package and IT-infrastructure is part of the pre-implementation phase. Before the CERP system is rolled out the specific business requirements are evaluated beforehand with the client. This incorporates the functionalities, special needs in the branch and integration capabilities. Additionally, the associated costs as well as the resources need to be assessed in order to define the budget and estimate the right amount human resources.

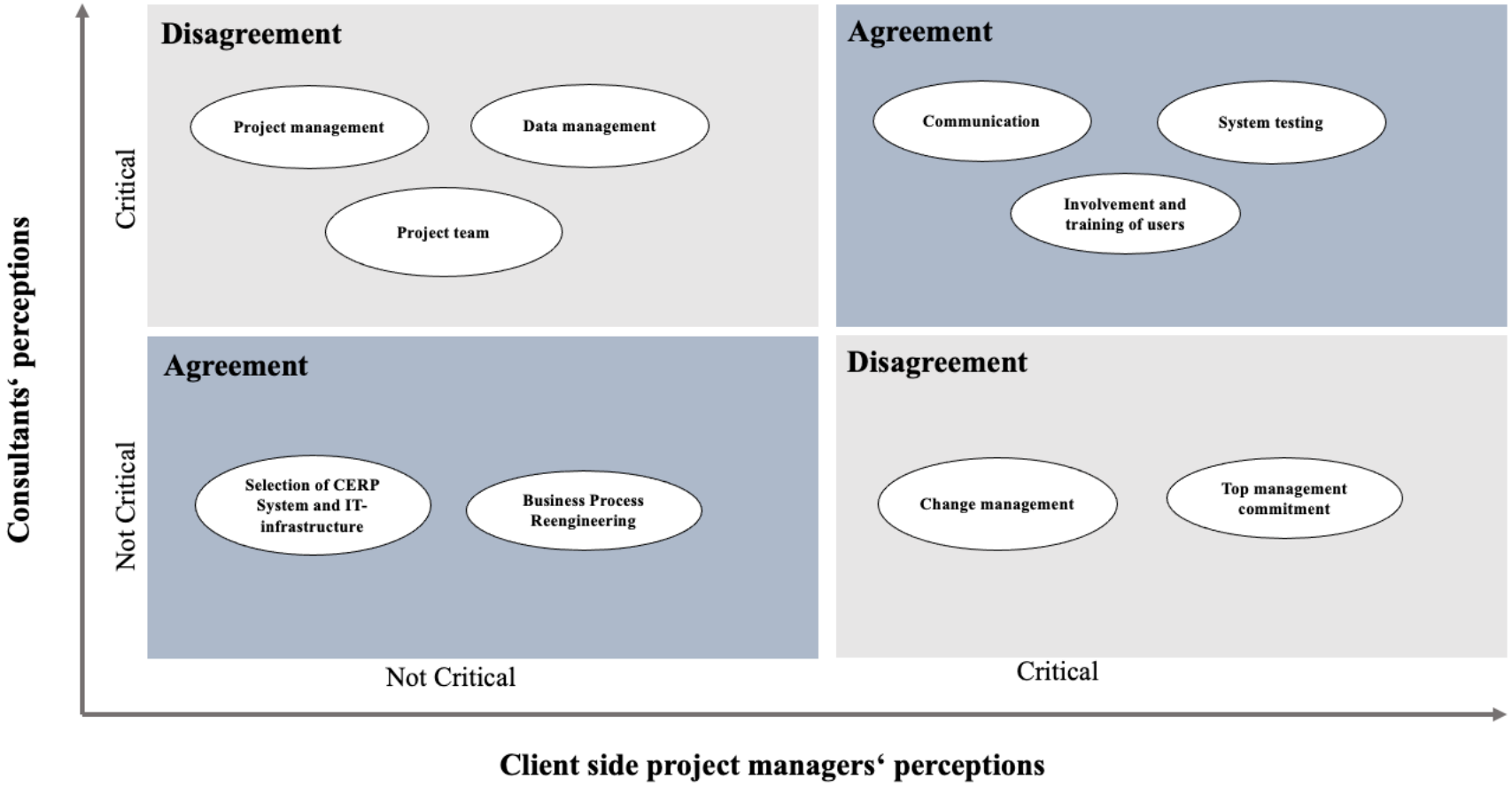
System testing

The CSF 'System testing' was viewed as critical in six cases according to **the consultants' and client-side project managers' perceptions.** Referring to the consultants' perceptions, the importance of test concepts was notably emphasized in the cases B, C, D, E, F and G. Test concepts provide a holistic guideline for testing the components and functions of the CERP system. That not only supports the users in getting familiar with the system, but also allows for a comprehensive quality assurance of the system components ensuring that the functions operate appropriately and meet the defined requirements according to client-side project managers' perceptions in the cases B, E and G.

5.4 Summary of analysis

Drawing upon the cross-case analysis and its corresponding reasoning considering the criticality of the CSFs, a 2x2 matrix was illustrated. The matrix represents a visual depiction, whereby the perceptions of the CSFs for CERP implementation are represented as observed from the consultants' and client-side project managers' perceptions across all cases. In particular, the matrix showcases the area of convergence in perceptions ("agreement") whilst emphasizing perception gaps ("disagreement") regarding the CSFs.

Figure 3:Commonalties and perception gaps of CSFs.



The greatest overlap in perception refers to the CSFs ‘communication’, ‘system testing’ and ‘involvement and training of users’. Following the reasoning in the previous chapters, these CSFs are agreed upon to be critical for both the consultants as well as the client-side project manager during the implementation phase of a CERP project at large companies. These three factors are interconnected and mutually reinforce each other whereby the bridge between the CSFs categories namely ‘organisational, ‘human-related’ and ‘technological’ is built. It was discovered that effective communication not only leads to an improved project coordination, but also to risk minimization as well as smoother collaboration between the project team members. Combined with the involvement and training of users, familiarization with the new CERP system can be achieved. As a result, system testing can be carried out whereby the functionalities of the CERP system are validated in order to achieve the alignment between the system and the business requirements. By prioritizing these CSFs, consultants and client-side project managers can establish a proper groundwork that thrives the success of the CERP project.

Additionally, there was the shared perception that the CSFs ‘Selection of CERP system and IT-infrastructure’ as well as ‘Business process reengineering’ are not deemed critical. Instead, these CSFs are seen as part of the pre-implementation phase.

On the contrary, perception gaps were discovered. The CSFs ‘top management commitment‘ and ‘change management’ were seen more critical according to the client-side project managers’ perceptions whereas ‘Project management’, ‘Project team’ and ‘Data management’ was regarded as more essential by the consultants’ perspective. From the client-side project managers perspective, it can be interpreted that top management commitment and change management hold a greater significance in the adopting company as these CSFs need to be managed by the client-side project manager instead of the consultants. Their embeddedness in the adopting company underlines their importance in fostering the transformation to a new CERP system at large company. Above that, it was frequently mentioned that ‘change management’ is seen as part of other implementation phases, such as pre-implementation or post-implementation.

However, on the other hand, the ‘Project management’, ‘Project team’ and ‘Data management’ can be significantly impacted by the consultants’ expertise. Thus, these

CSFs are regarded as vital considering the consultants perceptions. In turn, by recognizing the consultants' capabilities, guidance can be provided that support a successful outcome of CERP projects in large companies.

Drawing upon this analysis of the findings, the framework on the next page could be developed.

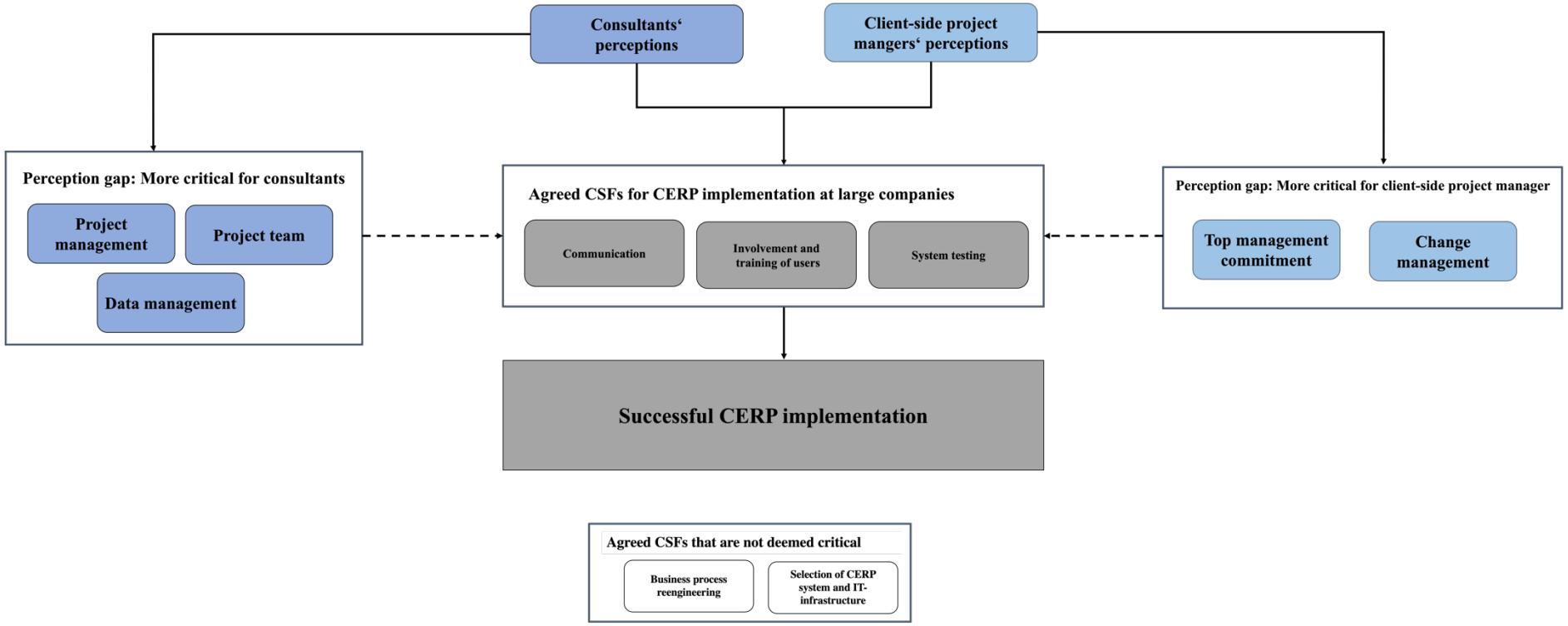


Figure 4: Framework based on CSFs for successful CERP implementation.

6. Discussion

The chapter focuses on contrasting the cross-case analysis with the existing literature that was represented in the frame of reference.

Previous literature was used to derive the ten CSFs which were categorized in organizational, human related and technical CSFs and developed into a framework (Appendix 2). The respondents expressed their views on the criticality of each CSFs during the implementation phase considering the consultants' and client-side project managers perceptions. Based on the analysis a framework was developed (Figure 4).

The CSFs 'Communication', 'System testing' and 'Involvement and training of users' were deemed critical by both the consultants' and client-side project managers' perceptions. 'Communication' and 'Involvement and training of users' are supported by the respondents reasoning and frequently cited by the existing literature (Gupta & Misra, 2015; Gupta & Misra, 2016b; Gupta et al., 2018; Huang et al., 2021; Radhakrishnan et al., 2022; Gerhardter & Ortner, 2013; Alharthi et al., 2019). Yet, some further insights for the CSF 'Communication' were shared which were not mentioned in the existing literature. It was pointed out that an escalation matrix adds to the effective communication during a CERP project as it assigns roles and responsibilities. When the CERP project is threatened in terms of time delays or budget problems, it provides guideline regarding the accountability. Subsequently, communication promotes in taking the ownership for the CERP project.

However, amongst the shared CSFs which were deemed critical, one finding stands out prominently. Although 'System testing' was only sporadically mentioned in previous literature (Gupta et al., 2018; Gupta et al., 2019; Huang et al., 2021; Gupta & Misra, 2016b), there was a broad consensus between the consultants' and client-side project manager perceptions' that the testing of the system is vital for the success of the CERP project during the implementation phase. However, it was reinforced by the respondents that test concepts which support the client in testing the functionalities of the system are

regarded as important since proper system testing leads to quality assurance and user acceptance. Herein, the users can provide valuable feedback to the consultants who can fix potential bugs and adjust functionalities where needed. Thus, the high criticality of this CSFs is not reflected in the literature.

Above that, there was the shared opinion that the CSFs 'Selection of CERP system and IT-infrastructure' as well as 'Business process reengineering' are not deemed critical during the implementation phase. However, it is important to note that the existing literature (Emam, 2013; Gerhardter & Ortner, 2013; Gupta & Misra, 2015; Gupta & Misra, 2016a; Gupta et al., 2018; Alharthi et al., 2019; Huang et al., 2021; Shatat & Shatat, 2021) did not examine CSFs with focus on the different implementation phases which were presented in chapter 2.2 by Markus & Tanis (2000) and Kachur & Kleinsmith (2013). Rather, the CSFs are generally stated. Therefore, since this study only focuses on the actual implementation phase, the 'Selection of CERP system and IT-infrastructure' and 'Business process reengineering' were deemed as critical for the pre-implementation phase. Both CSFs set the basis for the CERP system to be implemented. Accordingly, these CSFs touch upon fundamental questions considering the business requirements and that are evaluated beforehand. Hence, the literature lacks the examination of CSFs divided according to the implementation phases.

Furthermore, the CSFs 'Top management commitment' and 'Change management' are partly supported by the literature as there is a perception gap about their criticality between the consultants and the client-side manager. Both CSFs were frequently cited by several authors in the literature (Emam, 2013; Gupta & Misra, 2015; Gupta et al., 2018; Gupta et al., 2019; Huang et al., 2021; Gerhardter & Ortner, 2013; Gupta & Misra, 2016a; Alharthi et al., 2019; Shatat & Shatat, 2021; Radhakrishnan et al., 2022). However, the consultant perceptions in this study contrast the existing previous literature on the CSF 'top management commitment'. Although some findings of this study support that the top management allocates resources for the CERP project (Gupta et al., 2019), provides risk management (Alharthi et al., 2019) and is responsible for the monitoring of the project (Gupta et al., 2019), the criticality was denied in almost all cases by the consultants' perceptions. The reasoning revealed that the top management commitment is not regarded as task that is actively managed by the consultants and hence is not deemed critical.

Instead, it is seen as given circumstance, otherwise the CERP project would not have been approved in the first place. Moreover, similar reasoning applies for CSFs 'change management' according to the consultants' perceptions. On top of that, 'change management' was further justified that it is seen as part of other phases, such as the pre- or post-implementation phase.

The CSF 'Project management' is in particular supported by the literature regarding the consultants' perceptions whilst the client-side partially confirms the criticality. Although there is a perception gap between consultants and the client-side project manager, it was seen as critical in most of the cases and therefore aligns with the existing literature (Alharthi et al., 2019; Gupta & Misra, 2016b; Gupta et al., 2018; Ram et al. 2013). Additionally, this study sheds light on the importance of the used project framework, such as agile or waterfall frameworks. These are different approaches associated with distinct methodologies which impact the project management. This is supported in the research by Radhakrishnan et al. (2022) which is the only study in the frame of reference that examined the CSFs with regards to different project frameworks. However, in two cases project management was seen as part of the consulting service according to the client-side project managers perceptions which explains the minor discrepancy in viewpoints.

Similarly, the CSF 'Project team' is deemed critical according to the consultants' perceptions whereas the criticality is partially confirmed by the client-side project managers' perceptions. Regarding the CSFs 'Project team', this study mainly confirmed the importance of heterogeneously composed project teams incorporating different skills and levels of experience (Gupta et al., 2019; Gupta & Misra, 2016a; Gupta & Misra, 2016b; Nah & Delgado, 2006) as well the importance of collaboration between the team members (Lapiedra et al., 2011; Gupta & Misra, 2015). Hence, the findings align with the existing literature.

Lastly, the CSF 'Data management' was supported in the literature according to the consultants' perceptions and the provided reasoning (Emam, 2013; Gupta et al., 2019; Gupta & Misra, 2016b; Alharthi et al., 2019). Although there is a perception gap, the client-side managers' reasonings are supported in the literature as well. With the shift to cloud technologies, data management becomes less important for the client-side as it is

outsourced. Therefore, the reasoning aligns with the underlying concepts of cloud technologies being outside of the clients' responsibilities (Mell & Grace, 2011).

7. Conclusion

In this chapter, the conclusion of the study is outlined by providing answers to the research questions as well as representing the contributions, limitations and future research areas.

7.1 Summary

This study aimed to examine the perceived criticality of 10 CSFs for CERP implementation at large companies from both the consultants' and client-side project managers' perceptions. Thereby, the focus was on the explicit implementation phase whereas the pre- and post-implementation phases were excluded. Further, the client-side project managers' perceptions were represented through the lens of the consultants. Accordingly, the study indented to shed light on commonalties in perceptions as well as perception gaps regarding the CSFs. Thus, the following research question was represented:

RQ: *How are the critical success factors for cloud-based ERP implementation at large companies perceived by consultants compared to the client-side project manager?*

The findings of this study revealed that there was a shared perception between the consultants and client-side project managers that the CSFs 'Communication', 'System testing' and 'Involvement and training of users' are critical during the implementation phase at large companies. They were found to lay the groundwork for a successful CERP project as they not only reinforce each other, but integrate aspects of all CSFs categories, namely organisational, human related and technological.

Moreover, another commonality in perceptions referring to the CSFs 'Selection of CERP system and IT-infrastructure' and 'Business process reengineering' was discovered. Both consultants and clients deemed theses CSFs as not critical during the implementation phase at large companies. Instead, they are seen as critical during the pre-implementation phase.

Furthermore, perception gaps were revealed. There were contrasting views regarding the CSFs ‘Top management commitment’ and ‘change management’ which were found to be more important to the client-side project manager than the consultants. Since these CSFs need to be addressed in the adopting company with the aim facilitating the transition to a new CERP system, they subsequently hold a greater significance for the client-side project managers.

In addition, the CSFs ‘Project management’, ‘Project team’ and ‘Data management’ were discovered to be more important to the consultants since these CSFs can be impacted by the consultants’ expertise.

7.2 Contribution

Considering the theoretical implications, the aim of this study was to address two main gaps in the literature. This study addressed the missing comparison of perceptions regarding the criticality of CSFs for CERP implementation between consultants and client-side project managers. A comprehensive comparison was not done in the existing literature before. Therefore, this study enriched the existing literature by shedding light on both commonalities in perceptions as well as perception gaps.

In particular, the most outstanding finding refers to the CSF ‘System testing’. The consultants and client-side project managers shared the common opinion that this CSF is vital for the success of the CERP project although it was only sporadically cited in the existing literature. This study provided extensive reasoning as to why ‘System testing’ is vital.

Moreover, the study provided new reasoning for the CSFs ‘Business process reengineering’ and ‘Selection of CERP system and IT-infrastructure’ as to why they are not seen as critical during the implementation phase. Instead, they are seen as part of the pre-implementation phase.

Additionally, the existing literature mainly focused on the CSFs in SMEs whereas this study examined the CSFs for CERP implementation within the context of large client

companies. Hence, the findings of this study can be generalized and applied to large client companies which intend to implement a CERP system.

As for the managerial implications, practitioners can use these findings to develop a strategy for the CERP implementation in the explicit implementation phase. It was discovered that the CSFs 'Communication', 'Involvement and training of users' and 'System testing' are deemed as critical with regards to both the consultants' and client-side project managers' perceptions. Hence, practitioners can use these insights and prioritize the aforementioned CSFs since they were found to establish a solid groundwork for a successful outcome of CERP project in large companies.

Furthermore, however, practitioners are required to focus on the CSFs where perception gaps were discovered. Perceptions gaps need further attention since a common agreement should be reached as to how these CSFs can be handled in a CERP project.

7.3 Limitations

This study has some limitations to it. First, the client-side project managers' perceptions were investigated through the viewpoints of the consultants. Hence, the respondents were asked to empathise with the client-side project managers' role which may result in bias. Therefore, it needs to be acknowledged that the shared insights may be limited and partly incomplete. Moreover, other perspectives, such as the perspective of the top management or user perspective were excluded.

Secondly, although this study provided an overview of commonalities and perception gaps regarding the CSFs, no ranking of those was done. This is due to the qualitative nature of this study as the respondents only could decide whether a CSF is critical or not. For ranking the importance of the CSF, a quantitative study could be conducted. Herein, different ranks of importance could be provided in a survey.

Thirdly, this study only covers the actual implementation phase. Other phases, such as the pre- or post-implementation phase were excluded. It is important to acknowledge that the criticality of the CSFs may be perceived differently in other phases.

Lastly, the study was carried out in Germany. Therefore, the sample of cases only originated from Germany. Conducting this study in another country could provide different findings since cultural differences may provide different insights in the perceptions of the CSFs. Additionally, the selected cases did not specify on a selected branch. Instead, the investigated cases covered different industries. Thus, the findings of this study cannot be generalized to a certain branch. Yet, the study focused on the CSFs for the CERP implementation in large companies and thus can be generalized to large companies.

7.4 Future research

This study motivates further research within the field of CSFs for CERP implementation. Further research can examine the criticality of CSFs with focus on the different phases of CERP implementation. In this study, it became apparent that some CSFs are deemed critical in other CERP implementation phases. Hence, further studies can be conducted which compare the criticality of each CSFs within the different phases. This further refines the perception of the CSFs within the context of CERP implementation.

Moreover, future research can focus on a multiple stakeholder analysis. Besides the consultants and the client-side project managers, several other stakeholders are involved in a CERP project, such as the (end)-users, IT-staff and the top management. By incorporating and analysing all perspectives within one research setting, further insights regarding commonalties and perception gaps can be discovered.

As aforementioned, conducting a quantitative study would sharpen the criticality of the CSFs as a proper ranking can be provided. This can be combined with the focus on different implementation phases which was already mentioned in the first research gap. This would result in a better understanding of the actual criticality in the different phases and hence, the right CSFs can be prioritized by the project team.

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9. Appendix

Appendix 1: Condensed CSFs for CERP from the literature

CSFs for CERP in the literature	Condensed CSFs
Communication Effective communication and feedback	Communication
Organization resistance	Change management
Reduced organization resistance	
Effective change and configuration mangement	
Knowledge Quality	
Readiness	
Readiness of organization	
Work experience	
Budget and time Time and resource planning Project management Good project leadership Method of the approach Effective project management process and methodologies Implementation strategy Strategic goals and objective Vision Effective monitoring and control	Project management
Business case	Business process reeingeneering
Process Quality	
Reorganization of business processes	
Business process reeingeneering	
Alignment of IT with business	
Commitment of top management Top management support	Top management commitment
User / client involvement	Involment and training of users
Involvement and training of users	
Training of user	
Team Project team Technically skilled and competent team members	Project team
ERP package selection	Selection of CERP package selection and IT infrastructure
Customization	
Technical requirements	
IT infrastructure	
Cloud service layer	
Data quality Information Quality Functionality Compatibility Mobility factor Data integrity	Data management
System Testing	System testing
Dependency on provider	

Appendix 2: CSF framework for CERP implementation developed by the author

#	Critical Success Factor	Description
Organisational CSFs		
1	Project management	Project management refers to the planning, organization, control, and monitoring of CERP projects to ensure they are completed within specified timeframe, budget, and scope.
2	Top management commitment	Top management commitment refers to the support and involvement of the highest management level in the introduction of a CERP system. Top management provides the resources required to implement the CERP project and initiates change management
3	Business process reengineering	Business Process Reengineering refers to the comprehensive redesign of business processes to achieve significant improvements in efficiency, effectiveness and competitiveness. Existing processes are analyzed, reconsidered and radically changed in order to achieve the desired results.
4	Communication	Communication involves the exchange of information and feedback between the parties involved in the CERP project, such as project teams, stakeholders and end users.

5	Change management	Change management refers to the planning and implementation of strategies to foster employee acceptance and engagement in order to successfully manage the changes brought about by the CERP system. It also includes identifying and addressing challenges related to adapting to new processes and systems.
Human related CSFs		
6	Involvement and training of users	Early involvement and proper training helps users to use the system effectively and helps increase user adoption and satisfaction.
7	Project team	The project team is a group of people responsible for planning, executing and controlling a CERP project. It includes members with different skills and experiences who work closely together to achieve the project goal within given timeframe, budget and scope.
Technological CSFs		
8	Data management	In the context of implementing a CERP system, data management refers to the integration and transfer of data from existing systems to the new system. It also includes defining and setting up data standards, maintaining and controlling data quality, and backing up and restoring data.

9	Selection of CERP system and infrastructure	The selection of the CERP solution and IT infrastructure includes the evaluation of different solutions and technologies to find a suitable solution that meets the needs of the company and enables smooth integration into the existing IT infrastructure.
10	System testing	Testing the CERP system involves checking the functionality, performance and security of the system to ensure it meets user needs and expectations.

Appendix 3: Interview guideline for respondents

Question	Justification
General questions	
What is your current position in the company?	For understanding possible different levels within the job title "consultant"
How long do you already work within the field of ERP implementation?	For ensuring whether the interviewee's knowledge level is sufficient
Are you currently staffed in a cloud-based ERP implementation project at a large company? What are your tasks in it?	For understanding the interviewee's sphere of influence in the project
Was the project successful?	For understanding the experience of the consultant
Main questions For each CSF, the same structure is followed. First, the respondents will be asked to justify the perceived criticality from the consultants' viewpoint and then from the viewpoint of the client-side project manager. Below, an example of the CSF "Project management" is stated. Follow-up questions such as "how" and "why" will be continuously utilized in order to clarify or gain in-depth understanding.	
Consultant's own perception on CSFs	
Project management	
How was the project management approached by your organization?	For building a comprehensive foundation for the following question
Do you deem the project management critical for a successful outcome of the cloud-based ERP project? Why?	For validating whether the factor is deemed critical or not from the consultant's perspective
Do you deem other CSFs as critical that have not been mentioned before? Why?	For understanding if there are other relevant CSFs
Consultant's perception of the client-side project manager perception on CSFs	
How was the project management approached by the adopting organization?	For building a comprehensive foundation for the following question
Do you think that project management is deemed critical for a successful outcome of the cloud-based ERP project by the adopting organization? Why?	For validating whether the factor is deemed critical or not from the consultant's perspective of the adopting organization's perspective

Appendix 4: Letter of consent given to the respondents

JÖNKÖPING UNIVERSITY
Jönköping International Business School

GDPR Thesis Study Consent Form

Required by European Union General Data Protection Regulation 2016/679

The GDPR consent form should always be accompanied by a Participant Information Sheet [see JIBS' guidelines at the end of this template]

GDPR Consent for the thesis: *Analysis of critical success factors for cloud ERP implementation at large companies – a comparison between clients' and consultants' perceptions*

Please tick the appropriately	**Yes**	**No**
Taking part in the study I consent to JIBS processing my personal data in accordance with current data protection legislation and the data delivered.		
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.		

My signature below indicates that I choose to take part in the thesis study and consent to JIBS treating my personal data in accordance with current data protection legislation and the data delivered.

Name of participant [IN CAPITALS]	Signature	Date

Thesis contact details for further information

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E-Mail: amyv22la@student.ju.se

Appendix 5: Abstract of coding process

Quotes

"Keeping the time frame regarding the Go-Live date is the most important requirement for the customer. There should clear milestones that pave the way for the Go-Live."

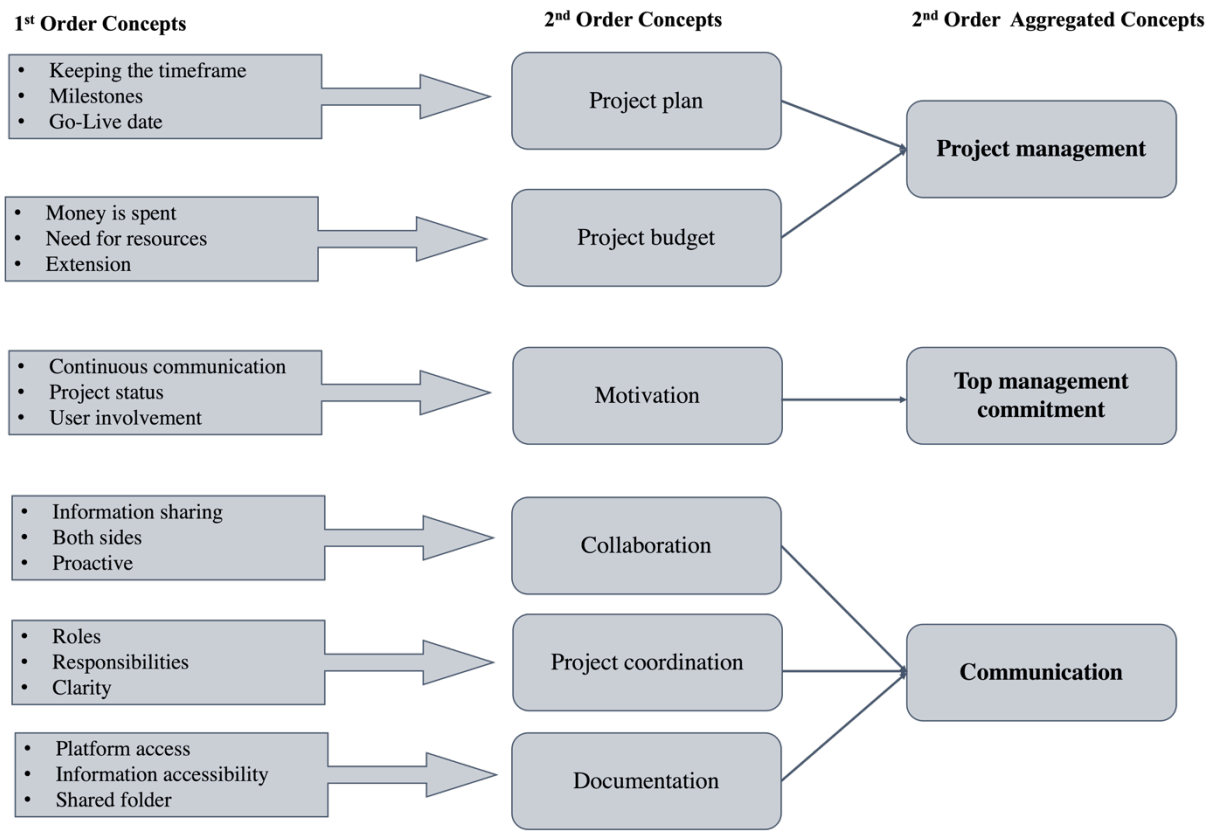
"Postponing the Go-Live date could result in spending more money on the project than originally planned for the project as some resources are occupied for a longer period."

„It is important for us, that the top management communicates with the users about the project status."

„Communication goes both ways. You need to be proactive with the client as we need to exchange information."

„Everyone needs to know what to do (...). People have a role in the project that is associated with responsibilities.

„We use Teams as a common platform with like shared folders. Sometimes people cannot attend meetings but need to be informed about the current status."



Appendix 6: Case overview of perceived criticality of CSFs.

	Project management		Top management commitment		Business process reengineering		Communication		Change management		Involvement and training of users		Project team		Data management		Selection of CERP system and IT-infrastructure		System testing	
	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions	Consultants perceptions	Client-side PM' perceptions
Case A	✓	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗
Case B	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓
Case C	✓	✓	✗	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓			✗	✗	✓	✓
Case D	✓	✗	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✓	✗			✗	✗	✓	✓
Case E	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓
Case F	✓	✗	✗	✗	✗	✗	✓	✓	✗	✓	✗	✗	✓	✓	✓	✓	✗	✗	✓	✓
Case G	✓	✓	✗	✓	✗	✗	✓	✓	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓	✓
Frequency of deemed critical	7	5	1	4	1	2	7	7	2	3	4	4	7	5	5	3	0	0	6	6

✓ deemeed critical

✗ not deemed critical

not stated

The abstract refers to the perspective of the consultants in case B for the CSFs ’Project management’, Top management commitment’ and ’Communication’