CRITICAL SUCCESS FACTORS OF ERP IMPLEMENTATIONS IN SMEs

A Case Study of a Finnish SME

Master’s Thesis
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ERP systems have been used by companies to streamline and automate their internal processes. Hence, SMEs seeking to grow and capture more market share tend to implement ERP solutions to propel themselves across the chasm. But ERP implementations are risky ventures that can lead to insurmountable financial losses if mismanaged. However, extant research has focused more on ERP implementations in bigger companies, who can command resources unavailable to SMEs. To that end, this thesis aimed to explore the critical success factors (CSFs) of ERP systems implementation in SMEs.

The literature review revisited the Critical Success Factor theory, analysed ERP implementation stages as well as CSFs from past implementations. Based on the results, a conceptual framework was developed which categorised ten CSFs across three distinct implementation phases based on their significance at each level.

A single case study was then designed to test the validity of this conceptual framework. The case study consisted of eight semi-structured interviews and observations from the author. The interviewees at the case company consisted of members from senior management, salespersons, the project lead, the consultant, and an end-user. The author was also part of the implementation team. The implementation at the case company occurred between Spring 2020 and Autumn 2021 and the interviews were conducted in Autumn 2021.

The findings affirmed the importance of CSFs such as Top Management Support and Clear Business Plan & Vision. However, people-centric CSFs such as Interdepartmental Communication & Cooperation proved to be more consequential to the case company than presented in literature due to SMEs' reliance on fewer employees to execute a successful implementation. Furthermore, the case study revealed SMEs' greater dependence on external consultants, thus mandating a more robust relationship management with externals at SMEs.

The findings motivated the development of a novel two-tiered CSF categorisation scheme across the implementation phases. The CSFs were classified based on their importance and impact on the efficacy of the other factors. This two-tiered framework brings clarity to the convoluted nature of CSF research in ERP implementations. SME managers should benefit from having less CSFs to manage when implementing an ERP.

Future studies should further test the validity of this two-tiered CSF classification in other SMEs.
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1. Introduction

In an ever-changing global business environment, companies, big or small, face increasing pressure to remain competitive while meeting rising customer expectations. At the same time, the rise of powerful IT tools such as big data analytics and cloud computing has empowered companies with even sharper tools to manage themselves. Those companies that can better utilise these tools tend to get ahead of market competition and establish themselves as firm market leaders. But the core enabler of these advanced capabilities is a functional and effective Enterprise Resource Planning (ERP) system that can facilitate organisational growth and scaling without hindrance. Ever since the 1990s, global businesses have been turning to major ERP vendors, such as SAP, Oracle, or Baan, for business tools to manage information flow, aiming at improving “interdepartmental cooperation and coordination” (Davenport, 1998; Umble et al., 2003: 242).

According to literature, a common objective of these tools was to manage the “fragmentation of information” that occurs as companies increase in operational scale (Davenport, 1998: 123). To develop and maintain their competitive advantage, larger companies might need to facilitate cross-functional decision making through smooth and accurate data flows, which is a promise of ERP systems. In addition, Umble et al. (2003: 241) proposed that ERP systems increases organisation control and provides a “unified enterprise view”. As a result, senior management can have a real time understanding of their business and hence, make better-informed and data driven decisions.

However, smaller companies, which do not necessarily suffer from the same scale-induced fragmentation, have been increasingly active in implementing ERP systems (Ahmad & Cuenca, 2013; Loh & Koh, 2004). This has been partially driven by the need of small- and medium-sized companies (SMEs) to integrate themselves into the supply chain systems of bigger corporations. The need to communicate electronically via specific ERPs especially with bigger customers and suppliers preclude other simpler alternatives. For instance, when supplying to global giants, like Airbus or GE, smaller companies will have no choice but to receive POs (Purchase Order) and submit invoices on the ERP portal defined by those giants (Airbus, 2021). In addition, the benefits of running an integrated information system have appealed to SMEs.
ERP systems have enabled SMEs to optimise their operations such that they can manage and plan just-in-time productions. From the point of view of the SME owner, having an ERP also increases the marketability of the company to bigger investors as they tend to have more stringent internal control and governance requirements. Thus, there is a compelling case for implementing an ERP in an SME.

Nonetheless, SMEs lack the human, monetary and knowledge resources that are otherwise available to bigger corporations. This means that SMEs must manage their ERP implementation process more tightly while relying minimally on external consultants. Walking on such tight ropes mean that SMEs would have to better manage critical success factors (CSF), or their business run the risk of going bankrupt. Unfortunately, extant literature on CSFs tend to focus more on bigger corporations which begs the question: how should SMEs manage the CSFs in ERP implementation for a successful outcome? This question will increase in relevance as more SMEs look to modernise their internal tools in anticipation of more remote working in the wake of the COVID-19 pandemic.

2. Research Questions

As the question presented above is a composite of smaller problems, this study will decompose it into two smaller research questions to facilitate discussion. Before an SME can attempt to manage any CSF, they would have to understand what are the CSFs that apply to them, in addition to the reason for the importance of these specific factors. Hence, research question 1:

“What are the ERP implementation CSFs in SMEs?”

After establishing the CSFs, the next thing that would intrigue the practitioner is how best to manage these CSFs. While it is acknowledged that there is no specific success formula for managing these ERP implementation CSFs, this research will assist managers by categorising the factors into phases of ERP implementation in which they are the most important. In the absence of a universal solution to managing all these CSFs, the more pragmatic solution is to inform the SME managers that these factors are the most important at these specific phases of the implementation. Thus, research question 2:
“Which CSFs are important to SMEs at different ERP implementation phases?”

3. Literature Review

To develop a thorough understanding of the topic, this paper will review and synthesise previous studies, and in the process draw upon the ERP implementation successes and failures the authors have found across the industries. The aim of this review is to develop a conceptual framework which can be used to guide the later field research. To that end, this study will first review the various ERP implementation staging methods used in literature. Next, this study will motivate the use of CSFs by revisiting the critical success factor theory, followed by a dissection of ten of the most cited CSFs in literature. There will be additional focus placed on the relevance of the CSFs to SMEs as well as the stage of ERP implementation where they are the most important. Lastly, all the previous discussions and reviews will be consolidated into a conceptual framework that will guide the later sections of this paper.

3.1. ERP Implementation Phases

As mentioned previously, ERP implementation CSFs have been well studied over the years, with each set of authors bringing in their own take on this subject. While this lends well to creating a comprehensive understanding of CSFs for the researcher, they might confuse the practitioner. The cost of understanding the overwhelming list of CSFs will outweigh the benefit it brings to the executive, not to mention the overloaded SME manager who must carry out their daily tasks while implementing an organisation wide ERP. If one is to manage an ERP implementation with the taxonomy of success factors proposed by Umble et al. (2003) or al-Mashari et al. (2003), one would get an exhaustive overview of implementation CSFs while not necessarily understanding when these factors might matter most. Thus, researchers have been diligent in creating ways to categorise these success factors to ease the mental load of the practitioner.

The most direct of these categorisations would be that of using ERP implementation stages. This approach also has the benefit of being the most relatable to managers as they create stages that are more business oriented (Saade & Nijher, 2016). Among the simplest is that of Hustad & Olsen (2013) who simply divided their success factor study according to pre-
implementation, implementation, and post-implementation, which could have been inspired by the unfreeze, change, refreeze methodology (Lewin, 1947). Loh & Koh (2004: 3440) built upon the process theory proposed by Markus & Tanis (2000) and presented a more elegant four-stage model of “chartering phase, project phase, shakedown phase and onward & upward”. Conversely, Somers and Nelson (2001: 7) following the work of Cooper and Zmud (1990), who proposed a more theoretical five-stage implementation of “initiation, adoption, adaptation, acceptance, routinisation, infusion”. Regardless of their differences, all the categorisations presented above are an improvement from that which Bancroft et al. (1998) proposed, primarily because they created these staging with technological diffusion in mind. While Bancroft et al. (1998) finished their model at the stage of ERP implementation, later researchers rightly posited that the diffusion of enterprise applications, that is, the active use of ERP systems, can be more difficult and more important than the actual implementation process itself (Lorenzo et al., 2012; Lorenzo et al., 2005; Mass et al., 2016; Janssens et al., 2020).

Other school of scholars chose to dispense with implementation stages entirely and focused on whether these factors are strategic or tactical, which reduces the category space to just two classes of CSFs (Holland & Light, 1999; Finney & Corbett, 2007). This approach splits the success factors according to whether they address the big-picture or the finer details which require skilful methods. An extension of this would be the operational category that Al-Mudimigh et al. (2001) included. Instead of viewing CSF categories through the small and big picture lens, Ahmad & Cuenca (2013) divided the factors to three categories: organisational and cultural factors, operational and technical factors, and neutral factors. Although not mentioned by the authors, their approach of focusing on the organisation has been promoted by Hong & Kim (2002) and Law & Ngai (2007).

Lastly, Saade & Nijher (2016) synthesised the categories proposed by the prior authors and created a set of categories that straddled between implementation process based and organisation based. Their categories of “organisational state, business requirements, technical solutions, project implementation [and] post-implementation usage” also considered the strategic and tactical perspectives of ERP implementation (ibid., 89). In many
ways, their “great synthesis effort” provided the most comprehensive list and categories of ERP implementation CSFs (ibid., 89).

To assist the readers in understanding the diverse phasing proposed in the literature, the table below is presented as a synthesis of the phases used by key authors above. While individual authors might not define similar start and end points (Hustad & Olsen’s Implementation phase might not end at the same time as Somers & Nelson’s Acceptance stage), the main point of this work is to advocate a richer view of each stage in literature. An organisation implementing an ERP would have to consider the adoption of the new system, the adaptation of their processes as well as the acceptance of the new system within their organisation. To maintain simplicity, this study will use the model put forward by Hustad & Olsen (2013), while occasionally lending sub-stages from the others to grant more context to the upcoming analysis.

<table>
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<th>Authors</th>
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**Table 1: Synthesis of ERP Implementation Phases**

3.2. Critical Success Factor Theory

Research on ERP implementation often looked to the Critical Factor Theory that Rockart (1979) proposed in his touchstone article. “CSF thus are, for any business, the limited number of
areas in which results, if they are satisfactory, will ensure successful competitive performance
for the organisation” (ibid.: 85). The use of critical factor theory assists in simplifying and
categorising the varied perspectives that managers need to be aware of during a complicated
project such as an ERP implementation. As Finney and Corbett (2007:330) observed,
“identifying CSFs helps to ensure that those factors receive the necessary attention.” Indeed,
with such a multi-dimensional and multi-departmental system implementation to manage, it
is no wonder that CSF theory has become a popular lens through which both the practitioners
and researchers aim at understanding and managing ERP implementation.

Accordingly, literature is replete with studies focusing on the identification of ERP
implementation CSFs (Ahmad & Cuenca, 2013; Somers & Nelson, 2001; Loh & Koh, 2004). In
most of these cases, the authors have built upon the works of previous researchers and then
expanded on those identified factors. For example, Somers & Nelson (2001), among the
earliest of CSF researchers, compiled a comprehensive list of 22 different CSFs. They ranged
from top management support to defining the architecture, factors which could still be
relevant even as the ERP landscape has changed much since then. Top management support
still appears to be a highly rated CSF in the literature (Mahmood et al., 2020). However, other
factors such as solution architecture could be less relevant as businesses and vendors
increasingly turn to cloud ERP solutions. Cloud ERP systems tend to be easier to deploy and
they do not demand extensive IT infrastructure (Gupta et al., 2017). Hence, the modern
uptake of cloud ERP motivates a revisit to traditional ERP CSF literature.

In addition, ERP CSF literature tend not to restrict their CSFs according to the types of business
or companies implementing those systems. Consequently, some proposed CSFs might be
crucial for some companies while being a non-factor for others. For instance, Saade and Nijher
(2016) concluded from their meta research of case studies that the existence of legacy
systems support presents a crucial success factor when selecting a new ERP. This is a relevant
factor when older companies transition to a new ERP system while some departments or
processes are still using the older system. In the absence of legacy systems support, entire
processes could break down, leading to heavy business implications. However, younger and
smaller companies do not usually face this issue as their processes can be shorter, which
means that there is a higher likelihood that they can be handled within the basic ERP modules
immediately taken into use. Therefore, this research is also motivated by the need to keep ERP implementation CSF relevant for emerging SMEs.

3.3. ERP Implementation CSFs

Having established the CSF theory, this study proceeds to the success factors themselves. Although the list of success factors can be extensive, Finney & Corbett (2007) aptly observed that the meaning of these terms is more poorly defined. This could easily create confusion for the practitioner as they scour through the literature. They pointed to change management in their article, critiquing previous authors for their lack of consensus on the scope of change. While some viewed ERP-related change management to mean managing resistance, i.e., Hong & Kim (2002), and Mahmood et al. (2020), others considered it to be akin to full scale business process reengineering, i.e., Somers & Nelson (2001) and Umble et al. (2003). The variety in definitions and scope is worsened by the lack of specific tactics needed to address these factors (Finney & Corbett, 2007). Even though Somers & Nelson (2001: 5) rightly asserted that “managing change is a primary concern” to those implementing ERP and that half of all failures in ERP implementation could be linked to change management deficiency, they do not provide any pragmatic advice to managers in this regard. To give some clarity in this subject, this section will hence delve into select CSFs while attempting to give a clear understanding to the reader as to their meaning and their managerial implications as well as the stage of ERP implementation in which these factors are the most relevant. The following ten CSFs are chosen because they have been cited consistently across literature as the most important factors in ERP implementations (Somers & Nelson, 2001; Loh & Koh, 2004; Saade & Nijher, 2016).

3.3.1. Top Management Support

Amongst all the studied success factors, top management support and commitment is undoubtedly the most important and most cited (Davenport, 1998; Somers & Nelson, 2001; Hustad & Olsen, 2013; AboAbdo et al., 2019). Somers & Nelson (2004: 259) went as far as to assert that “no single factor is as predictive of ERP project success” than unceasing top management commitment. Furthermore, the timeless quality of this factor is firmly established considering that it is still being included in recent ERP implementation CSF studies.
(Mahmood et al., 2020). In fact, the systematic literature review that Mahmood et al. (2020) conducted shows that top management support appears in 40 out of 53 articles, far outstripping the second factor in relevance.

Even though each set of authors have their own understanding of what top management support entails, the common thread is that senior managers should be involved in the ERP project from its outset. As ERPs have key strategic, tactical, and operational implications for the organisation, top managers should not only be “involved in the strategic planning,” rather they have to “constantly [monitor] the progress of the project and [provide] direction to the implementation teams” (Somers & Nelson, 2004: 259; Finney & Corbett, 2007: 335). Thus, it is the responsibility of senior management to dedicate time and resources not only at the pre-implementation phase, but also throughout and after the implementation to ensure that every member of the organisation understands the significance of the new ERP to their daily work. In fact, Ahmad & Cuenca (2013) found that this success factor increasingly interact with other factors as the ERP project continues, implying that this burden on senior management will get weightier and trickier in the later stages of ERP implementation.

Looking at SMEs, this might be challenging as they lack the “organisational culture and top management commitment” to bear short-term disruptions stemming from adopting a new ERP (Loh & Koh, 2004: 3441). The lack of secure funding or pressure from early investors could easily push young SMEs to give up on this project and simply resume the old ways of doing things. Hence, many authors have proposed plans of actions that apply also to the SME. For example, Loh & Koh (2004) recommends public affirmation of the ERP project as a top priority within the SME while Finney & Corbett (2007) suggests careful planning of new business processes to anticipate potential glitches when working with the new system. Furthermore, to combat the potential absence of change culture in the SME as per Loh & Koh (2004), top executives should put in effort to establish a “suitable culture for ERP implementation” (Mahmood et al., 2020: 639).

In short, top management support is arguably the most important of all the CSFs and it is relevant across all three implementation phases, be it an SME or a multinational conglomerate. In response, literature has many recommendations for senior management to
tackle this issue. As no two companies are alike, these suggestions are mostly normative in nature and requires managerial discretion. However, this does not reduce their significance for the implementing organisation. Davenport (1998) warns that managers should take control of the entire implementation process or risk themselves being controlled by an impersonal ERP system.

3.3.2. Project Champion

The presence of an ERP project champion is a success factor closely related to committed senior management. In many ways, the project champion is the personalisation of top management support as they are given the onus of bringing the company through the entire life cycle of the ERP implementation. Among the first proponent for this role was Somers & Nelson (2001: 2), where they recommended appointing an “executive level individual” with the authority and social capital “to move large and complicated projects through the transition.” In this capacity, the project champion would thus “champion the project throughout the organisation,” implying efforts in organisational transformation and internal marketing (Loh & Koh, 2004: 3441; Tan et al., 2009).

As for the SME, managing of this success factor could prove challenging due to the potential lack of a person with appropriate skillsets. Although moving changes through a smaller organisation might be simpler, they might lack either of the “business, technical [or] personal managerial competencies” that this role demands. In addition, many authors also emphasised on the importance of filling this role early in the project, i.e., during the pre-implementation phase (Somers & Nelson, 2001; Umble et al., 2003; Loh & Koh, 2004). Thus, the SME would do well to prepare in advance for an ERP implementation by hiring externally or by training internal staffs for this role.

3.3.3. Project Management

Given the scale and complexity of ERP implementations, one can already assume that expert project management is a key success factor. Project management in the context of an ERP implementation can be tricky as it involves a “vast combination of hardware and software and the myriad of organisation, human and political issues” (Somers & Nelson, 2001: 3). As a clear
definition of scope appears to be commonly quoted as a hallmark feature of good ERP project management, this success factor is relevant for the company early in the pre-implementation phase (Loh & Koh, 2004; Mahraz et al., 2020). Even though the importance of project management wanes in the post-implementation routinisation and infusion phase, its significance is affirmed by Dezdar & Ainin (2011), who found a firm relationship between ERP implementation success and effective project management (Somers & Nelson, 2004).

To assist in project management for the entire ERP life cycle, authors tend to suggest starting with a high-level steering committee or group, with representatives from different corporate functions and end user groups (Somers & Nelson, 2004; Mahmood et al., 2020). This will facilitate consistent involvement and participation of key stakeholders during the ERP implementation. Top management support tends to come in handy during this phase to select the right stakeholders to be part of this steering group. And as for the ERP implementation project itself, both Umble et al. (2003) and Mahraz et al. (2020) recommend a clear work and resource plan as well as progress tracking. Taking an employee morale perspective, Loh & Koh (2004: 3441) proposes planning the project such that the team can deliver “early measures of success”. In addition to boosting implementation team spirits, this could potentially reduce scepticism within the organisation towards the new ERP. Hence, an SME looking to implement an ERP should ensure that it has the capability for “rigorous and expert project management,” or it could face cost overruns that could potentially bankrupt the company (Saade & Nijher, 2016: 84).

3.3.4. Clear Business Plan & Vision

Having a clear and definite business plan can be considered a prerequisite for a successful ERP implementation. Drawing from industry ERP implementation examples such as FoxMeyer Drug and Dow Chemical, Davenport right argued that most of the issues faced during an implementation are business problems as opposed to technical limitations. Later researchers also agreed with him that implementations often failed because companies fail to align the tool with the business needs of the company itself. For instance, Loh & Koh (2004: 3441) advocated for a clear business plan and vision to “steer the direction of the project [to] maintain focus on business benefits”. By doing so, the company would ensure that there is a
“clear link between business goals and [Information Systems] strategy” (Finney & Corbett, 2007: 335).

Seeing that having a clear business plan is a CSF, Umble et al. (2003) recommends that executives clearly establish the raison d’être of the ERP implementation, primarily to ensure that the project aims to solve a critical business problem rather than to follow in on the trends. Once the business goals are well placed, then it becomes clear that the ERP project is more than an IT project - it affects multiple business processes and strides across departmental borders. Hence, the SME looking to implement an ERP should first establish clear business reasons before deciding on which vendors or which modules to implement.

In fact, once the business motivation for having an ERP is set, the other pieces will fall into place. If the SME looks to scale and grow internationally, they should consider using cloud ERP so that the tool can grow easily with the number of users and transactions they will make. Or if managing subscriptions is the core business of the company, they should then build their ERP modules around subscriptions, i.e., recurring billing, recurring revenue management, user management. Therefore, this is also a CSF that features extensively in the pre-implementation phase, although some argue that it is needed throughout the entire ERP life cycle (Loh & Koh, 2004; Hustad & Olsen, 2013).

3.3.5. Great Implementation Team

As ERP implementations tend to be complex and lengthy, it follows that having a great and well-motivated implementation team is a CSF, and this is well attested in literature (Somers & Nelson, 2001; Umble et al., 2003; Saade & Nijher, 2016). Indeed, this cross-functional team should consist of the “best people in the organisation,” chosen on the basis of their “business and technological competence” (Somers & Nelson, 2004: 259; Loh & Koh, 2004: 3442). This is because they must be able to make critical decisions during the implementations that would carry major process implications. They would also need to reconcile, on the spot, the differences between the IT tool and the desired business outcomes. To facilitate this, the team should be empowered to making rapid decisions by senior management (Umble et al., 2003). In addition to choosing the best internal people, Loh & Koh (2004) further proposes
including consultants in the team, bringing in external viewpoints on designing ERP fit with the organisation.

This CSF appears to be the first among those studied that matters mostly during the implementation stage. Somers & Nelson (2001, 2004) placed this in the adoption, adaptation, and acceptance phase, claiming that the implementation team becomes less relevant in the post-implementation stage where the focus diverts to diffusing the ERP into the organisation.

When looking at SMEs implementation teams in particular, Mahmood et al. (2020) warned that ERP-specific knowledge might be overly concentrated amongst a few people. And in the absence of proper knowledge creation and diffusion structures, if any key team member leaves the organisation, there will be a major knowledge gap that could be detrimental to the daily operations of the SME. As implementation team within the SME might be smaller, this presents an even higher risk than those of a bigger organisation.

### 3.3.6. Interdepartmental Communication & Cooperation

If great implementation team and teamwork is the micro-CSF, then interdepartmental communication and cooperation is the macro-CSF. As ERP systems affect multiple functions and processes, it is essential that each individual function is willing and ready to cooperate with each other (Somers & Nelson, 2001; Nagpal et al., 2015). If there are channels for open communication, then it will help, for instance, the finance, sales, and operations team to develop a subscription management process that is conforms to the needs of the customers while being compliant with accounting standards. These communications need not be purely formal as either oral and/or written form according to Mahmood et al. (2020).

Another key benefit of low friction interdepartmental communication and cooperation is that expectations can be managed more easily. If the affected teams are being forthcoming of their progress in the implementation and adaptation to the new tool, it will help the implementation team to modify the affected parameters so that some processes could be more highly automated or totally redesigned to suit the business needs. This alludes to the primary takeaway from the clear business plan CSF – business goals above tools. Although Somers & Nelson (2001) indicated that this CSF is most apparent during the routinisation and
infusion stages, i.e., post-implementation, Mahmood et al. (2020: 640) points to its “high impact on system acceptance” and that it is “critical at every level during ERP implementations”. Thus, companies, big or small, should foster a positive environment for interdepartmental cooperation and communication to increase the chances of a successful ERP implementation.

3.3.7. BPR & Minimum Customisation

Business Process Re-engineering (BPR) has often been studied by itself, not necessarily in the context of an ERP implementation, but researchers have been promoting the recursive relationship between BPR and ERP implementation (Subramoniam et al., 2009). BPR can be understood as a “transformation from [being] function based to process based,” implying potentially major redesign of how things work within an organisation (ibid.: 653). This could be highly disruptive for a fledging SME who is beginning to develop itself into a more mature company with set and extensive processes.

The need for BPR arises when there is a mismatch between the ERP logic and predefined processes in the company. This conflict is inevitable so long as the system is not designed in-house, hence, requiring either the tool or the company to bend to the other. While the path of least resistance is to modify the ERP to fit the company, literature often recommends the reverse. For instance, Davenport (1998: 127) insisted that the company should “rework its processes to fit the system requirements”. This is supported by Loh & Koh (2004) and Finney & Corbett (2007: 336), with the latter using the term “vanilla ERP” in describing the minimally customised ERP. In an ideal world, the mismatch between the tool and company would be small, requiring only minimal customisation and process change, small-r re-engineering à la O’Leary (2000) and Subramoniam et al. (2009). Big-R re-engineering, on other extreme, occurs when both the software and processes need to be changed. Under normal circumstances, both the software and processes will undergo some alteration, but literature insists on changing processes instead of the software whenever possible. To motivate management to push through these arduous process change, Somers & Nelson (2001) claimed that BPR with minimal customisation promises the highest ROI while Park (2018) pointed to improved organisational performance resulting from higher information orientation.
While Somers & Nelson (2004) claimed that BPR is only critical at the pre-implementation phase, both Loh & Koh (2004) and Park (2018) assert that it matters only during the implementation phase. Although processes within SMEs tend to be simpler and shorter than their bigger counterparts, authors tend to agree that SMEs should be careful in crafting and fine-tuning their new processes so that they can gain the most out of it (Loh & Koh, 2004; Mahmood et al., 2020). Indeed, BPR should redefine the business operations within the company and thus change the way the firm relates to the ERP tool.

3.3.8. Change Management

When introducing changes to the organisation, especially one as big as a new ERP, inertia and misunderstanding tend to occur, leading to change resistance. Hence, companies implementing a new ERP should account for the resources needed for managing ERP-induced change. Some authors suggest taking a macro approach and manage this change from an enterprise-level. This might take the shape of helping the employees understand if the company is becoming either more centralised or decentralised after taking this ERP into use (Davenport, 1998). As ERP tend to inject discipline and structure to an organisation, employees in SMEs who are used to more flexible work processes might find it difficult to understand and accept the new bureaucracy that is being introduced. Therefore, both senior management and the project team should devote resources to train their colleagues to understand and to use the newly implemented tool. Umble et al. (2003: 245) provides further encouragement by stating that sufficient training in the context of change management is “probably the most widely recognised” CSF. Furthermore, this effort should not cease at any point because effective ERP use requires a “critical mass of knowledge” (ibid.).

As Loh & Koh (2004) rightly claims, the main bulk to change management occurs at the post-implementation shakedown phase, as that is when management and the implementation team has the new software ready for active use. However, this does not mean that the company need not think about change management before this. Change management is one field where the project champion comes in handy, especially in educating and addressing the concerns of those affected users all the way from the beginning of the implementation project (ibid.). Although the SME might find change management easier due to the lack of middle
management inertia, they should not underestimate the task of building user acceptance and a positive employee attitude towards this ERP (Finney & Corbett, 2007; Mahmood et al., 2020). As Davenport (1998: 130) fittingly quipped, “computer systems alone [do not] change organisational behaviour”.

3.3.9. Working Partnership with Vendors & Consultants

The need for vendors and consultant arises as more companies source for off-the-shelf ERP systems rather than to develop one themselves. The consultants are also supposed to understand better the intricacies of designing and linking business processes to the new ERP. Indeed, Somers & Nelson (2004: 260) recommends a good fit between the vendor, the consultants, and the company itself as this is “positively associated with...success”. To achieve such success, the consultants facilitate the company in performing requirement analysis, selecting the best software, and implementing the software. Hence, this CSF appears to matter more in the pre-implementation software selection as well as during the implementation phase. Understanding that the vendors and consultants play a leading role in a successful implementation, Saade & Nijher (2016) additionally suggests partnering with local vendors and consultants as they might understand the local needs better.

In the context of an SME, the role of vendors and especially consultants become even greater due to their potential lack of internal IT capabilities. Even though Davenport (1998) claimed that reliance on internal resources is not only cheaper but also encourages internal learning, it might not be a feasible option for SMEs. Hustad & Olsen (2013) was critical in their analysis in this respect. They correctly observed that “a good partnership between the implementing company and the vendor or consultant...might be an issue which is less critical for larger companies,” precisely because larger companies tend to have in-house skills to manage the technical side of this implementation (ibid.: 188). Therefore, an SME implementing an ERP should be prudent in managing this CSF. When selecting vendors and consultants, the SME should look for qualities such as “quick response, patience, perseverance and [good] problem solving capabilities” (Loh & Koh, 2004: 3444). A popular trend in recent times would be to choose a cloud ERP instead on premise ERP as they tend to be easier and quicker to deploy without needing substantial IT infrastructure (Gupta et al., 2017; Chang & Hsu, 2019; Chang,
While it is undeniable that cloud ERP is an attractive and even the better option for SMEs, they should be aware of the “vendor lock in problem” which exists mostly with cloud ERPs (Mahmood et al., 2020: 642). They might even find it surprisingly difficult and costly to change vendors for several reasons, i.e., legal, and technical (ibid.). Thus, if an SME decides to implement a cloud ERP, they should be diligent in managing and maintaining a working relationship with their vendors and consultants.

### 3.3.10. Performance Monitoring & Evaluation

Both the performance of the ERP implementation team as well as the company should be well evaluated throughout the implementation process, and these evaluation metrics should be designed from the beginning according to Umble et al. (2003). The goal of measuring performance should be to ensure that the organisation changes along with the ERP implementation (ibid.). In the short term, management can promote superior and reliable performance through activities such as “celebrating small wins” or ERP project-based compensation (Loh & Koh, 2004; Saade & Nijher, 2016: 86). These tend to promote good morale throughout the organisation during the transitory period. However, management should not lose sight of the bigger picture, which is ERP diffusion throughout the organisation in the post-implementation phase. For this to occur, continual management support post-implementation and resilient feedback networks need to exist in the organisation (Finney & Corbett, 2007). Once best practices are established, management should ensure that they are benchmarked so that the organisation continually increase in their effective use of the ERP.

Looking at SMEs, employee recognition and retention are even more important as knowledge diffusion tend to be poorer than in bigger companies (Saade & Nijher, 2016). If any key employee leaves during the crucial post-implementation phase, the knowledge gap could hamper efforts to spread ERP use throughout the organisation. To reduce reliance on key users, management should continually emphasise extensive post-implementation training, while using the feedback network to further improve and streamline new processes (Umble et al., 2003). Post-implementation audit is also suggested as a method to measure performance against set benchmark. In short, the company should be disciplined in measuring and evaluating their performance during and after the ERP implementation for a
higher change of success. Tan et al. (2009: 8) warns against slacking in this regard or the company might find it difficult to quantify “tangible benefits from [ERP] adoption”.

3.4. Conceptual Framework

Having discussed in detail ten of the most prevalent CSFs in literature and their impact on organisations as a whole and SMEs in particular, this paper will further categorise them into ERP implementation stages where they are the most important. As mentioned previously, the three-stage model from Hustad & Olsen (2013) will be utilised as it appears to be the framework that is the easiest for SME practitioners to understand. It must be noted that categorising any CSF into a particular phase of implementation does not mean that they lose their relevance in other phases. Research has shown that, in most cases, these CSFs all play a role throughout the entire life cycle of the ERP project (Somers & Nelson, 2001). Being categorised into an individual phase simply indicate that these CSFs are the most crucial at that specific stage of implementation. In many ways, this research is building on the works of Somers & Nelson (2001), Loh & Koh (2004) and Saade & Nijher (2016), and it echoes their opinion that all CSFs are critical, but some CSFs are more critical than others at separate phases. Guided by this conceptual framework, this research will further analyse these CSFs and their importance in the ERP implementation of an SME, hoping to build a deeper understanding of the CSF theory for ERP implementation within an SME.
As the goal of this research is to establish ERP implementation CSFs in SMEs, it demands the development and testing of a theoretical framework within a specific context. As such, the case study methodology appears to be the most appropriate tool for this study. According to Rashid et al. (2019:2), this method should “reveal multiple facets of the [studied] phenomenon” as the researcher observe and understand the phenomenon within its naturally occurring context.

Throughout the literature review, it has been established that while ERP implementation CSFs are well studied, SMEs respond to them differently as they are bound by different limitations. For example, SMEs tend to lack extensive financial resources that are available to bigger companies, or their ERP implementation knowledge capital might be deficient especially if the SME has inexperienced senior managers. Hence, this situation presents an appropriate opportunity to view this study through the abductive research logic. According to Dubois & Gadde (2002), abductive research can be broken down into the theory testing and theory verification stages. The former deduces a hypothesis or framework from literature and tests
it against empirical evidence; the latter induces a universal law based on the tested theory (Rashid et al., 2019: 5). Indeed, Rashid et al. summarised the abductive method Dubois & Gadde (2002) posited into four distinct components:

1. “Current literature or theories,”
2. “the case that evolves gradually,”
3. “empirical material representing the reality,” and
4. “the [concluding] analytical framework”

So far, this research has completed the first component by deducing a conceptual framework on ERP implementation CSFs in SMEs based on extant literature. Next, the case that was chosen for this research is the ERP implementation within a Finnish SME. The collection of empirical materials for this study was done through semi-structured interviews of eight key individuals within the case company. Lastly, this study will test the conceptual framework against observed reality to conclude with an analytic framework to guide future research and managers on the field in implementing ERPs in SMEs.

4.1. Case Description

The case company (QQ) for this research was founded in 2012 and it provides real-time locating systems to businesses worldwide. It is based in Espoo, Finland where most of the headcount is located. As of November 2021, the headcount was 50 and the annual turnover was around 10M€. While half of the salespersons were based in Finland, the remaining half were spread over Australia, China, and the US. Although its official language is English, the company does operate in a multicultural and multilingual environment. Due to the global pandemic, the teams from the external offices were unable to meet physically throughout this implementation, so most of the communications were done via Google Meet and phone calls. Moreover, this ERP implementation was among the biggest, most complicated, and most expensive project this company has ever embarked on. It directly affected Sales, Operations, HR, and Finance, with some process ramifications for Products & Services and IT, leaving only R&D untouched. In the future, the company is aiming to expand the use and scope of this ERP to other departments such as Marketing.
4.2. Data Collection

In November 2021, eight employees from the case company were interviewed for the purpose of this research. The semi-structured interviews, which were voice recorded with consent, were conducted in English in QQ’s premises. During the interviews, field notes were taken to assist in adding more context to the Out of the eight participants, three were senior managers (CEO, CFO and CPO (Chief Product Officer)) in the company executive team (two of which were superusers), the Development Manager who led the project, two were end users from the sales department, the Logistics Coordinator who was a key user of the system and one was the project team lead from the consulting company. The researcher himself was also working in this company as a project team member and superuser during this implementation from summer 2020 onwards.

At the start of each interview, the interviewee was asked some background questions such as, their role in the company and within this ERP implementation, their prior experience implementing ERPs and their experience in managing business processes. After that, they were asked more detailed questions that were crafted from various aspects of the ten CSFs studied in the literature review above. The concluding questions in the interviews were designed to encourage the interviewee to consolidate and synthesise their thoughts. For example, they were asked about their main learnings during this implementation or the top three things they would do differently with this project if they could start all over again. Guiding questions for the interviews are available in the appendix.

4.3. ERP Implementation at QQ

QQ started sourcing for a new ERP early 2020 and by summer 2020, it has started the piloting and implementation process. As soon as the Development Manager was nominated, she started generically mapping the main processes within QQ to be transferred to the new ERP. According to most of the interviewees, the commonly understood goal for the ERP project was to consolidate the lead-to-cash process into one system. Before using this ERP, this process was done in four separate systems: (1) Pipedrive for lead and quote management, (2) a customer portal for order management, (3) the warehousing provider’s portal and (4) Procountor for finance and accounting. Hence, the key processes that the Development
Manager mapped were the sales process and the order fulfilment process. She did not map fully the processes within Finance because the CFO has decided to lead the Finance implementation himself. As she had an operational background in QQ, her familiarity with the operations process was greater than the sales process. So, she interviewed key people within the sales team to fully understand and to document their processes, definitions, and regional requirements.

Based on the mapped processes and priorities, the Development Manager shortlisted three different ERP options: Odoo, NetSuite and Microsoft Dynamics. Of these three, the leadership team chose Odoo because of its customisable, open-sourced nature. In addition, the subscription management module is built natively within Odoo. These two features in particular had strategic appeal to many within the leadership team because they were aiming to integrate QQ’s own licensing server to this new ERP in the future to streamline subscription management. Moreover, the base software price was also lower than the two other available options. To execute this implementation, QQ selected a local consulting company that had prior experience in implementing Odoo solutions in Finland. The consulting company assisted the case company by providing project management expertise, implementing the customisations to suit the case company, and providing hosting services for the cloud ERP.

The ERP of choice, Odoo Enterprise, is an open-source cloud-based software that was developed by Odoo S.A. based in Belgium. It is a modular ERP where each business function is operated through a separate module (Odoo, 2018). This approach, along with its open-source philosophy, allows Odoo to cater to various businesses while allowing for high degree of customisation according to actual needs. Unlike more established ERPs such as SAP or NetSuite, Odoo gives the business more freedom to execute customisation to meet their needs. However, like any other customised software, the greater the customisation in Odoo, the more complex and costly development and maintenance will be. In terms of this case company, the selected modules for implementation are CRM, Sales, Purchase, Inventory, HR, Finance and Subscriptions.

During the piloting phase in Summer 2020, the consultants started with a basic list of requirements from the Development Manager and demonstrated to QQ’s employees the
functionalities of Odoo. During this pilot, the consultants had many discussions with Sales and Operations heads about their requirements based on the native Odoo that were shown to them. Based on the collected feedback, the consultants performed a fit-gap analysis which later informed them on the remaining development work. The project team carried out master data migration and extensive testing during October 2020 and the go-live was November 2020.

During the first few months of use, there were many issues plaguing the tool across all modules, i.e., missing data in CRM, ERP logic mismatch with QQ’s lead-to-quote process, incorrect calculations in tax reporting. These issues, along with unfamiliarity with the new tool, led to an influx of issues for the project team to solve. In addition, a senior manager left at around this time, so the Development Manager was assigned to lead that department. As she could not manage this project while handling the task of managing the new department, the CFO and I took over the development and maintenance of this ERP project in Spring 2021. The CFO took an entirely different approach and tried to involve the users in more direct conversations with the consultants. Also, he formally introduced QQ’s business model and strategy to the consultants. As a result, the consultants’ understanding of QQ and Sales’ need improved. For example, the native lead-to-quote process in Odoo required managing items on three views (leads, opportunities & quotations) which included a jump between two modules (CRM & Sales). But after the consultants learned that QQ’s lead-to-quote process for any single business case is all managed only by a salesperson, they started designing solutions that integrated these views and modules. The consultant lead mentioned that his improved understanding of our needs and the scale of this project helped him to lobby for more experienced resources internally to work on QQ’s ERP project.

As of when the interviews were conducted (November 2021), most of the goals of this ERP implementation has been done. The lead-to-cash process for all sales cases are now fully executed within Odoo; the lead-to-quote process almost matched what the previous tool could offer functionally; Operations could deliver and invoice all the placed orders; Finance was able to close FY 2020 and all months in 2021 within Odoo. The remaining work for this project would be the integration of subscription management with the licensing server, user experience improvements and other IT integrations for user management. Hence, most of
the interviewees agreed that while this project was not successful in the project management sense, “it has been done on best effort basis” and that the company as whole has done a “relatively good job.” While the project was not executed within budget or on time, both the Chief Product Officer and the Logistics Coordinator agreed that this implementation was a “discovery of business processes.” Hence, the mutual understanding has been that this lengthier path to a unified ERP was a necessary sacrifice to arrive at a functioning ERP which improves the processes within the company.

5. Findings and Discussion

Having elaborated on the business case at hand, this study will now apply the ERP implementation CSF framework to analyse the materials collected during the interviews. By considering the significance of the CSFs featured in the interviews and by contrasting between observations from the industry and literature, this study aims to obtain a better understanding of their implications in ERP implementation in SMEs. Furthermore, this study proposes to further restrict the list of CSFs to determine which ones are truly important to SMEs. This should lend a pragmatic hand to managers as they would be able to choose to focus on factors that might be fatal to the project if not managed properly. Lastly, having consolidated all the findings and discussion, this study will propose a revised conceptual framework.

5.1. CSF Management at QQ: Practice vs Theory
5.1.1. Top Management Support

Amongst all the factors discussed during the eight interviews, the questions related to this CSF was most widely discussed with the most differing opinions depending on the interviewee. Their opinions ranged from being critical of senior management to being supportive of senior management efforts. It comes without surprise that members of the leadership team have the most positive opinion of themselves while the project team seems to be the most critical of top management. A preliminary guess could be that they are the ones who see both the high- and low-level gaps when executing the implementation.
According to the CEO, who took a more laissez faire approach to this implementation, senior management involvement is about assigning the project to someone for tool selection and implementation. If the ERP project is proceeding with all the funding it requires, his overseeing role ends there. Thus, he was not overly involved in the detailed planning and implementation. However, the CFO took a more hands-on approach when he took over the project in Spring 2021. He acknowledged that senior management recognised a need for increased “transparency and process efficiency improvements” and, hence, when he brought in his big picture view in running the project (for the Finance and Sales Modules) there were less misspecification and process conflicts. This effectiveness was acknowledged by a few other interviewees, i.e., the Development Manager, the consultant, the Logistics Coordinator as well as both the sales members. Hence, this supports the claims by Somers & Nelson (2004) and Finney & Corbett (2007) that senior management should be involved in giving clear directions to the project teams, instead of just giving strategic pointers. And resource permitting, the best way to give directions to the project would be to be involved in the project themselves. Thus, senior management’s support in the case of QQ varied from setting up the infrastructure and funding for the project to directing and involving themselves in the daily running of the project. QQ’s senior management support seemed to have improved as they got closer to the project as the project progressed and matured.

Due to the differences in senior management’s own understanding of their role within this ERP implementation, the organisation did not have a unified commitment toward this ERP implementation. Indeed, the Development Manager claimed that:

“senior management lacked a good understanding of the importance and scale of the project, which affected their decision making and prioritisation.”

This lack of understanding spilled over to their subordinates which had a negative impact on this project. As each departments understood this project differently, they unknowingly made decisions that impacted the ERP project without considering its wider implications on other processes. For example, she claimed that Sales changed some key definitions for a process that was to be implemented in the ERP without including her in the discussions. This complicated her work in adjusting the ERP accordingly as processes could change faster than
an IT tool. On the other side, her decisions on ERP processes were not always accepted internally as binding. Hence, she felt that top management did not give her an effective mandate throughout this implementation. Thus, top management’s lack of understanding of the project’s scale and importance negatively affected the project team’s ability to execute.

Another senior management shortcoming was the lack of dedicated human resources for this project. Throughout this project, there was usually only one full time person running the development and troubleshooting. Both the Development Manager and the Logistics Coordinator agreed that resourcing was light for a project of this scale, even for an SME. As for the Development Manager, she gradually had more tasks in addition to running this ERP project as another department in the company needed her time. Even when the project was shared between CFO and I, we each had around half a week of time for this project because we were expected to run this ERP project while carrying out our previous duties. This resulted in a lack of concentration and reduced the development speed of this project. The Development Manager further claimed that, in hindsight, she would have preferred to work with a dedicated team from different departments, i.e., Sales, who would have senior management’s permission to allocate a full workday each week to this project. This would have reduced the degree of miscommunication and misspecification that occurred during this implementation. It could also be argued that this lack of dedicated resourcing is a symptom of senior management’s ill understanding of this project’s importance to the company.

However, senior management did attempt to support this project by ensuring that it had sufficient monetary resources, even though the budgeting process was not well controlled. All the interviewed senior managers and the Development Manager agreed that this project had full financial support from the company and the board. Even though they started the project with a fixed budget, as the project grew and complexity, budget control became less important as the project team was more focused on getting the ERP to work. While it may be argued that this displays project management imprudence, the CEO believed QQ was willing to expend however much it was needed to get this ERP working. Moreover, the CPO believed despite the lack of formal cost control, the cost was still reasonable up to the point of this interview. Hence, senior management support was vital for this project because they ensured that there were sufficient financial resources dedicated for it.
Senior management support for this project was more evident when the CFO took ownership of this project, even though he was not officially defined as the replacement project lead. According to the consultant and the Logistics Coordinator, sufficient contact and involvement from the CFO gave the project a clearer direction. The Logistics Coordinator said it rightly that the project work changed from “seeing what wasn’t working today” to the team taking “coordinated steps” to develop the individual modules within the ERP tool. Consequently, prioritisation within the project improved tremendously. For example, the developments within the CRM module became more user focused because the issue at that point was on user dissatisfaction. Leveraging on cross-functional expertise between Sales, Finance and Operations, the CFO managed to develop the CRM module to a state which was more suitable for the team. Thus, this affirms the assertion by Davenport (1998) and Umble et al. (2003: 245) that an ERP tool should be “directed by business requirements…not the IT department”. By fully understanding the requirements from the main users of the tool as well as the users in the data downstream, the CFO demonstrated that senior management support is crucial in implementing ERP in an SME.

The evidence from the interviews fully support literature in claiming that this was the most important success factor when implementing an ERP in an SME. Senior manager at QQ was fully involved in the strategic planning as well as the daily running of the implementation project. This supports Somers & Nelson (2004) and Ahmad & Cuenca (2013) that senior managers should always be involved in the project. However, literature seems to only consider top management support as a binary state where support either exists or it does not. The case of QQ shows that top management support tends to strengthen as the project progresses because more senior managers will understand the impact the new tool has on their departments. Thus, SME managers should learn to offer more support to their implementation team from the beginning even if the project appears to be very distant from their daily work, and the support could come in the form of dedicated work hours from knowledgeable staffs or sufficient funding for the whole project. As much as possible, senior managers should try to understand and visualise their department or company’s future with the ERP tool in place because this will then provide steps to work backward to their current situation. In addition, this would motivate senior managers to provide enough weight to the project internally so that the project team are able to get all the needed assistance. By doing
these, senior managers are then fully able to support their team in successfully implementing the ERP.

5.1.2. Project Champion

During the interviews, the participants did not explicitly mention about the presence or impact of a project champion during this ERP implementation. However, it was observed that when the CFO got involved in the project, he managed to instil a purpose and direction for the rest of the company. It seemed as if his participation gave Sales and other departments more confidence towards the project. Even though he did not think that he was the project champion, the positive effects of his leadership were clear. Moreover, the CEO’s occasional participation breathed life into the project whenever he gave companywide statements about the strategic and operational significance of this new ERP. This was usually done during QQ’s companywide biweekly meetings.

Although literature proposed the importance of having a project champion internally, the case study revealed that if senior management are involved enough in the project, there is no true need for a project champion. In QQ’s case, once senior managers from different department started to understand the importance of the project, they were eager to personally get involved with the project team in pushing through the development of their modules. While QQ’s CFO could be argued as the project champion as he was an executive level individual who had the business and technical expertise to support this project, it was QQ’s top management matured understanding of the ERP that eventually led them to set corresponding managers as heads of their own respective modules. Thus, this factor did not appear to be as important as promoted by literature.

5.1.3. Project Management

Although the Development Manager had prior experience leading IT tool implementation at QQ, she acknowledged that she lacked experience leading a big project such as this ERP implementation. Even though the CFO has led other implementations in the past, he was not leading day-to-day project management. Project management in this context refers to module-by-module implementation in QQ’s ERP. In general, QQ lacked internal project
management experience as none of the interviewees were project managers in their daily work. As a result, this ERP project at QQ was marked by too many parallel developments and poor risk management. Despite this, QQ seemed to have been able to implement a working ERP, which led to the Sales head remarking:

“[given that] none of the people within the company had project management background, and [that] this project has been done on best effort basis, [the project team] has done a relatively good job.”

Firstly, the scope and objectives of the ERP implementation were not always clearly defined. This problem could be observed from both the goals and subgoals in this implementation. From the big picture point of view, although the goal of this ERP project was to integrate the lead-to-cash process, the project team got side-tracked early on and implemented the HR module first. From QQ’s perspective, the first modules that should have been implemented would have been Sales (for order management) and CRM. But because the leadership team suddenly decided that they needed an HR module for recruitment, they overridden the project team’s original plan and bumped HR to the top of the queue. The unfortunate outcomes of this were that the project team lost its focus, even though only for a brief time, and it set a precedent for other departments, i.e., Finance, to develop their own modules independently of the project team. As QQ’s leaders were not determined enough to follow their original implementation plan, they displayed a lack of project management understanding and skills.

Similar confusion can also be observed in the management of subgoals within the implementation. Although the last-minute inclusion of the HR module was an example of poor project management, QQ was fortunate in that the subgoals for this module were quite simple and well-defined. Indeed, the consultant referred to this module when he wanted to contrast between good and bad project management throughout this project. From his perspective, this HR module’s “implementation goal [and subgoals] were clear. It was executed on time, and everyone was happy.” However, the implementation of the CRM module was difficult. In fact, both the consultant and the Logistics Coordinator agreed that the subgoals for this CRM module kept on changing. The extent to which the specifications
kept changing made it appear to the consultant as if they “were changing according to [Sales’] mood.” As the goals and subgoals were not clearly defined from the beginning, this made developments and releases increasingly difficult for the consultants because they were not able to plan and allocate enough resources for QQ’s development. Thus, project management at QQ was subpar as shown by their unclear goals and subgoals.

Secondly, as the project went overtime and overbudget, it could be argued that there was insufficient project management at QQ. For example, the CEO expected this project to have been executed faster without having to incur such excessive costs. He believed that the delay in this project could be attributed to three factors: project team optimism, lack of experience in the project team as well as the change in leadership halfway through the project. However, the other interviewees believed that this implementation was meant to take more time than expected. In fact, the CPO stated that this was a “typical disaster...because it is a discovery of business processes.” If the company is willing to commit to this project, he believed that “many processes [would be] automated and more benefits will come [to the company].” This opinion was echoed by the CFO as well. Although this project felt to him like doing something with the “left hand” as resources were lacking, him and other management recognised more potential from this ERP project as it proceeded. This led to an inflation of goals and subgoals which then stretched the project duration. But the CFO believed that this could be alluded to resource bottlenecks with the consulting company. The consultant also agreed that they did not foresee QQ’s project to grow to this size, which meant fewer programmers were budgeted for QQ. In many ways, the progress of this project is a symptom of QQ’s working as an agile SME. The Development Manager said that she “could not spend a year to define things before implementing it. There has to be a balance between specifying things and implementing things.” Therefore, a finer inspection of QQ’s circumstances imply that the extra time and financial costs incurred should have been understood as learning costs for the SME, instead of merely a failure in project management.

Lastly, project management at QQ displayed a lack of risk awareness and risk management policies. Considering the importance of having a running ERP to daily operations at QQ, it did not have any contingency plans if anything critical were to fail in this project. For example, all order processing and invoicing at QQ would have been suspended if this ERP project were to
fail for any reasons. Moreover, most of the knowledge about the ERP itself were concentrated within just a handful of internal personnel. For example, when the Development Manager left to manage another department, the CFO had to take over the project even though he was thus far involved only in the finance and accounting module of the ERP. When he first took over the project, he was not aware of the work done by the outgoing Development Manager. Nonetheless, the CEO believed that this is a characteristic of an agile SME where change is a constant, and issues were handled as they come. This way of working can also be observed in other areas within QQ as well. Thus, while risk assessment and management at ERP implementation at QQ might appear poor from the outside, but it might have just been business as usual for them.

The need for expert project management for ERP implementation in an SME was clearly felt in the case company. Due to a lack of clear project management, there were too many developments occurring in parallel and deliverables were coming in too slow. The morale impact of being unable to deliver “early measures of success” was felt by the interviewees as the project gradually slipped into cycles of patching the ERP when an error occurs (Loh & Koh, 2004:3441). If the SME does not have project management capability, they should consider employing resources so that the implementation project remains within scope. Furthermore, having proper project management will inform internal user expectations. If an individual modification in the tool is beyond the scope of the current project, then the users could work towards changing their work habits to suit the new tool. However, in the absence of project management, it is observed that the users formed false expectations to cope with not knowing when the latest changes would occur. And when their false expectations were not met, it could lead to dissatisfaction and low morale. In short, literature tends to focus on the financial benefit of project management, i.e., timely go-live and controlled project expenditure, but case study shows that the human side of project management is important as well, and SME managers should be attentive in managing their ERP implementation projects for this very reason.
5.1.4. Clear Business Plan & Vision

As mentioned before, the main goal of this ERP implementation project was to unify the lead-to-cash process in QQ within a single system. This business plan for the ERP seemed to have been clearly understood by most of the interviewees. According to the CEO and CFO, the growing complexity of the business as well as its data meant that a better system was needed to manage their business. QQ’s new business model is aimed at increasing its product install base which would generate continuous subscription revenues per install site. For QQ, this meant a major increase in data flow that could not be managed with the old tools and processes. Previous systems required manual data transfers between the software licence management system and the invoicing system to invoice a subscription. This, and other business data needs, meant that a new ERP was needed to execute QQ’s new business plan and vision. Hence, senior management had a clear picture of the company’s business plan and vision for this new ERP.

Having a well-defined business plan also directed the project team in selecting a tool that best met QQ’s needs. While comparing between the different ERP options, the Development Manager and the CPO commented that they selected Odoo because it is open sourced and subscription management was available natively. In addition, Odoo was also an affordable option for QQ. As the leadership team understood that focusing of selling subscriptions would require API (Application Programming Interface) integrations between the license server and the ERP, they selected a tool that gave QQ more freedom in modifications and customisations. However, the CPO said that Odoo turned out to be “surprisingly hobbyist” in that it lacked some enterprise-grade features such as native Two Factor Authentication and technical documentation was sparse across the different modules that QQ took into use. Despite these shortcomings, it was clear that QQ made their ERP systems decision based on the requirements of their new business plan.

Although the business plan was clear to senior management and project team, the internal communication of their business plan appeared to be ineffective as different departments seemed to have understood the goals of this ERP implementation differently. For example, although senior management was convinced that lead-to-cash was the main goal, Sales
thought that it was a quote-to-cash project. The significance of this misunderstanding is that lead management was up till then done in Pipedrive and Sales was quite pleased with its performance and ease of use. So, it came as a surprise when Sales learned that they needed to switch to a new CRM tool within this ERP. According to one of the Sales heads,

“For me, the surprise was that [while] this was an ERP selection, but at the same time we ended up selecting a CRM system as well and that was a wrong choice from my point of view...I didn’t and still don’t understand why we ended up selecting a CRM system since we had a working CRM system.”

Consequently, this misunderstanding of ERP business plan had a negative impact on the management of other CSFs, such as interdepartmental cooperation and change management. While Sales thought that they just needed to advise on a supply-demand planning tool, the project team and senior management were aiming at integrating the CRM system within the supply-demand management tool. This confusion spilled over to the way QQ worked with the external consultants as well. The consultant went as far as to say that almost half of the problems might have been due to misunderstanding of project goals. Hence, it can be observed that although QQ’s business plan for this ERP was clear, internal miscommunication and misalignment dampened the effectiveness of this CSF.

Thus, QQ had a clear business plan for their ERP implementation, and it gave a clear impetus to the project team in selecting the right system for QQ. However, internal miscommunication of these plans might have contributed to Sales’ misunderstanding of the direction of this project, negatively impacting their transition to this new tool as well as interdepartmental cooperation.

Analysing the evidence from the interviews affirms literature’s assertion that clear business plan and vision drives effective ERP implementation (Loh & Koh, 2004; Epizitone & Olugbara, 2020). The case study showed that having a clear business plan not only informed the Development Manager on the vendors to choose but also directed module selection. Moreover, as the ERP project was driven by business needs, it was not relegated to be merely an IT project. The people involved understood that they were making decisions and
developments which will have an impact on the business years into the future. However, literature seemed to have assumed that businesses are a monolith where all the individuals have a collective understanding of the business plan (Somers & Nelson, 2004; Huang et al., 2019). The case study found that, in addition of having a clear business plan, SMEs should work on communicating widely on their business plan and the role of the ERP in this plan. By ensuring that internal users accept the role of the new ERP in their business plan and vision, it reduces the frictions that the SME would face when implementing and rolling out this ERP. Thus, SME managers should focus on careful crafting and the subsequent communicating of their business plan prior and during the implementation of an ERP.

5.1.5. Great Implementation Team

The implementation team at QQ was not fixed throughout the project. It started off only with the Development Manager and when she had to leave the project to head another department, she gradually handed the project over to the CFO and me. The project lead has been working at QQ for over six years as of 2021, mostly in order management and supply chain. As such, she is familiar with the processes that were being moved to the ERP. Along with the CFO, who is one of the most experienced senior personnel at QQ, they are the two most suited people to lead this project. This is in line with the advice given by Somers & Nelson (2004) and Loh & Koh (2004) that the implementation team should consists of the best people within the organisation. However, this team lacked crucial membership from Sales, which are among the main end users of the ERP. The Development Manager believe that:

“it would have been better to have a team with dedicated full days per week allocated to this ERP project, which is approved by senior managers, and these people should be from different departments. They would communicate the project plans to their team.”

Even though the team members understood the Sales processes though not perfectly, they ultimately required the buy-in from the Salespeople for them to fully accept the tool. And in the case of QQ, having a Salesperson as a member of the implementation team would not only inform the direction of the development but also grant legitimacy to this tool in the eyes of other Salespeople. Indeed, the consultant commented that the impact of lacking a
salesperson in the team was felt when comparing the outcome of the fit gap analysis and the actual implementation outcome a year later. Thus, Sales’ absence in QQ’s implementation team, along with their confusion regarding the goal of the project, led to various conflicts and change resistance when the new tool went live in November 2020. While the implementation team at QQ was great by literature’s standard, the team missed key members from other departments who could have made it greater.

This success factor seems to be of moderate importance to the case company because there were underlying issues which affected the effectiveness of their implementation team. While the observations seem to agree with literature in that the team should have a thorough understanding of business processes, literature appeared to have overlooked the need to include key stakeholders in the team (Somers & Nelson, 2004; Saade & Nijher, 2016). For the case company, the absence of salespeople in the team gradually became problematic for the company because project team made decisions during the implementation that did not always made sense to the salespeople, who were the end users of the ERP. While it could be argued that having a steering committee consisting of salespeople would have prevented the problem altogether, the evidence still points to the implementation team making small workflow decisions that did not align with habits of the salespeople. These can appear to be insignificant changes that are beyond the oversight of the steering committee. Hence, the selection of implementation team should be done after careful internal stakeholder analysis to ensure that key people are involved when making ERP process and customisation decisions.

5.1.6. Interdepartmental Communication & Cooperation

As a part of the legacy of its start-up roots, the communication culture at QQ tended to be uncoordinated and dispersed. As a result, it is common to have misunderstandings between different team members working on the same project. Although the teams were tight knit, which facilitated frequent interpersonal communication, coordinated teamwide communication tended to lack discipline. During the interviews, the CEO believed that in general, QQ needed to develop more in its interdepartmental communication.
The lack of mature interdepartmental communication had a real and negative impact on the progress of this project. For example, while the CEO and Sales thought that this project goal was quote-to-cash, the actual objective was instead lead-to-cash as attested by the CFO, CPO, and the Development Manager. It is highly likely that this miscommunication of high-level project goals resulted in internal misunderstanding of the scale and scope of this project, leading to varying levels of commitment towards it. These differing dedication towards the project then presented itself as poor interdepartmental cooperation, especially when people outside the project team do not put this project on an equally high priority.

According to the Logistics Coordinator, the main difficulties that pertain to this project were the interfaces between Finance & Operations and Sales, especially in the beginning when the what’s and how’s were still unclear. The CFO believes that this could be due to the lack of proper definition and documentation for processes in general at QQ. Moreover, Sales were also disappointed in the performance and usability of the CRM tool. This is shows that both the leadership team and project team were unable to manage expectations sufficiently so that key stakeholders would understand to expect and anticipate poorer performance in the beginning while the tools are the refined.

However, as the project matured, the Logistics Coordinator commented that:

“[communication] improved significantly. Sales started to understand the scale of work this implementation is and they understood the validity of other [change] requests. Also, Sales’ requests were taken more seriously by Finance & Operations. In general, mutual understanding improved.”

Although the project has improved interdepartmental communication and cooperation, QQ managed this CSF poorly as can be seen from the degree of confusion that goes across even amongst the key stakeholders.

For an SME similar to the case company, the gravity of this CSF is understated in literature. The lack of clear and constant internal communication seems a major reason for the conflicts that occurred in the case study. For example, the lack of consensus on the lead-to-cash goal
of the project resulted in change resistance from the salespeople. This could have been averted if internal communication were more mature in the case company. Moreover, literature appeared to have missed the importance of this success factor from the very beginning of the ERP implementation project. The results of the case study propose that SMEs should focus on cultivating open and clear interdepartmental communication from the very earliest phase of implementation. This would ensure that the project has the buy-in from key stakeholders from the inception and pre-implementation stage until the post-implementation routinisation phase. As changes to internal communication involve cultivating new habits, SME managers should be consciously and continuously managing this CSF.

5.1.7. BPR & Minimum Customisation

In preparation for this ERP implementation, the Development Manager mapped the generic processes to be transferred to the new ERP. Based on the requirements deduced from process mapping, QQ did a pilot implementation with the chosen consultant and vendor. During this pilot, key processes were trialled and tested by the Development Manager along with members of the Operations and Sales. Based on reports from different departments, the consultants created a fit gap analysis to further develop the tool towards go-live.

Business processes at QQ, especially sales processes, were flexible to cater to its wide variety of business clients. As a result, the Development Manager found it difficult to map and formalise some of the processes. However, the CFO believed that BPR in QQ’s context occurred more in the finer details – “Core processes didn’t change but individual activities changed. There were more details added during the [new] processes.” For example, in the new system Sales had to find out and formally record the delivery addresses into the system instead of delegating the task to Operations when order fulfilment takes place. The sales process did not alter but the individual activities are now done by different individuals and departments.

Contrary to advice from literature, QQ started this ERP implementation project with customisation in mind. A key requirement for this ERP was that it could be customised easily to ease integration with QQ’s customer portal to automate subscription management. Both
the Development Manager and CPO understood and were fully supportive of this customisation. However, there were also mismatches between the tool and QQ’s processes. For instance, lead and quote processes were handled by a single account manager at QQ but in the ERP, the processes were broken into two separate modules. Hence, the processes in the two modules had to be merged to fit QQ’s native sales process. But despite QQ’s international sales presence, there were no region-specific customisation needs.

In short, as the processes at QQ are still being changed to best suit their working environment, the CPO summed up the customisation need neatly:

“this is a discovery process for [QQ] and the consultants, so I’m not too sure how much customisation is truly needed.”

By just familiarising themselves with the new ERP, the users at QQ discovered better ways of working that would further drive customisation of the new ERP. This process seems contradictory to literature, but this gradual learning process appears to work best for an SME where the people define for themselves their best ways of working.

While literature appears to be advocating “vanilla ERP” at all costs, the case company preferred to be driven by business needs rather than to mould their processes around the new ERP (Finney & Corbett, 2007:336). Indeed, the extensive customisations executed by the case company were driven by the need to unify different processes to individual business functions. It may even be argued that there are inherent conflicts between adhering to the company’s business plans and minimising ERP customisations. If the SME managed its clear business plan CSF well, they could very well run into conflict with this success factor. However, as the interviewed consultant claimed, more modern ERPs can be customised without compromising the company’s access to future updates. Thus, while it is important to reengineer processes to be function-based as well as to minimise customisation to control costs, evidence from the case study proposes that the SME should focus more on achieving the business goals with the ERP.
5.1.8. Change Management

The opinions of the interviewees differed significantly regarding the change culture at QQ. The Logistics Coordinator believed that change at QQ has usually been reactive than proactive, and this can be observed from the responses of some of the interviewees. Sales for one felt that too many changes were implemented at the same time and the changes were often chaotic. The interviewed Sales head mentioned a few factors that made this change difficult for him and his team: change in project lead manager, lacklustre project leadership handover and immature ERP solution. Through deeper analysis, Sales’ inertia could be explained by them not understanding the reasons behind the change to a new CRM tool within the new ERP. The Sales head commented that:

“there were quite some dissatisfactions among the sales team because we weren’t sure of the reason for changing from Pipedrive to Odoo for CRM...Management should have listened more to the users and adjusted the tool to fit them so that they would have buy-in to the project.”

On top of this, they were facing challenges in getting sufficient and accurate trainings for this ERP. As the consultants understanding of QQ’s use of the tool improved, they customised the tool more to suit QQ. But in the process of doing this, Sales had to relearn the activities and reformulate their habits to best suit the system. Hence, because of the stepwise incremental improvement of the ERP, the ERP users at QQ had to change reactively which did not improve the overall change culture at the company.

On the other hand, senior management believed that the change culture at QQ was good. The CPO believed that:

“there was always a willingness to change within the company...willingness to try out new things, and when I’ve taken new tools into use, there were little resistance I’ve met with these changes. There might have been complaints, but change was accepted.”
The CFO also believed that “everyone was willing to do their best. We are still learning how to do our best and we understand the objectives of the project.” By synthesising the views of senior management and the other employees, a viable conclusion of the situation at QQ is that there might have been a disconnect between senior managers and the people under them.

However, the project did manage to develop the company change culture as it progressed. In particular, the Logistics Coordinator mentioned that the project had the benefit of aligning views and the purpose of change at QQ. Moreover, the CFO believed that this project “made the people at [QQ] rethink how they want to do things. By adding transparency [to internal processes], it promotes correct processes. People want to do things correctly [from] the first time.” For example, transparency in order intake and revenue data could act as a signal and motivation for the customer support and product management team in developing better solutions for the market.

Another vital aspect of change management at QQ was the training and educational opportunities related to this ERP project. On the one hand, the Logistics Coordinator commented that QQ only recognised the need for training at the later stage of the project. He believed that this was due to the lack of resources to execute training. On the other hand, the CFO and CPO both agreed that it was difficult to conduct trainings especially when the tool was still being customised extensively by the consultants. Nonetheless, all the interviewees agreed that training became more extensive as the change culture matured at QQ. Indeed, the Logistics Coordinator observed that

“this was the biggest change the company had until this point, so the new ERP improved the company’s understanding of change. The project [also] improved the company’s capability to change as it involved almost all departments and functions.”

While it may be assumed that the volatile operating environment of SMEs tend to shape the company so that change comes more easily to them, the case study shows that there is still room for improvement. Literature points rightly to the role of an ERP in injecting discipline to an SME by formalising processes and increasingly transparency (Umble et al., 2003). This was
a challenge for the case company because they were used to having flexible work processes. The need to formalise processes also challenged QQ’s way of working by provoking them to question the definitions for even the simplest entity, i.e., what counts as a customer. Nonetheless, a major lesson from the case study for SMEs implementing an ERP in the process of change management is that of offering user trainings. The implementation team at QQ did not manage to proactively offer user trainings, which hampered user acceptance of their ERP. In contrast, literature emphasised the need for extensive training even from the beginning of the implementation so that the users would be prepared to integrate the new tools and processes into their daily work (Loh & Koh, 2004). However, this study acknowledges that giving user training early on often presents a dilemma to the project team and managers. As the go-live version of the ERP usually differs significantly from its final form, giving early user training could mislead users into developing habits and practices that are not ideal in the last version of the ERP. Therefore, SME managers need to straddle the fine line between giving enough user training without encouraging the users to form permanent habits.

5.1.9. Working Partnership with Vendors & Consultants

For QQ the relationship management between ERP vendors and consultants are simplified as the consultants are also the resellers of the ERP system being implemented. Hence, QQ did not need to manage their relationships with the vendors. However, this did not mean that the process was any easier for QQ. There have been instances of miscommunication and misunderstanding between QQ and the consultants, and this can be attributed both parties throughout this project. Most of the interviewees from QQ complained about the slow turnover or task completion rate from the consultants. Furthermore, they were at times doubtful if the consultants have the capabilities to fulfil the development tasks given to them. For instance, the finance team from the consultants were unable to provide an automation solution for recurring revenue management, which is crucial in the monthly closing processes at QQ. As a result, QQ still had to manually register and book every revenue item that had to be deferred, which was a backward step from the previous accounting solution where this process was already automated.
However, the issues and disappointments that QQ had towards the consultants could be a result of QQ not communicating fully the scale and importance of this implementation. As the consultants were not aware of the complexity of this implementation, they did not budget as much resources as they would otherwise have, leading to longer times between releases and bug fixes. As the Logistics Coordinator pointed out, this was a problem because the ERP tool was being developed alongside its daily use. So, the same problem would be felt throughout the day, which magnified the intensity of the issues for the users. He also felt that work prioritisation of the consultants was not always in accordance with the need at QQ. He attributed it to the lack of communication and mutual understanding between QQ and the consultants. Lastly, the consultants themselves were unable to provide proper documentation for developers and superusers at QQ, which meant that more advanced work needed extensive testing before it could be done on the production server.

Despite these issues, the communication between QQ and the consultants remained open and focused, so much so that the consultant felt that “we are all a team in solving Odoo problems.” According to the CFO and CPO, once the consultants had a better understanding of QQ’s needs, the project became a bigger priority for them. They dedicated more senior resources to offer better working solutions to QQ, thus speeding up development. Indeed, the CPO noted that the implementation for some modules could not be completed if not for the more senior developers that joined the project later. Although the working relationship between QQ and the consultants were riddled with miscommunications earlier in the project, they were able to improve and develop their working relationship so that development and problem solving became more efficient and effective.

Out of all the CSFs, this factor was a surprisingly vital for QQ, because they are fully reliant on the consultants to implement the ERP, develop new functionalities and maintain the ERP’s operations. Thus, literature supports the decision made by QQ to partner with local consultants (Saade & Nijher, 2016; Huang et al., 2019). However, the partnership between QQ and their consultants were marred by miscommunications from the beginning of the project, which impacted the solutions that the consultants were able to deliver. While distance working due to the Covid-19 pandemic might have had negative repercussions on communications, further analysis revealed that the issues faced by QQ and their consultants
were due to them losing sight of the big picture as they were bogged down by minute details of the implementation. The turnaround led by the CFO after he gave to the consultants a full introduction to QQ’s business and operations demonstrated the importance of clear and contextual communication between SMEs and their implementation partners. Therefore, the case study shows that SMEs should carefully manage their working relationship both with the vendors and consultants because SMEs tend to rely more on these stakeholders to successfully implement a working ERP.

5.1.10. Performance Monitoring & Evaluation

Compared to the others, this was the CSF that QQ did the least to manage. This was partially due to the incompleteness of the tool when the interviews were conducted, which prevented a complete analysis of the performance of the new ERP. Indeed, while none of the senior managers were able to pinpoint the monetary benefits of taking this ERP into use, the process and transparency related benefits were felt widely. The eagerness with which different departments had in getting their processes integrated with the new ERP showed that the leaders at QQ recognised its potential in improving internal information flow. In addition, the project team utilised a common slack channel to guide and direct developments. It was used mostly as a platform to collect immediate user feedback on any changes done to the tool as well as to discuss potential upgrades to the current setup. While this arrangement worked at this scale, the CPO believed that QQ could have been more systematic in collecting and handling internal feedback. If QQ were twice as big, using only slack channels would not have been sufficient in keeping feedback coherent.

From the project team’s point of view, there were no clear performance metrics or incentives set by senior management to motivate timely project completion. This could have been due to the start-up culture of the company where the employees have just been expected to contribute to the common good. On the other hand, members of senior management have commented that the project team often gave overly optimistic timeline on the completion of the project. For example, the CEO said that the “usual answer for when things are ready is very soon” even as the schedule kept on slipping. He did however believe that it could also have been due to the project team’s total dependence on the consultants to execute on time.
Thus, QQ did not have a mature attitude towards performance monitoring and evaluation which affected the motivation and effectiveness of the company in timely completion of the project.

The lack of straightforward evidence for the management of this success factor in the case study complicates its analysis and generalisation to wider SMEs. Nonetheless, the benefits proposed by literature indicate that personnel at QQ might have had better morale throughout this project had this CSF been managed actively (Saade & Nijher, 2016). For instance, setting reachable targets and celebrating small wins would have been useful motivation for the project team, while signalling internally the importance of supporting each other through the transition phase. Despite the possible benefits of conducting a post-implementation audit to quantify ROI for ERP adoption, an SME might instead find it easier to focus on determining the procedural benefits of having the new ERP and communicating internally about the issues this new way of working have solved. Doing this would assist SME managers in motivating user routinisation and diffusion of the new practices internally.

5.1.11. Conclusion

In short, the ERP implementation at QQ presented an opportunity to observe the management of these CSFs in the industry. It showed that managers in SMEs are truly constrained by resources as suggested by Finney & Corbett (2007), thus limiting their ability to manage all ten CSFs throughout the project. In the case of QQ, it became clear that they were able to manage well only a few of the CSFs at one time. There were also evidence showing that their failure to effectively manage some of these CSFs impacted other CSFs as well. For example, the lack of convincing top management support and understanding of project importance resulted in poor resource allocation for the implementation team. This negatively affected the ability of the team to plan effective process changes, thus impairing QQ’s change management. On the other hand, once QQ had a clear business plan for their ERP implementation, it paved the way for the implementation team to redesign processes to fit the newly selected tool, thus boosting BPR performance and vendor-consultant working partnership.
The case study has also shown that CSFs can be crucial at more than just one stage of ERP implementation. Top management support and interdepartmental communication & cooperation are two of the CSFs that were relevant for QQ throughout all phases of their implementation. It was the response of internal personnel to QQ’s management of these two CSFs which showed that the CSFs mattered to them from the beginning to the end of the implementation project. Driven by this observation, this thesis now motivates the development of a new dimension to categorise these CSFs.

5.2. Two-Tiered CSF Categorisation

For an SME to successfully manage all ten CSFs concurrently, it will certainly require extensive managerial resources and experience which might not be available to the SME (Umble et al., 2003; Loh & Koh, 2004). In addition, for the scholar venturing to understand ERP implementation CSFs, literature tends to overwhelm the uninitiated with a flood of CSFs due to fellow researchers’ desire to be thorough in analysing the phenomenon. This can be seen from the extensive list of 20-30 CSFs found by key authors such as Finney & Corbett (2007), Ali & Miller (2017) and Mahmood et al. (2020). Without dismissing the comprehensiveness of previous researchers, this study aims to bring simplicity and clarity to this widely ruminated field by proposing a novel classification of the ten studied factors into two separate categories.

This two-tiered classification further develops the work done by Ahmad & Cuenca (2013) whereby they analysed the impacts the CSFs had on each other. They proposed three categories: Basic - “[CSFs] associated to the initial state of the enterprise,” Critical – “CSFs which are impacted by the basic factors, and they have a [notable] impact from others,” and Dependent – “factors which are highly impacted by other CSFs” (ibid., 2013: 108 – 109). Instead of using their classification ad verbatim, this study aims to further distil their findings and provide simple heuristics to SME managers by grouping the CSFs based on its impact on other factors as observed in the case study. Furthermore, this two-tiered CSF classification could benefit researchers seeking to rank CSFs according to their significance in practice.

Tier 1 CSFs are the factors which are not only important on its own, but they augment the effectiveness of other CSFs as well. Tier 2 CSFs, on the other hand, are factors that seem more important in isolation. The findings suggest that Tier 1 CSFs are: Top Management Support,

By carefully managing Tier 1 factors, SME managers would enable themselves to provide the most impact with the least effort. With the case company as an example, when the CFO took over the project, it gave the project more importance in the eyes of the employees, thus motivating more people to dedicate more of their resources to this project. For instance, salespeople were more willing to spend time to improve the ERP and the head of marketing started seeing the potential of this ERP as a customer contact database. By providing better Top Management Support to the project, the case company helped in improving Change Management and Interdepartmental Communication & Cooperation.

Also, having Clear Business Plan & Vision offered a straightforward path for the implementation team throughout the project, which directed them during the BPR and change management process. Driven by a top management-back business plan, the whole company would have a better understanding of the role played by the ERP in the company’s future, thus encouraging proactive internal communication. Moreover, a well-defined business plan for the ERP simplifies the process of target setting for the implementation team and the company, which is a crucial part of Performance Evaluation & Monitoring.

This study acknowledges that the tiering method selected is based on the findings in the case study and suffers from difficulty in generalisation. However, drawing from the experiences of the more senior interviewees who implemented ERPs in the past, the issues faced by the case company were not unique. SME managers facing the overwhelming load of managing ongoing issues while implementing an ERP would benefit by leaning on a distilled list of CSFs.
5.3. Revised CSF Management Framework

This case study has revealed that CSFs should be managed across multiple stages of the implementation in an SME. Moreover, it is highly unlikely that any single CSF is relevant only at an individual stage without showing significance at other stages. This is especially true of Tier 1 CSFs, some of which should be managed across the entire lifecycle of the ERP implementation. Hence, the following revised framework applies the Two-Tiered CSF Categorisation over the three stages of ERP implementation.

![Revised CSF Management Framework Diagram]

**TABLE 3: REVISED FRAMEWORK FOR MANAGING CSFS ACROSS ERP IMPLEMENTATION STAGES**

Compared to the initial conceptual framework, this revised framework reveals a more complicated reality in which SME managers operate. They cannot afford to mismanage the three Tier 1 CSFs throughout the whole ERP implementation project, while needing to create a clear business plan and to set in place expert project management from the beginning of the project. As the go-live date approaches, the need to manage change becomes more
relevant to the whole company. However, an improvement this revised framework offers to
the practitioner is that they can choose to focus on Tier 1 factors with their limited resources
and still have a reasonable chance at a successful ERP implementation. This work also
contributes to the field of ERP implementation CSF studies by synthesising the work of
authors who classified CSFs into implementation stages as well as the authors who ranked
the CSFs according to their general importance.

6. Conclusions

This thesis examined the significance of the CSFs related to the implementation of ERP
systems in the context of SMEs. Having established the complexity of implementing ERP
solutions in SMEs, this study is presented with two research questions, namely: (1) what are
the ERP implementation CSFs and (2) which CSFs are important to SMEs are different ERP
implementation phases.

By synthesising extant works, this study arrived at a list of ten ERP implementation CSFs,
which are relevant across three separate ERP implementation stages. The grouping of CSFs
into three stages are based on their observed importance during the distinct stages of ERP
implementation in literature. It should be noted that reducing the extensive list of CSFs into
merely ten undeniably impact the thoroughness of the literature review. However, the
resulting conciseness and clarity from this synthesis enables more precise observations in the
following case study. Key CSFs in the Pre-Implementation phase were Top Management
Support, Project Champion, Project Management, Clear Business Plan & Vision; CSFs during
the Implementation Phase were Great Implementation Team, Interdepartmental
Communication & Cooperation, BPR & Minimum Customisation, Change Management,
Working Partnership with Vendors & Consultants; Post-implementation CSF was Performance
Monitoring & Evaluation. The findings from the literature review were consolidated to create
a conceptual framework which provided literature-based answers for the two research
questions.

To provide an empirical edge to this thesis, a case study was conducted at a Finnish SME which
was implementing an ERP solution in 2020. Based on a combination of interviews and
observations, the case study analysed the ERP implementation at the case company through the lens of the CSFs established through literature review. The case study revealed that implementing an ERP in an SME can be a time-consuming and chaotic process which demands a focused team of senior managers and highly motivated personnel. This finding not only affirms the weight that authors gave to the Top Management Support CSF but further supports it. In many ways, the progress of the ERP implementation at the case company appeared to react positively to the presence of Top Management Support.

In addition, the case study shows that SMEs need to consider external stakeholder management, i.e., consultants, more than bigger companies due to their greater reliance on external expertise throughout the ERP implementation process. Furthermore, it is found that SMEs should focus on building a cohesive company by focusing on more people-centric CSFs, such as Top Management Support and Interdepartmental Communication & Cooperation, because SMEs can be more reliant on fewer people to implement the required changes during the project. A more united SME would find it easier to accomplish timely ERP implementation and to motivate their people through the transition to new processes. These findings contrast with the suggestions from literature which tended to give these two CSFs supporting roles, as opposed to factors such as Project Champion and Great Implementation Team.

In short, the case study challenged the findings from literature review and brought into question the importance of all the ten CSFs in the context of an SME, as well as the need to manage them all. To provide satisfactory answers to the two research questions that can be applicable in the industry, this study proposes a revised framework which incorporated two-tiered CSFs that should be managed over the three ERP implementation stages. By not limiting a CSF to any single stage, this study presents a solution that better reflects the reality of managing an ERP implementation in an SME. It is hoped that the findings from this thesis can guide and inform SME managers in their ERP implementation project, without labouring them with an unachievable list of factors to manage.
7. Implications: Research & Practice

This thesis contributes to the academia by revisiting and updating the study of CSFs in SME ERP implementations. It has found that the arguments used previously for some CSFs are lacking validity due to more advanced ERP technologies. For example, modern ERPs are more robust towards customisation which means that the significance of this factor could be due to past technological constraints. Moreover, this paper proposes a novel model that categorised CSFs according to their impacts on other factors. This model should motivate other researchers to focus on better understanding the relationships between each CSFs and their business impacts on SMEs implementing ERPs.

For the practitioners, the two-tiered model proposed in this thesis can be beneficial for SME managers to understand fundamental drivers to successful ERP implementations. This approach believes that it is better to manage fewer CSFs effectively than to manage a thorough list of CSFs poorly. The model could be modified according to the practitioner’s understanding of the factors that their company best respond to.

8. Limitations & Suggestions for Future Research

As this research attempts to draw conclusion based on a sole case study, it presents an obvious limitation regarding the generalisability of its findings. The combinations of internal and external properties at the case company would surely predispose them to need better management of certain success factors. For example, a smaller SME consisting of a handful of staffs might find effective interdepartmental communication to be so natural that it does not belong to a Tier 1 CSF, but they might be challenged to form a competent implementation team. Thus, this paper cautions practitioners when taking the findings into use, that they should analyse their own strengths and weaknesses to establish which success factors are more crucial to their ERP implementation project.

The lack of generalisability faced by this study presents an opportunity to the research field. Throughout the literature review, a lack of modern CSF studies of ERP implementation in SMEs can be observed. Most of the research was done around the turn of the millennium. Modern advancements in ERP technology as well as a greater variety of available solutions in
the market would undoubtedly entice more SMEs to obtain their own ERP solutions. Thus, this could be an opportune time for ERP researchers to study ERP implementation in a smaller scale.
6. References


7. Appendices: Interview Questions

Background Questions

1. What is your name & role at this company?
2. What is your role within the ERP implementation?
3. Do you have any prior experiences in ERP implementations?
4. Do you have any prior experience in managing processes?
5. How familiar are you with this company’s processes?

Critical Success Factors-Related Questions

Top Management Support

1. What is the overarching role of senior management during this implementation?
2. How well did senior management support & directed the project?
3. How was the resource allocation throughout the project?
4. What was management’s role in creating a suitable change culture for this ERP implementation?

Project Champion

1. Was there a clear project champion who was driving this project and what was their contribution?
2. (If there was a project champion), how pivotal was this person in marketing the project internally and facilitating transformation?

Project Management

1. How clearly defined were the scope and objectives of this project?
2. Was this project executed on time? And what were the enabling/crippling factors in this?
3. How did this project fare in terms of staying within the budget?
4. Was there a (cross-functional & interdepartmental) steering committee guiding the project?
5. What were the risk management policies & contingency plans for this project?

Clear Business Plan & Vision

1. Were the goals and objectives for this project clear from the beginning and were there any changes during the project?
2. How did the project objectives affect tool and vendor selection? What was the process for tool selection in this regard?
3. How well did the selected tool, vendor & consultants fare compared to selection criteria and expectations?
4. Did management take a more organisational vs operational (technical vs business) view of this ERP project?
5. How well was the project plan communicated throughout the company?

Great Implementation Team

1. How were the project team members selected? Were their business and technical competence important in affecting the outcome of the project?
2. How well did the team members worked with each other?
3. How did senior management empower the team throughout this project, especially with the authority to make decisions?
4. How much of the team's daily resources was dedicated to this project?

Interdepartmental Communication & Cooperation

1. How did this project affect the company's interdepartmental communication and cooperation as compared to before the implementation?
2. How did management encourage open interdepartmental cooperation and communication for this project?
3. How well did the company managed expectations internally during the project?
4. Were there instances of internal miscommunication and what was done to remedy it?

BPR & Minimum Customisation

1. How were the business processes defined and redesigned in preparation for this project?
2. How much conflict was there between the native ERP and the company processes?
3. How willing were the project team to customise the tool to fit the company’s business processes? And were there any examples?
4. Were there regional preferences when it comes to redesigning processes and customising the tool?
5. How much misalignment there was between the tool and the company’s operations? Were these differences recognised and acknowledged early on?

Change Management

1. How strong was the change culture in the company? Did this project improve management’s understanding of change management?
2. How much did the new ERP changed the people, organisation, and culture of the company?
3. Were there extensive training and educational opportunities given to the employees during the project?
4. How effective was the data migration plan and execution?

Working Partnerships with Vendors & Consultants

1. How was the working relationship with the vendors and consultants? Is there anything that you would change about it & why?
2. How did the consultant’s role change throughout the implementation?
3. Were there any benefits from using local consultants?
4. Given the ERP’s software model, were there much assistance provided by the vendor during this implementation?
5. How was the knowledge transfer from the consultants to the employees planned during the project?

Performance Monitoring & Evaluation

1. How did the project team perform relative to the set metrics and milestones?
2. Were there incentives or recognition given to motivate the project team?
3. How well did the project team manage scepticism and resistance during the implementation?
4. Were there mechanisms to collect user feedback and how were these feedbacks used to modify the tool or training?
5. Was the company able to measure the benefits from this ERP implementation?

Closing Questions

1. What have been the main learnings for you throughout this whole project?
2. How did this new ERP change your way of working?
3. If there are three things that you would change about the project, what would they be and why?
4. Do you have any concluding remarks?