



Irving Marlon Reascos Paredes

**Acquisition and implantation of software
in Small and Medium Enterprises (SMEs)**

Universidade do Minho
Escola de Engenharia



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**Acquisition and implantation of software
in Small and Medium Enterprises (SMEs)**

Doctoral Thesis
Information Systems and Technologies Doctorate
Program

Thesis performed under the supervision of
Professor João Álvaro Carvalho

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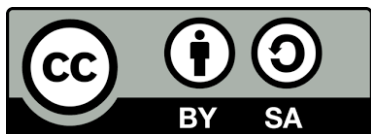
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"Never forget those who supported you and quickly forget those you supported".

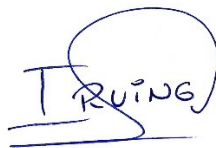
Statement of integrity

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

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Full name: Irving Marlon Reascos Paredes

A handwritten signature in blue ink, appearing to read "IRVING", with a large circular flourish above the letters.

Signature: _____

Resumo

Para as micro, pequenas e médias empresas (PME) é mais fácil comprar e implantar uma EITA já desenvolvida do que tentar desenvolver uma por conta própria. No caso do desenvolvimento de software, existe uma extensa literatura que aborda esse processo; no entanto, no caso do processo de implantação, identificamos que há literatura limitada e ainda mais para processos de implantação de EITAs focados em PMEs. A implantação da EITA não é um problema menor. Trata-se de trazer mudanças para um ambiente estável, redefinir o trabalho, as estruturas sociais e alterar os balanços de poder existentes, mesmo nas PME, cuja dimensão e complexidade reduzidas podem levar à ideia de um processo simples de implantação. No entanto, na prática, o risco de falha é alto. Devido a isso e às habilidades e recursos limitados das PME, ainda existem altas taxas de fracasso no processo de implantação da EITA nas PME.

O objetivo da investigação foi desenvolver suporte metodológico ao processo de implantação de EITAs em PME. Esse processo inclui a pesquisa, avaliação, seleção de EITA disponíveis comercialmente, sua aquisição, instalação e exploração.

A investigação abrange duas fases. Na primeira fase, realizamos uma extensa revisão da literatura, um estudo de caso exploratório e um estudo de campo, no qual foram realizadas 48 entrevistas com diferentes atores envolvidos no processo de implantação da EITA na PME. Para a segunda fase, usamos o paradigma Design Science Research (DSR).

O resultado obtido na primeira fase é um framework para o sucesso da implantação da EITA nas PME - o SImplE. O framework considera três aspectos principais: i) atores envolvidos; ii). um modelo de processo que considera as fases e sua subdivisão em estágios, preocupações transversais e áreas de foco; iii) fatores que influenciam o sucesso de um processo de implantação. O framework SImplE enfatiza os principais aspectos que uma PME deve considerar antes, durante e após a implantação de uma EITA, privilegiando a perspectiva da PME. A estrutura também pode ser útil para os outros atores (desenvolvedores de software, fornecedores de EITA e outras organizações de suporte). Embora criada como um modelo descritivo, o framework SImplE é uma base sólida para um modelo prescritivo a ser usado em projetos de implantação de EITA em PMEs. Na segunda fase da pesquisa, propomos um artefato que complementa o componente de gerenciamento de mudanças da metodologia de implantação Primavera.

Como conclusões, descobrimos que as motivações e dificuldades são de natureza organizacional, e não de tecnologia, como é frequentemente assumido e tratado. Os processos de negócios são uma questão vital na implantação da EITA nas PME; no entanto, como as PMEs raramente formalizam seus processos, o framework contribui para tornar os processos visíveis e conduzir as PME através do ajuste entre o processo comercial e as funcionalidades fornecidas pela EITA. Áreas de interesse transversais (liderança, comunicação, gerenciamento de projetos e gerenciamento de mudanças) e áreas de foco (pessoas e processos) devem ser abordadas em conjunto para alcançar uma melhor implantação.

Palavras chave: CRM, EITA, ERP, implantação, SImplE framework, SME.

Abstract

For micro, small and medium-sized enterprise (SME), it is easier to buy and implant an already developed EITA than to try to build one on their own. In the case of software development, there is an extensive literature that addresses this process. However, in the case of the implantation process, we identify that there is limited literature and even more so for processes of implantation of EITAs focused on SMEs. Implanting EITA is not a minor issue. It is about bringing change to a stable setting, redefining work, social structures and altering existing power balances, even in SME, whose reduced dimension and complexity might lead to the idea of a simple implantation process. Nevertheless, in practice, the risk of failure is high. Due to this and the limited skills and resources of SMEs, there are still high failure rates in the process of implanting the EITA in SMEs.

The objective of the research is to develop methodological support to the implantation process of EITAs in SME. This process includes the search, evaluation, selection of commercially available EITA, its acquisition, installation, and exploitation.

The research encompasses two phases. For the first phase, we performed an extensive literature review, an exploratory case study and a field study, in which we did forty-eight interviews with different actors involved in the process of implantation of EITA in the SME. For the second phase, we use the paradigm Design Science Research (DSR).

The result obtained in the first phase is a framework for the successful implantation of EITA in SMEs - the SImplE. The framework considers three main aspects: Actors involved; A process model that considers phases and their subdivision in stages, cross-cutting concerns, and areas of focus; Factors that influence the success of an implantation process. The SImplE framework emphasises the main aspects an SME should consider before, during and after the implantation of an EITA privileging the perspective of the SME. The framework can also be useful for the other actors (software developers, the EITA providers and other support organisations). Although created as a descriptive model, the SImplE framework is a strong basis for a prescriptive model to be used in EITA implantation projects in SMEs. In the second phase of the research, we propose an artefact that complements the change management component of the Primavera implantation methodology.

As conclusions, we find that the motivations and difficulties are of organisational nature, instead of technology as it is frequently assumed and treated. Business processes are a vital issue in EITA implantation in SMEs; however, as SMEs seldom formalise their processes, the framework contributes to make the processes visible and to lead the SME through the adjustment between the business process and the functionalities provided by the EITA. Cross-cutting areas of interest (leadership, communication, project management, and change management) and focus areas (people and processes) should be addressed together to achieve better implementation.

Keywords: CRM, EITA, ERP, implantation, SImplE framework, SME.

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Abbreviations and acronyms

ACL	Action Centred Leadership
BPM	Business Process Management
BPR	Business Process Re-engineering
CEO	Chief Executive Officer
CIO	Chief Information Officer
CM	Content Management
COTS	Commercial Off The Shelf
CRM	Customer Relationship Management
CSF	Critical Success Factors
DBMS	Data Base Management System
DM	Document Management
DSR	Design Science Research
DSRP	Design Science Research Process
EITA	Enterprise Information Technology Application
ERP	Enterprise Resource Planning
IS	Information Systems
IT	Information Technology
MIP	Metodologia Implementação Primavera
OUM	Oracle Unified Method
PBSS	Primavera Business Software Solution
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
POS	Point of Sales
RFP	Request for proposals
RUSP	Ready to Use Software Product
SaaS	Software as a Service
SCM	Supply Chain Management
SIMPLE	Simple Implantation of EITA in SME
SERVQUAL	Service Quality
SME	Small and Media Enterprise
SQL	Structured Query Language

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PART 1

Chapter 1

1. Introduction

At present, it is easier for micro, small and medium-sized enterprise (SME) to buy and implant an already developed Enterprise Information Technology Application (EITA) than to try to develop one on its own. Also, due to its nature, the SME does not have enough resources and competencies for both cases: developing software or addressing the process of implanting a business application.

In the case of software development, there is an extensive literature that addresses this process. However, in the second case (the implantation process), we identify that there is limited literature and even more so for processes of implantation of business applications focused on SMEs.

We must be aware that this process is complex: It begins with recognising the need to systematise specific tasks of the enterprise. Subsequently, the search, evaluation, selection and contracting of the EITA and its provider are carried out. Next, the implantation team introduces the EITA; this causes a series of changes in the enterprise's structure, processes, and personnel. Finally, once the EITA is operational, it starts a continuous conservation phase.

Therefore, the gap we detect is the lack of methodologies focused on SMEs that guide the process of implanting the EITA. Due to this and the limited skills and resources of SMEs, there are still high failure rates in the process of implanting the EITA (Ahmad & Cuenca, 2013; Nguyen et al., 2015; Nofal & Yusof, 2016; Ramdani et al., 2013; Reicher et al., 2015; Zeng et al., 2017).

This research is about this issue. To try to give answers, we will work in two phases. The first phase proposes a model that describes the process of implanting EITA in SMEs; the second phase proposes change management guidelines to be integrated into the Primavera Implementation Methodology (MIP)¹.

This introductory chapter is organised as follows: First, it begins with a preface in which it describes in a general way how SMEs access to EITA and the difficulties they have in the process of implanting an EITA in the enterprise. Next, we describe the study problem. Then we raise the research

¹ We will use the original abbreviation MIP - Metodologia de Implementação da PRIMAVERA - (PBSS, 2017)

objectives and research questions. Subsequently, we explain the research approach to use. Finally, we justify the relevance of this investigation.

1.1 Context – EITA implantation in SME

In times past, when one enterprise wanted to use computers to support its operational or managerial activities, there was no alternative to start a tailor-made software development project. Producing the software product itself was then the critical problem in the process of reaching computer support to enterprise activities. The importance of having the software being appropriately used by the enterprise's personnel and achieving the expected benefits from its use was obfuscated by the challenge of identifying the right business and organisational requirements and building a computer application that adequately fit those requirements. For this reason, only large companies could access this type of technology, especially due to the high costs that software development represents.

Nowadays, the challenge for enterprises is no longer to produce software to satisfy their needs (except when it wants to obtain competitive advantages) but to search in the market for a software product ready to be used, it means, to find an EITA that meets their requirements. The fundamental problem now is how to select and successfully implant an EITA in the enterprise, to use it as quickly as possible and obtain the expected benefits.

The selection and implantation of EITA have its difficulties and demands specific competences to be accomplished successfully. The phenomenon attracted attention from researchers who addressed aspects such as the readiness of SME, search, evaluation, and selection of EITA, decision support for EITA implantation, the factors that condition its success, among the main. Most of the existing studies, however, focus on large companies, that can afford expending significant resources in the process and can secure the necessary IT capabilities. The implantation of EITA in SME has been studied to a lesser extent.

It can be argued that, due to the reduced dimension of SME, the complexity of the implantation of EITA in these types of enterprises is minor, and, therefore, potential problems in the implantation process are of little significance. Such position neglects the fact that SME account for most of the enterprises in any economic sector. Furthermore, SME lacks IT capabilities (Reicher et al., 2015; Seethamraju, 2014; Zeng et al., 2017) crucial to the successful execution of implantation processes, even those an at a small scale.

Implanting EITA is not a minor issue. It is about bringing change to a stable setting, redefining work and social structures and altering existing power balances, even in SME, whose reduced dimension and complexity might lead to the idea of a simple implantation process, but in practice, the risk of failure is high (Ramos et al., 2005). The impact of such failures in the economy can be considerable if we take into consideration the number of SME, including micro-enterprises.

Also, there is an additional drawback; it is that all types of enterprises underestimate the process of software implantation. It is not recognised that this process has difficulties and requires specific competencies; it should also be considered that SMEs have limited resources.

For the reasons mentioned above, projects to implant EITA in SME have a high percentage of failure (Ahmad & Cuenca, 2013; Nguyen et al., 2015; Nofal & Yusof, 2016; Ramdani et al., 2013; Reicher et al., 2015; Zeng et al., 2017). Besides, the literature review has allowed categorizing the causes of failure in three groups: Technological, Organisational and Environment, according to the TOE Framework (DePietro et al., 1990).

Among the leading technological causes, the following can be highlighted: heterogeneous and incompatible infrastructure (Douglas et al., 2010); few capabilities and technological competences of SMEs (Ahmadi et al., 2013; Nguyen et al., 2015; Seethamraju, 2014); the complexity of EITA (Equey & Fragnière, 2008); fit and customisation in the enterprise and poor data quality and security (Sahran et al., 2010; Shaul & Tauber, 2012).

The main organisational causes are: poor leadership (Shaul & Tauber, 2012); low strategic planning (Reicher et al., 2015); direct and indirect costs are poorly estimated (Jha et al., 2008); errors in the initial stages scale to the following (Hustad & Olsen, 2013); a deficiency in the structure of the organisation and informal processes (Čelar et al., 2011; Leyh, 2014; Reicher et al., 2015); lack of required resources (knowledge, skills, finance, management, time) (Johansson et al., 2013; Nguyen et al., 2015; Salim, 2013); deficiencies in management (projects, change, risk) (Deltour, 2012); the selection de software package (EITA) and implantation are difficult (Hustad & Olsen, 2013); neglecting social aspects such as user resistance (Hustad & Olsen, 2011; Shaul & Tauber, 2012); informal communication (Hustad & Olsen, 2013; Sahran et al., 2010); inadequate training and preparation of end users (Deltour, 2012; Ghobakhloo et al., 2012; Hustad & Olsen, 2013; Shaul & Tauber, 2012).

The main causes of the environment are: changing government regulations (Alshawi et al., 2011; Li et al., 2012; Salim, 2013; Seethamraju, 2014); constants market pressures (Alshawi et al., 2011;

Serrano et al., 2010; Shahawai & Idrus, 2010; Shaul & Tauber, 2012), the difficulty of accessing to external EITA and external consultants that fit the organisation (Sahran et al., 2010; Sia, 2008).

It should also be considered that due to the many differences between SMEs and large firms, several authors have argued that techniques and models from large firms do not apply to SMEs (Johansson et al., 2013; Leyh, 2014). Also, few models of strategy for large firms were applicable to small firms. Furthermore, small businesses need different organisational theory (Cragg et al., 2011; Ramdani et al., 2013).

To mitigate this inconvenience, software development enterprises have created their methodologies for the implantation of EITA; examples include SAP Activate (SAP, 2018b), Microsoft Dynamics Sure Step (Microsoft, 2012), Oracle Unified Method (Oracle, 2016). These methodologies primarily focus on large enterprises but need to be adapted when applied in SMEs. There are also other methodologies aimed at small and medium enterprises such as the Primavera Implementation Methodology – MIP - (PBSS, 2017).

From an academic perspective there are frameworks that approach the problem in a more specific way towards SMEs such as frameworks to support decision making in the implantation of ERP in SMEs (Blackwell et al., 2006; Xie et al., 2014); frameworks to be used in the pre-implantation phase (Ahmadi et al., 2013; Hidayanto et al., 2013; Jebreen et al., 2013); frameworks to select the EITA (Ganapathy & Raju, 2008); theoretical or conceptual frameworks (Awa & Ojiabo, 2016; Nofal & Yusof, 2016; Olupot & Kituyi, 2013; Ramdani et al., 2013; Saedi, 2016), and frameworks that address the implantation from a more comprehensive perspective (Fu, 2010; Sahran et al., 2010; Xia et al., 2010).

One of the main problems is that the frameworks for the EITA implantation developed by software producers are more oriented to large companies, are not available to the public and have a consulting perspective. From the academic side, some frameworks only cover parts of the implantation process of EITA, they do not cover the whole process, and those that exist are very elementary. Besides, the existing frameworks are oriented to be used from the point of view of the supplier - consultant and not from the perspective of the SME. Also, the models do not describe completely the stages that should be carried out by the SME and by the consultant/provider.

1.2 Problem – lack of methodological support to EITA implantation in SME

The general problem addressed in this thesis is the lack of methodological support that SMEs have when they want to implant an EITA in the enterprise.

For this research, we divide the process of implanting the EITA in the SME into three phases: pre-implantation, implantation, and post-implantation. The pre-implantation phase begins with a definition of needs and finishes with a selection of the EITA and its provider. Implantation phase begins with preparing the company to receive the EITA and ends with the software running in the enterprise. Post-implantation phase focused on providing technical support to EITA, and its continuous operation.

On the other hand, as explained in the previous section, SMEs still have many problems when implanting an EITA. Besides, there is no general model to describe the entire implantation process, those that exist are mainly concentrated in the first phase such as the preparation of the enterprise, frameworks for decision support for EITA implanting, the selection of the EITA and the consultant, among others. There are also some theoretical models based on the TOE framework, that provide the main success factors that should be considered when implanting the EITA.

Also, to solve this problem, software producers have developed their methodologies, which focus on solving their own problems. These methodologies are not very useful for SMEs mainly because they have a focus for large companies and have stages that are not interesting for SMEs, for example, the EITA sales process. Moreover, these methodologies lack steps that are important for the SMEs. For example, a stage that addresses the search, evaluation, and selection of the EITA.

For the reasons given, the research problem is the lack of methodological support that SMEs have when they want to implant an EITA in the enterprise, that is, the lack of an EITA implantation process for SMEs. To try solve this problem, in the first moment, it will be necessary to understand the entire implantation process of the EITA in the three phases (pre-implantation, implantation and post-implantation); and in a second moment should propose partial solutions to improve the process of implanting of the EITA in the SME.

1.3 Objective and research questions

The objective of the research is to develop methodological support to the implantation of EITAs in SME. This support must be suitable to a wide range of situations faced by enterprises with little information technology (IT) capabilities and limited financial resources when getting involved in processes that include the search, evaluation, selection of commercially available EITA, its acquisition, installation, and exploitation.

To meet the overall objective, we have worked with two specific objectives:

- **Specific objective 1:** Develop a descriptive model of the EITA implantation process for SMEs.

This objective can be expressed in a set of research questions:

Why does the SME implant an EITA?; What are the motivations for an SME to implant an EITA?; What are the main difficulties SMEs face when implanting EITAs?; What are the main factors to the success of an EITA implantation process in SMEs?; What are the main activities of an EITA implantation process in SMEs?

- **Specific objective 2:** Develop artefacts to address change management in the context of EITA implantation in SMEs to be incorporated into the MIP.

1.4 Research approach

The research encompasses two phases. The first phase aims at a better understanding of the implantation of commercially available EITA in SME. The second phase aims to produce design knowledge of relevance for those involved in the implantation of EITA in SME.

To conduct this research in the first phase, we use a qualitative approach since this type of research is used to understanding issues or situations by investigating the perspectives and behaviour of the people in these situations and the context within which they act. For this, qualitative research is conducted in natural settings and uses data in the form of words rather than numbers. Qualitative data are gathered primarily from observations, interviews, and documents, and are analysed by a variety of systematic techniques. This approach is useful in understanding causal processes, and in facilitating action based on the research results. Qualitative methods are primarily inductive (Kaplan & Maxwell, 2005)

This phase started with an extensive literature review; next we conducted an exploratory case study in an SME that recently went through the implantation of a new EITA. Then, with the knowledge, we performed a field study, in which we did forty-eight interviews with different actors involved in the process of implantation of business applications in the SME.

For the second phase, we followed a design science research (DSR) process. This phase aimed at creating prescriptive knowledge supported in the experience produced during the first phase and on the literature. Thus, it can be described as applied research. Furthermore, in this phase, we addressed a problem identified by the consulting division of Primavera Business Software Solution (PBSS): the need to develop the change management dimension of their methodology for the implantation of their EITA - MIP.

1.5 Relevance

To justify the development of this project is necessary to emphasise that in Europe, micro, small and medium enterprises (SMEs) correspond to 99.8% of existing enterprises, of which micro covers 92.8%, small ones 6% and medium ones 1% (European Union, 2003). Most of the research done in this field, are oriented to large enterprises and a lesser extent to medium-sized companies, which is why there are considerable research gaps still in micro and small enterprises.

Also, we must consider that the percentage of failures in the implantation of EITA in SMEs is still very high (Ahmad & Cuenca, 2013; Nguyen et al., 2015; Nofal & Yusof, 2016; Ramdani et al., 2013; Zeng et al., 2017), and if we consider that SMEs are 99.8% of enterprises, we can say that the costs involved in these failures are very high.

On the other hand, it is necessary to emphasise that there are no global solutions for this problem. We can find partial solutions to this issue such as the selection of software, the preparation of SMEs or critical success factors (CSF) frameworks, among others. It is also necessary to recognise that there is a lack or isolated scientific knowledge for these repeated failures in organisations because the field of information systems is relatively new, and there is little accumulated knowledge.

It is essential to recognise that there are many investigations regarding the implantation of the EITA in SMEs, especially in ERP. However, usually approaches focus on particular problems, failing to address, in a holistic way, all the acquisition and EITA implantation process.

1.6 Thesis outline

This thesis consists of nine chapters organised into five parts (cf. Figure 1-1): **Part 1** - covers the first three chapters: 1. Introduction, 2. Adoption of enterprise IT applications in SMEs, and 3. Influence factors in EITA implantation; **Part 2** - contains chapter 4 (Research design); **Part 3** - includes chapter 5 (Exploratory case study – The northern Ecuador car dealer), chapter 6 (Field study – motivations, difficulties, facilitators and actors involved in EITA implantation) and chapter 7 (Framework SlmpIE – Simple Implantation of EITA in SME); **Part 4** - has chapter 8 (Change management. A proposal for enhancing MIP – Metodologia de Implementação Primavera); and **Part 5** - contains chapter 9 (Conclusions).

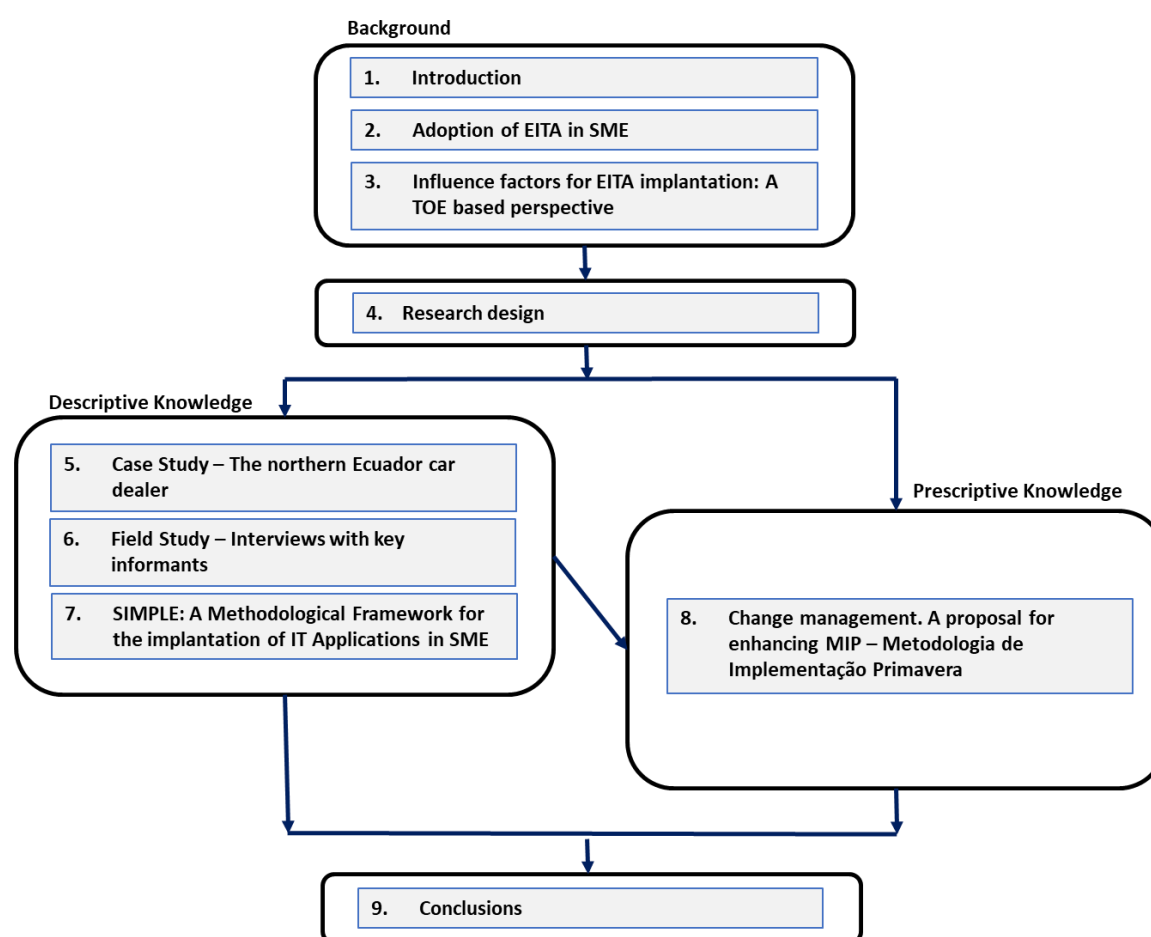


Figure 1-1: The structure of the thesis

In this chapter, we present to the reader, an overview of the matter to be treated. This overview consists of the preface, the study problem, research questions, research approach, and relevance. The first chapter terminates with a synopsis of the thesis structure.

Chapter 2: Adoption the Enterprise IT Applications in SME. In this chapter, we review the main concepts dealt during this investigation; this allows us to frame and limit the terms that we employ in this document. For this, we start with the characterisation of the SME in the European Union; we continue presenting the concept of Enterprise IT Application (EITA), later we focus on justifying the use of the term implantation instead of implementation. Next, we discuss the different ways of adopting an EITA in the SME; we continue describing a series of terms that are used (especially by the industry) in the process of implanting an EITA in the SMEs. Finally, we detail the actors involved in the process of implanting an EITA in the SME and identify the main contributions in this issue from industry and academia.

Chapter 3: Influence factors in EITA implantation: A TOE based perspective. One of the first actions carried out in this research was to conduct a literature review to try to understand the factors that influence in the process of implanting an EITA in the SME. This chapter describes this review, starts by explaining the methodology used then presents the factors and sub-factors that were found. They are classified according to the Technology, Organisational and Environment – TOE - framework. Finally, we present the main influence factors to consider when implanting an EITA in a SME.

Chapter 4: Research design. For the design of the research, we began by reviewing two theories related to technology in enterprises (Delone and McLean IS success model and TOE framework). Later we raise the research questions and the research approach to use. Next, we describe the research methods to be used in the descriptive phase and later in the prescriptive phase.

Chapter 5: Case study – The Northern Ecuador car dealer. We conducted an case study in a medium-sized company that is dedicated to the sale and after-sale of vehicles. This case study is the starting point to understand the process of implanting of EITA in SMEs.

Chapter 6: Field study – Motivations, difficulties, facilitators, and actors involved in EITA implantation. This study consists of conducting interviews with the stakeholders involved in the process of implanting an EITA in SME. In total, we conducted forty-eight interviews that included different stakeholders that participate in EITA implantation processes in SMEs. Two results were obtained from the field study: the first allows to identify the motivations, difficulties, facilitators, and actors involved in the process of implanting an EITA in SMEs (covered in this chapter), and the second result was the SIMPLE Framework discussed in the next chapter.

Chapter 7: Framework Simple – Simple Implantation of EITA in SME. The SIMPLE framework was obtained through a field study and describes how SMEs are currently facing the implantation of an EITA in SMEs, encompasses three components: i) actors that may be involved in an implantation project (software developer, provider -software & management consultant- and support organisations). ii) process model and areas of concern (three phases - pre-implantation, implantation, post-implantation; cross-cutting areas of concern - leadership, communication, change management and project management; areas of focus - persons and process); and iii) Influence factors that stimulate the success of the EITA implantation process.

Chapter 8: Change Management. A proposal for enhancing MIP. This chapter presents a model for change management obtained from the field study; below is an overview of the Primavera implementation methodology (MIP) and its change management component. With this background, using DSR process proposed by Peffers, a change management artefact was developed, an extension to the MIP methodology. The main aspects of this artefact are four diagnostic instruments to characterise the EITA users.

Chapter 9: Conclusions. Finally, we present the conclusions, limitations and for future research.

Chapter 2

2. Adoption of Enterprise IT Applications in SMEs.

This chapter attempts to clarify terminology and definition of scope. In this chapter, we review the main concepts that we use during this research. This allows us to frame and limit the terms that we employ in this document. For this, in the first part, we started with the characterisation of the SME in the European Union, we continue describing the concept of Enterprise IT Application (EITA), later we focus on justifying the use of the term implantation instead of implementation. These three concepts will be used frequently in this document.

In the second part, we discuss the different ways of adopting an EITA in the SME (build, buy, rent). We continue describing a series of terms that are used (especially by the industry) in the process of implanting an EITA in the SMEs, among which we have: type of implantation, type of technology, implantation scenarios, implantation strategies, and implantation categories.

In the third part, we detail the actors involved in the process of implanting an EITA in the SME and identify the main contributions in this issue from industry and academia.

2.1 Micro, Small and Medium Enterprise

2.1.1 Classification of enterprises

In 2003 the European Commission published a document (2003/361/EC) concerning the definition of micro, small and medium-sized enterprises (European Union, 2003). Currently, almost every document produced in the European Union refers to this document to define the concept of SMEs.

Enterprise

An enterprise is considered to be any entity engaged in economic activity, irrespective of its legal form. This includes self-employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in economic activity. Staff headcount and financial ceilings determine enterprise categories (cf. Table 2-1).

- The medium-sized enterprise's category encompasses companies which employ fewer than two hundred fifty persons and which have an annual turnover not exceeding EUR 50 million, and-or an annual balance sheet total not exceeding EUR 43 million.
- A small enterprise is defined as an enterprise which employs fewer than fifty persons and whose annual turnover and-or annual balance sheet total does not exceed EUR 10 million.
- A micro-enterprise is defined as an enterprise which employs fewer than ten persons and whose annual turnover and-or annual balance sheet total does not exceed EUR 2 million.

Table 2-1: Enterprise category (adapted from European Union, 2003)

Enterprise category	Headcount: Annual Work Unit(AWU)	Annual turnover	or	Annual balance sheet total
Medium	<250	<= € 50 million	or	<= € 43 million
Small	<50	<= € 10 million	or	<= € 10 million
Micro	<10	<= € 2 million	or	<= € 2 million

Micro, small and medium-sized enterprises (SMEs) play a significant role in the European economy. They are a significant source of entrepreneurial skills, innovation, and employment.

Another relevant fact that justifies the importance of SMEs in the European Union is the number of enterprises that exist by size: micro-enterprises account for 92.8% of enterprises, small-enterprises account for 6.0%, and medium-enterprises account for only 1.0% (Muller et al., 2016).

Figure 2-1 uses a “deformed” pyramid for presenting the distribution of enterprises by category, according to the criteria defined by the European Union. Micro, small, and medium enterprises (MSMEs) constitute more than 99% of all companies in the European Union. The distortion introduced in the pyramid is not enough to provide an exact proportion of MSME in the economy. Thus, the importance of paying attention to these enterprises and to their difficulties.

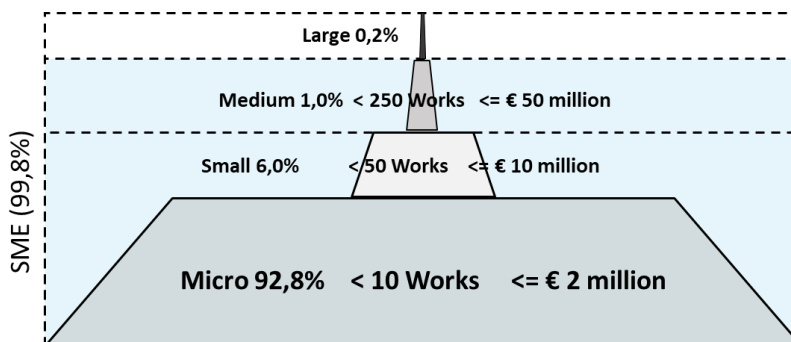


Figure 2-1: SMEs in Europe (adapted from Muller et al., 2016)

2.1.2 SME Characteristics

Ghobadian and Gallear identified 39 differences in 6 categories between large enterprises and SMEs. The main categories are structure, procedures, behaviour, processes, people, and contacts (Ghobadian & Gallear, 1997). Table 2-2 include those differences.

Table 2-2: Characteristics large Enterprise versus SME (adapted from Ghobadian & Gallear, 1997)

Large Enterprises		SMEs	
Structure			
L1	Hierarchical with several layers of Management.	S1	Flat with very few layers of management.
L2	The clear and extensive functional division of activities. A high degree of specialisation	S2	Division of activities limited and unclear. Low degree of specialisation.
L3	Rigid structure and information flow.	S3	Flexible structure and information flow.
L4	Top management a long distance away from the point of delivery.	S4	Top management close to the point of delivery.
L5	Top management's visibility limited	S5	Top management highly visible
L6	Multi-sited and possibly multinational.	S6	Single-sited.
L7	Many interests group.	S7	Very few interest groups.
L8	Normally slow response to environmental changes.	S8	Normally rapid response to environmental changes.
L9	Low incidence of innovativeness.	S9	High incidence of innovativeness.
L10	Cultural diversity culture.	S10	Unified culture.
Procedures			
L11	Activities and operations governed by formal rules and procedures. A high degree of standardisation and formalisation.	S11	Activities and operations not governed by formal rules and procedures. Low degree of standardisation and formalisation.
L12	System-dominated.	S12	People-dominated.
L13	Rigid and unadaptable processes.	S13	Flexible and adaptable processes.
L14	Incidence of fact-based decision making more prevalent.	S14	Incidence of "gut feeling" decisions more prevalent.
L15	Fragmented decision-makers.	S15	Few decision-makers.
Behaviour			
L16	Mostly bureaucratic.	S16	Mostly organic.
L17	Strong departmental/functional mind-set.	S17	Absence of departmental/functional mindset. Corporate mind-set.
L18	Cultural inertia.	S18	Fluid culture.
L19	Meritocratic.	S19	Patronage.
L20	Rigid corporate culture dominating operations and behaviours.	S20	Operations and behaviour of employees influenced by owners'/managers' ethos and outlook.
Processes			
L21	Extended decision-making chain.	S21	Short decision-making chain.
L22	Complex planning and control system	S22	Simple planning and control system.
L23	Strategic process is generally deliberate and formal.	S23	Strategic process incremental and Heuristic.

Large Enterprises		SMEs	
L24	Formal evaluation, control and reporting procedures.	S24	Informal evaluation, control and reporting procedures.
L25	Control-oriented.	S25	Result-oriented.
People			
L26	Personal authority mainly low.	S26	Personal authority is mainly high.
L27	Dominated by professionals and Technocrats.	S27	It is dominated by pioneers and entrepreneurs.
L28	Range of management styles: directive, participative, paternal, etc.	S28	Range of management styles: directive, paternal.
L29	Individuals usually cannot see the results of their endeavours.	S29	Individuals usually can see the results of their endeavours.
L30	Ample human capital, financial resources and know-how.	S30	Modest human capital, financial resources, and know-how.
L31	Training and staff development is more likely to be planned and large scale.	S31	Training and staff development is more likely to be ad hoc and small scale.
L32	Specified training budget.	S32	No specified training budgets.
L33	High incidence of unionization.	S33	Low incidence of unionization.
L34	High degree of resistance to change.	S34	Negligible resistance to change.
L35	Potentially many internal change catalysts.	S35	Very few internal change catalysts.
Contact			
L36	Wide span of activities.	S36	Span of activities narrow.
L37	Extensive external contacts.	S37	Limited external contacts.
L38	Greater scope for an extended customer base.	S38	Normally dependent on a small customer base.
L39	Large customer base.	S39	Limited customer base.

Table 2-2 shows that in most cases, large companies and SME occupy opposite positions. We make this clarification because the existing literature (academic and practitioners) to address this issue focuses mainly on large companies. It is not surprising that the methodologies or processes that exist for large companies are hardly the adapts to micro and small businesses (Alshawi et al., 2011; Caldeira & Ward, 2002; Derzy, 2010; G. Buonanno et al., 2005; Johansson et al., 2013; Kale et al., 2010; Leyh, 2014; Serrano et al., 2010; Shahawai & Idrus, 2011; Zach, 2011; Zach & Munkvold, 2011). Under certain circumstances, they might suit a medium-sized enterprise.

In this thesis, we are going to focus attention on micro, small and medium enterprises, because these companies need special attention.

2.2 Enterprise IT Applications (EITA)

Along with the evolution of IT usage in enterprises, there was a dramatic change from tailor-made to ready-to-use software products. Nowadays, there is a wide offer of ready-to-use enterprise applications of

IT (EITA) addressing most company areas. Examples include products such as Point-of-Sales (POS), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Supply Chain Management (SCM), Content Management (CM), Document Management (DM), among others.

There are no official names for these products as they can appear in many configurations, providing a wide variety of arrangements of functionality. Nevertheless, those designations are widely used in the IT market. ERP products are a case particularly compelling as they assure the essential functions of an enterprise. The ERP process business transactions, support the general ledger of an enterprise, hold a great deal of the enterprise's business records and execute a wide range of operational and managerial actions upon business information.

Also, we acknowledge that some key terms used in this thesis do not follow the customary terminology. We are using "EITA" – an acronym for Enterprise IT Application – to refer to IT artefacts utilised in the realisation of enterprise functions. Although the term "IT application" is widely used, the term "information system - IS" is also a common designation. We avoid its use as the designations are also used to refer to a perspective on an enterprise that addresses information processing encompassing not only IT artefacts but also humans and social elements. The term "EITA" adds the reference to the context in which IT applications are to be studied.

EITA can be obtained through several diverse ways – e.g., purchase, renting, licensing – and run either on in-house servers or on hosting services. Software-as-a-Service (SaaS) is becoming an increasingly common way for enterprises to get access to commercially available enterprise applications. These trend towards Software-as-a-Service only reinforces the movement towards the use of ready to use EITA – being Commercial-Off-The-Shelf (COTS) products and Ready to Use Software Product (RUSP) two designations found in the literature for these type of software packages

SMEs are a natural client of ready-to-use enterprise IT applications. Several reasons may be presented to explain this preference. First, the cost. It is no surprise that the cost of an EITA that addresses the essential needs of enterprises is lower than the cost of a tailor-made enterprise application (Daneshgar et al., 2013). Furthermore, a ready-to-use EITA embraces good practices of the enterprises, thus providing to any enterprise up-to-date support to generic business functions. This might be true even for specific industrial areas, as long as enterprises do not look for competitive advantages in the information processing domain.

Besides, in recent years the supply of EITA and the sectors that demand these applications has increased significantly. For this reason, in this thesis, we are concerned with EITA implantation in SME.

Although EITA can also be obtained through a tailor-made approach, in this thesis we are particularly interested in situations where EITA are obtained as COTS/RUSP

In short, when we talk about EITA, we refer to software products for enterprises; that can be obtained in the market in different contracting modalities, and that are ready to be installed, configured, and used.

2.3 EITA implantation – definitions and used terms

2.3.1 Implantation vs implementation

The use of the term implementation is ambiguous. For professionals whose background is computer field, the term implementation is most often used to refer to the development or production of software, and in recent times it is also used to describe the process of the start-up (deploy) of a software artefact.

Initially, the companies that planned to incorporate software to improve their processes in the company carried out the complete cycle of software development, which in its generic version consists of analysing, designing, building, testing and putting into operation the software developed in the business. When software development was in this state, many authors, especially in the area of software engineering, interchangeably used the term *implementation* to explain the stage of software construction or development.

Later, when the software industry begins to mature, software producers start to emerge in the market, offering commercial software ready to be used by enterprises, that is, companies no longer need to perform the complete software production cycle. Instead, they can search the market for a software package that suits their needs, buy it, install it, adapt it and put it into operation in the enterprise, and this model is also called *implementation*.

This ambiguity often confused in the same way, both professionals in computer science and related fields, as well as entrepreneurs who want to automate their business with the use of COTS or Enterprise IT Application.

For example, Ian Sommerville (Sommerville, 2015), one of the leading authors of Software Engineering books, also has difficulties with this ambiguity. So, describing the stages of the software

engineering process (Software specification, software development, software validation and software evolution), he has doubts in the second stage. In the eighth and tenth edition, he names as *software development*, and in the ninth edition, he defines it as *software design and implementation*. However, regardless of the edition, when developing the topic explains how the *design and implementation* of the software.

Below are some examples of the term *implementation*, used in the sense of software development or construction:

“Software design and implementation is the stage in the software engineering process at which an executable software system is developed. Software design is a creative activity in which you identify software components and their relationships, based on a customer’s requirements. Implementations are the process of realising the design as a program”. (Sommerville, 2015)

“Implementation. Models are translated into source code”. (Pressman, 2015) *In Agile Unified Process.*

“Implementation Phase: It refers to the realisation of business requirements and design specifications into a concrete executable program, database, website, or software component through programming and deployment. This phase is where the real code is written and compiled into an operational application, and where the database and text files are created. In other words, it is the process of converting the whole requirements and blueprints into a production environment”. (Bassil, 2012)

“The phase in the software life-cycle where the actual software is implemented. The result of this phase consists of source code, together with documentation to make the code more readable.” (Meas, 2008).

“The process of translating a design into hardware components, software components, or both. The result of the process. (IEEE Standard Glossary of Software Engineering Terminology, 1990)

Then, we presented the use of the term *implementation* used in the sense of putting an Information System or an Enterprise IT Application running in an enterprise.

“Implementation refers to all organisational activities working toward the adoption, management, and routinization of innovation, such as a new information system. In the implementation process, the systems analyst is a change agent. The analyst not only develops technical solutions but also redefines the configurations, interactions, job activities, and power relationships of various organisational groups.” (Laudon & Laudon, 2016)

To try to resolve this ambiguity, in this document we propose to use the term *“Implantation”* of a computing device in analogy to the word used in medicine, where it is used as the action of inserting a *device* or tissue in a human body.

Following this analogy of medicine, when an implant is going to be made, it is necessary to find the right *“device”*, the one that best suits the needs of the receptor. Next or in parallel, the doctor should

create the necessary conditions in the receptor to receive the new *device*. The implantation should be carried out following the protocols established for effect. Once the *device* is implanted, it should be avoided that the recipient rejects it, for which, in the case of medicine, immunosuppressants are administered, in order that the *device* is accepted in the recipient. It is necessary to emphasise that all this process of *implantation* must be carried out by specialised professionals in the respective area.

With this background, we will define the term *implantation* of an Enterprise IT Application as the action of inserting a software ready to be used in the enterprise, to optimise and automate the processes of the company. For the implantation to be successful, it must be carried out by professionals in the area, who know the software product and the processes that the software product support.

The generic steps that the process of implantation the software artefact should have are preparation, search, evaluation, selection, personalisation, information loading, testing, training, start-up, support and updating.

Also, we recognise that the use of the term “implantation” is unconventional in the IS community. At least in the Anglo-Saxon influenced space, where “implementation” is the most used term to refer to the situation where an EITA is put in use in an enterprise. Nevertheless, it should be noted that in the Spanish and French languages, the term “implantation” (implantación - Spanish, implantation - French) is often used as a synonym of implementation.

Once we have explained the term "implantation", we will use this term (implantation) in this thesis. We will use the term "implementation" only when we refer to a particular author or methodology.

2.3.2 Reasons and benefits for the use of EITA in SMEs

Among the main reasons for implementing the EITA in SMEs, in the literature, we identify the following:

- *Get competitive advantage* (Ferney & Bell, 2005; Johansson & Sudzina, 2009; Li et al., 2012; Nguyen et al., 2012; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Seethamraju, 2014; Serrano et al., 2010);
- *Replacement of legacy system* (Hallikainen et al., 2002; Hustad & Olsen, 2011; Kale et al., 2010; Zach, 2011; Zach & Munkvold, 2011; Zach & Olsen, 2011);
- *Cost-saving* (Hallikainen et al., 2002; Johansson & Sudzina, 2009; Sousa, 2007);
- *Expansion the enterprise or grown* (Čelar et al., 2011; Leyh, 2014; Sousa, 2007);

- *Customer demands* (Johansson & Sudzina, 2009; Sousa, 2007);
- *Improved productivity* (Johansson & Sudzina, 2009; Leyh, 2014);
- *Need to integrate existing system* (Čelar et al., 2011; Kale et al., 2010);
- *Improved communication* (Kale et al., 2010; Zach, 2011).

Sousa (Sousa, 2007), presents a list of benefits of an ERP (Table 2-3). The benefits he presents are consistent with those explained previously.

Table 2-3: ERP benefits (adapted from Sousa, 2007)

Operational	Cost reduction
	Cycle time reduction
	productivity improvement
	Quality improvement
	Customer services improvement
Managerial	Better resource management
	Improved decision making and planning
	Performance improvement
Strategic	Support business growth
	Support business alliance
	Build business innovations
	Build cost leadership
	Generate product differentiation
	Build external linkages
IT Infrastructure	Build business flexibility for current and future changes
	IT costs reduction
	Increased IT infrastructure capability
Organisational	Support organisational changes
	Facilitate business learning
	Empowerment
	Built common visions

Other authors also report tangible benefits (such as visibility, accuracy and control, best practice, integrated processes, reduction of inventory) and intangible benefits (such as optimal use of resources, better information, transparency) (Hallikainen et al., 2002; Kale et al., 2010; Seethamraju, 2014; Zach, 2011).

2.3.3 Build, Buy or Rent

When an SME begins the preparations for the implantation of the software, sooner or later, the question arises: "*Is it better to develop a tailor-made application or obtained a ready-to-use EITA (buy or rent)?*". In this section, the advantages, and disadvantages of each of these options are analysed.

The main **advantages** of acquiring an EITA are (Berg, 2008; D. T. Bourgeois, 2014; Frankel, 1984; Mendix, 2020):

- *Immediate availability.* It does not imply the long waiting time associated with custom development software.
- *Visible, known cost.* The price for the EITA is the quoted price, with no hidden expenses.
- *Lower cost.* The cost is typically much lower than the cost of custom development; this applies to purchase, implantation, training, and maintenance cost as well; the price is cheaper because software producers distribute the value of the software product for several companies.
- *Documentation.* Software comes with user documentation, which can be studied before purchase.
- *Reliability.* In most cases, the software has been well tested as it has been used by other organisations.
- *The support.* The vendor provides support to the product; the SME can use this support instead of creating its own support to its users.
- *Upgrades provided.* The vendor will offer periodically improved versions of the product; the cost of an upgrade of the system will be lower.
- *More stable industrial base.* The vendor operates on a wide commercial market; the vendor more likely to remain in business.
- *Facilities innovation from small business/academia.* Intense competition in the commercial marketplace causes suppliers to actively seek technology that will differentiate their product from the others.

Commercial-off the-shelf (COTS) / EITA has **disadvantages** as well, and these are (Berg, 2008; Frankel, 1984):

- *Inappropriate application.* The functionality of the software does not fit perfectly with the functional needs of the SMEs.

- **Vendor reliability.** It is essential when selecting a package to ensure that the vendor is well established and committed to the product.
- **Conversion.** A problem that can occur with the installation of a software package is an underestimation of the magnitude of adjustment to the conversion or transition of the enterprise.
- **User acceptance.** Although COTS may appear to management as the best fit, lower-level staff members might need to alter significant their work routines; most commercially available packages allow some flexibility in functional definitions; however, users be aware that changes in current procedures might be required, sometimes, because of the change of routine, staff members will openly exhibit resentment and hostility to the new procedures. One way to avoid resistance is to provide a proper introduction to the capabilities of the software package, emphasizing on improved and eliminating tedious tasks.

Some authors recommend buying software due to low costs, compared to development, as well as when working with standard tasks regulated by governments, such as accounting, billing, among others (Daneshgar et al., 2013; Harrell et al., 2001). Buying software, in current times is inevitable, as competitive pressures will eventually push most enterprises to change their ways of works to good organisational practices. COTS-EITA acquisition is often the more realistic option for SMEs (Daneshgar et al., 2013).

On the other hand, it is suggested to develop software when an enterprise' strategy relies on some novel IT application that is expected to provide a differentiation that will lead to a competitive advantage. Being a novel application, it is not available as COTS.

At present, also it should be considered that software delivery models are evolving to Software as Service (SaaS). In this model, firms use applications owned and maintained by software vendors, based on a pay-for-use model, instead of buying a software license (Li et al., 2012). The SaaS model has lower initial and operating costs, as cloud-based systems significantly reduce initial expenses related to hardware, licenses and implementation compared to other traditional models, which generally involve a high start-up cost (Zadeh et al., 2018)

Relative to the on-premise model, the SaaS environment delivers more freedom to the customer to change provider or exit if the solution or service is not satisfactory. In order to continue service provision and business, SaaS vendors are required to innovate and improve the product and service delivery

continuously; through efficient backups, software updates, contingency plans, disaster recovery plans and security updates (Seethamraju, 2014).

Another option that SMEs have is using free EITA; these applications are developed and maintained by software communities that allow the free use of their products. This type of EITA provides generic functionality and are an alternative to paid or rented software. Free does not mean zero cost, because it may be necessary to hire consultants for the implantation.

2.3.4 EITA hosting models

A vital factor to consider when implanting an enterprise IT application is to reflect on where the EITA will be located when in operations. There are two possibilities: at home "*on-premise*", away from home in "*on-demand*".

On-premise

In this scenario, EITA is located at the company's facilities and managed by its employees. The On-premise hosting model is usually associated with enterprises that do not want to trust their information to external entities.

On-demand

In this hosting model, EITA is located outside the enterprise in the facilities of a provider of hosting services. Usually, these services are offered by the provider of the EITA. This type of offer is attractive both for the company that acquires the EITA as well as for its provider. On the one hand, the client quickly accesses an EITA avoiding the acquisition of an IT infrastructure and on the side, the provider simplifies the support and maintenance tasks associated with the EITA. This hosting model is acceptable when there on good telecommunications connections.

2.3.5 Type of platforms

Software developer companies offer EITA in a wide variety of platforms such as client-server, Software as a Service (SaaS) and mobile. Each of these has its advantages and disadvantages and that SMEs should consider when choosing one or another platform.

Client-Server.

The enterprise client-server applications usually use a central server where the information of the organisation is stored. For access to this information, client applications installed on the personal computers of the end-users are used. The biggest problem of a client-server installation is that specific programs must be installed on the "client" computers to access the information and applications that reside on the server.

Advantages

- Users are familiar with these types of applications.
- Applications deploy faster.

Disadvantages

- A client application must be installed on each computer.
- Updates to the client application are for each computer.

Also, Web applications are the evolution of client-server applications, but they follow the same concept. In web applications, users use a web browser (Windows Internet Explorer, Firefox, Chrome, among others) to access the application and data. Users do not need to install additional software. This is what is called a thin client, and the advantages are apparent. The problem with Web applications is the user interface and the user experience. Undoubtedly, it is much easier to use a Client-Server application than a web application, although in recent years the quality of web systems has improved significantly.

Software as a Service (SaaS)

Software as a Service (SaaS) refers to applications, services, and data storage on the Internet. These service providers rely on giant server farms and massive storage devices that are connected via Internet protocols. SaaS is the use of these services by individuals and organisations (Bourgeois, D., 2014). These services are usually accessed through web browsers.

Advantages

- No software to install or upgrades to maintain.
- Available from any computer that has access to the Internet.

- Can scale to many users quickly.
- New applications can be up and running very quickly.
- Companies can lease services for a limited time, as needed.
- The information is not lost if a hard disk fails or due to the loss of a computer.

Disadvantages

- Enterprise information is stored on someone else's computer; this raises safety concerns.
- The company needs to have access to the Internet with good bandwidth.
- The company depends on a third party to obtain these services.

Mobile

Just as with the personal computer, mobile devices such as tablet computers and smartphones also have operating systems and application software. These mobile devices are in many ways, just smaller versions of personal computers. A mobile app is a software application programmed to run correctly on a mobile device.

These days, most mobile devices run on one of two operating systems: Android or iOS. As organisations consider making their digital presence compatible with mobile devices, they will have to decide whether to build a mobile app.

Mobile cloud computing is a fundamental mobile technology since it combines the advantages of the integration of both "cloud" and mobile computing to provide the best services for mobile users. There are many applications supported by mobile cloud computing, including mobile commerce, mobile banking, mobile learning, and mobile healthcare and other areas (Alzahrani et al., 2014).

2.4 Implantation categories

The implantation categories are related to the level of adaptation of the EITA to the work structure of the organisation, especially aspects related to the business processes. In this document, we will consider Motiwalla's proposal, which defines three Implantation categories: Comprehensive, middle of the road, and Vanilla (Motiwalla & Thompson, 2011; Nagpal et al., 2015; Parr & Shanks, 2000).

Comprehensive or chocolate.

This category represents the most ambitious implantation approach, involves implantation of the full functionality of the EITA. In this kind of implantation, significant customisation activity takes place, and most of the functionality of the EITA are attuned to the business processes of the organisation. This requires the business process re-engineering and EITA modification (Motiwalla & Thompson, 2011; Nagpal et al., 2015).

Vanilla.

It is an implantation plan in which no modifications are made to the EITA. This implantation process is undertaken when time and money are a significant constraint, utilises core functionality and exploits the best practice business processes built into the software. Here, business process re-engineering is eliminated. *“This decision essentially is a decision to align company processes to the ERP rather than modify the ERP to reflect unique business processes”* (Motiwalla & Thompson, 2011; Nagpal et al., 2015).

Middle of the road.

This plan is, as the name suggests, mid-way between *Comprehensive* and *Vanilla* implantation. In this implantation care is taken to have the least customisation, with the view that majority of the business processes that come bundled with the EITA are already best in market benchmarked processes. Thus, most of the processes are implanted as-is with a few of them being customised to the specific requirements of the enterprise. In this case, Business Process Reengineer (BPR) takes an important place wherein some of the existing organisation's business processes will have to be attuned to the EITA's business processes (Motiwalla & Thompson, 2011; Nagpal et al., 2015).

2.5 Transition / conversion approaches

These transition techniques should consider that in some companies, there are already EITAs being used. A new EITA system will replace an existing system, referred to as the legacy system. The legacy system may be an older generation of an EITA, a failed EITA, or inclusive, only a manual or paper-based system. The transition / conversion approach refer to the way an enterprise moves the its current situation (using or not an EITA) to the situation where a new EITA is available (Malhotra & Temponi, 2010; Motiwalla & Thompson, 2011).

The following is a brief explanation of the transition / conversion approach that can be used when to implanting an EITA. Figure 2-2 illustrate these approaches.

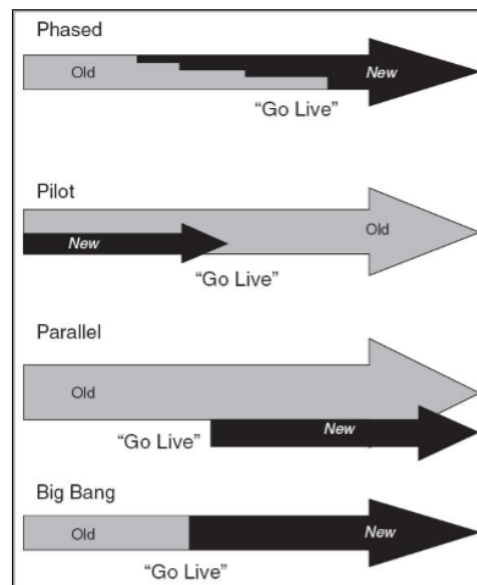


Figure 2-2: Main EITA implantation approach (adapted from Motiwalla & Thompson, 2011)

Phased

The phased approach involves implanting modules in a phased manner, such that core modules are implanted first followed by peripheral modules. This takes advantage of the high cohesive modularity and loose coupling between ERP modules (Nagpal et al., 2015). Different functions of the new application are implanted in phases, adding functionality as the phases are implanted. In the phased implantation, different functions of the new application are used as functions from the old system are turned off. This approach allows an organisation to slowly move from one system to another (Bourgeois, D., et al., 2019)

Pilot

A subset of the enterprise starts using the new EITA before the rest of the company. A subset of the organisation (called a pilot group) starts using the new EITA before the rest of the enterprise. This has a smaller impact on the company and allows the support team to focus on a smaller group of individuals (Bourgeois D., et al., 2019)

Parallel

The parallel involves working with the two EITAs (the new and the old) in parallel for a limited period, the advantage of this strategy is that the possible errors can be corrected in time and the

disadvantage is that for the end-user it represents double work. This method is the least risky because the old system is still being used while the new system is necessarily being tested (Motiwalla & Thompson, 2011).

This is the most expensive strategy since work is duplicated, and support is needed for both systems in full.

Big bang or Direct cutover

This implies implanting all modules in one go, maybe at a pilot site or all sites (Mabert et al., 2003; Nagpal et al., 2015; Nordin & Adegoke, 2015). In the direct-cutover implantation approach, the enterprise selects a date that the old system is not going to be used anymore. On that date, the users begin using the new EITA and the old EITA become unavailable. The advantages of using this approach are that it is speedy and the least expensive. However, this method is riskier. If the new EITA has an operational problem or if the users are not adequately prepared, it could prove disastrous for the enterprise (Bourgeois D., et al., 2019).

Mini Big-Bang

In this strategy, a sub-set of modules of the EITA is implanted all at one time (Mabert et al., 2003).

Hybrid

A hybrid approach is one that combine two or more approaches.

2.6 Players involved in the implantation of EITA in SMEs

The implantation of enterprise applications in SMEs typically involves more than the two evident players: the software-house (software developer) that produces the EITA and the company that implants it. Other players include resellers of the EITA and facilitators who help the enterprise and the software provider to implant the applications. Figure 2-3 depicts these players and their relationships. In this figure, we can see two essential components for the implantation of an EITA in SMEs: Management and IT capabilities. We also appreciate that these capabilities are more robust on the left side, that is, on the side of software producing companies, and as we move to the right, these capabilities are decreasing.

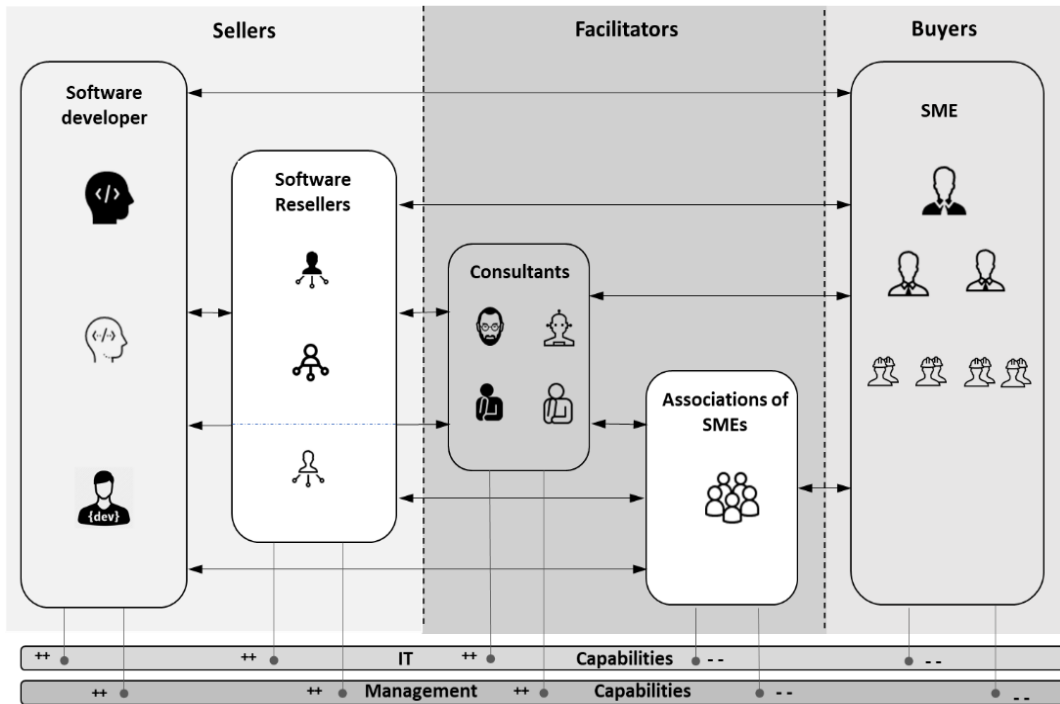


Figure 2-3: Players involved in the implantation the Enterprise IT Applications in SME

Below, we present a brief description of each player involved.

Software developer or software producer

The enterprise that develops the EITA; these companies cover the entire life cycle of the software, from the taking of requirements, design, construction, testing and on certain occasions, the implantation of their product. These producers frequently specialize in a specific product in order to improve the quality of the software. It is usual for software producers to recruit business partners to expand their market.

Software resellers

Software resellers are enterprises that sell EITA. These companies act on behalf of software developer companies. However, they may sell products from different software developers, even from competitors. In many situations involving SMEs, in addition to selling the EITA, resellers support the implantation process by providing both IT-related and management capabilities.

Consultants

Consultants provide services that involve IT and-or managerial capabilities; the consultants can act hired by the buying SME, the selling entity or both. Like software developers, consultants can specialise for specific market sectors.

SME

The SME that buys the EITA and that goes through the implantation process.

Associations of SMEs

The SME associations can play an important role in the adoption of EITA. Considering the small dimension of the buying enterprises, their typical deficit in IT and managerial capabilities and the cost of the EITA. Associations of SME can develop efforts to find solutions that suit their members and negotiate prices and conditions for a set of enterprises that will be more favourable than for a situation involving just one buying enterprise. Associations of SME can also negotiate advantageous terms for the involvement of consultants; this is particularly interesting in cases where the SME are from one same economic sector.

Figure 2-3 illustrates how SMEs can access an EITA and the variants that may exist. It should be considered that in this market segment, software producers may also be SMEs. Below we explain the main variants to buy an EITA:

- The SME buys the EITA directly from the producer
- The SME buys the EITA through a distributor or reseller
- The SME buys the EITA through consultants who work for the distributor
- The SME buys the EITA through consultants who work for the producer
- The SME buys the EITA through SME Associations. These associations may maintain contact with the EITA producer, distributor, or consultants.
- Consultants can play two roles: the first and most common occurs when they respond to the business goals of the software producer or distributor; the second role when it responds to the business objectives of the SME.

2.7 Implantation of EITA – contributions from the academy

In academic literature, we find some frameworks or models that guide the process of implantation of EITA, these frameworks have been classified according to the area they are trying to cover, so in this way, we have the following:

2.7.1 Frameworks addressing the pre-implantation phase

For this phase, we have found seven academic articles that propose to support SMEs in the processes of preparing, searching, evaluating, and selecting an EITA. We have classified these articles as follows: preparation frameworks, decision support frameworks, selection frameworks and requirements frameworks. Table 2-4 shows a summary of these frameworks.

Table 2-4: Academic articles that address the pre-implantation phase

Phase		Article	Contribution
Pre-implantation	Frameworks for readiness	Framework for Measuring ERP Implementation Readiness in Small and Medium Enterprise (SME): A Case Study in Software Developer Company (Hidayanto et al., 2013).	Provides guidelines for assessing the characteristics of the level of readiness at all levels of sub-factors, compiled by adapting guidance of the Control Objective for Information and Related Technology (COBIT).
		Strategic Framework for Achieving Readiness in Organisations to Implement an ERP System (Ahmadi et al., 2013).	this framework gives a general picture to companies' decision-makers about their readiness to implant an ERP system and consists of three strategic issues: Technical, Organisational and Social aspects.
	Frameworks for support decision making	A practical decision-support framework for implementing enterprise information systems within SMEs (Blackwell et al., 2006).	This framework helps SMEs decide the EITA that should be selected, considering different factors such as business problems, integration needs, the definition of roles, evaluation of vendors, purchase, or integration of EITA, among others.
		An integrated decision support system for ERP implementation in SME (Xie et al., 2014).	DSS_ERP serves as a useful tool for SMEs to predict the required resources and allocate them before ERP implantation, which maximises the probability of achieving predetermined targets.
	Selection of EITA	A framework for Enterprise resource planning system selection by small and medium enterprises (Ganapathy & Raju, 2008).	This paper presents the selection procedure used by six SMEs and proposes a systematic approach to ERP acquisition that SMEs can adopt to ensure that the ERP system selected offers a better fit to their requirements.
		Exploring the ERP pre-implementation process in a small-and-medium-sized enterprise: a case study of a Norwegian retail company (Hustad & Olsen, 2011).	The planning and information search processes. The selection, evaluation, and choice processes. The negotiation processes.

Phase		Article	Contribution
	Requirements	Packaged Software Implementation Requirements Engineering by Small Software Enterprises (Jebreen et al., 2013).	A theoretical model explaining the requirements engineering process for EITA implantation. This process should help to identify misalignments between users' needs and EITA functionalities.

2.7.2 Success factors for EITA implantation

There are also theoretical models that generally explain the main success factors based on the TOE framework (cf. Table 2-5)

Table 2-5: Academic articles that cover theoretical frameworks based on the TOE framework

Phase		Article	Contribution
Theoretical frameworks	Based on the TOE framework	A model of adoption determinants of ERP within T-O-E framework (Awa & Ojiabo, 2016).	This paper contributes to and-or extends adoption knowledge by proposing a 12-factor model of ERP adoption from the T-O-E framework.
		Cloud Computing Adoption Framework: Innovation Translation Approach (Saedi, 2016).	An integrated theoretical framework for adoption of cloud computing by SMEs influenced by TOE and Actor-Network Theory (ANT).
		Pre-Considered Factors Affecting ERP System Adoption in Malaysian SMEs using a Technology-Organisation-Environment Framework (Shahawai & Idrus, 2010).	Pre-considered factors affecting ERP system adoption in Malaysian SMEs based on the TOE framework. The authors propose that these pre-considered factors are the key elements in order to comprehend the cause that contributes to ERP adoption among Malaysian SMEs.
		SMEs' adoption of enterprise applications. A technology-organisation-environment model (Ramdani et al., 2013).	Results indicate that technology, organisation, and environment contexts impact SMEs' adoption of EITA. This suggests that the TOE model is indeed a robust tool to predict the adoption of EITA by SMEs.
		Success Factors for Implementing ERP in SMEs in India: A Conceptual Model (Saini et al., 2010).	This model has three categories: Organisational, technological and people factors.
		Taxonomy framework of ERP success usage in SMEs in the middle east region (Nofal & Yusof, 2016).	This study seeks to develop a taxonomic framework of ERP success usage, which identified five interrelated variables for ERP success. These are an organisational dimension, process dimension, technological dimension, people dimension, and ERP success usage.

Phase	Article	Contribution
	The adoption of techno-relationship innovations. A framework for electronic customer relationship management (Sophonthummapharn, 2009)	The study proposes a comprehensive research model for examining the adoption of techno-relationship innovations. The model covers 20 factors from individual, technological, organisational, and environmental contexts.

2.7.3 Process models and methods for the implantation of EITA

In addition to the models mentioned above, we also find more general frameworks or models, which try to cover the entire implantation process (cf. Table 2-6).

Table 2-6: Academic articles that cover process models and methods for EITA implantation

Phase	Article	Contribution
Holistic Frameworks	A Methodology for Successful Implementation of ERP in Smaller Companies (Xia et al., 2010).	Roadmap for ERP Implantation divided into four stages: Readiness assessment, BPR, EITA selection, and implementation. This has a more comprehensive view of the implantation process.
	Development of a Generic Procedure Model for the Enterprise Resource Planning Implementation in Small and Medium Enterprises (Fu, 2010).	ERP implantation procedure models based in four components: EITA, business process, business data and project. This model tries to cover the entire implantation process, and each component involves a variety of states when implanting the EITA.
	ERP Implementation Challenges in Small and Medium Enterprise: a Framework and Case Study (Sahran et al., 2010).	Conceptual Framework. This is one of the most detailed that exists and covers the three major phases (Pre-implantation, implantation, and post-implantation). Its weakness is that it is based on a single case study; also, the article does not support enough empirical evidence of how this model was made.
	Implementing Best Practices in ERP for Small & Medium Enterprises (Jha et al., 2008).	Systematic & Holistic Steps defined for Sustainable ERP Project (Selection) and Key Factors for SME's Strategic ERP Implementation. This model is more focused on the pre-implementation phase.
	Rescuing Small and Medium-sized Enterprises from Inefficient Information Systems – a Multi-disciplinary Method for ERP System Requirements Engineering (Vilpola et al., 2007).	Customer-centred EITA Implantation (C-CEI), this method is based on the combination of operational, contextual and risk analyses. These three phases together give the complete requirements for a new EITA system, its implantation and context of use.

Phase	Article	Contribution
	SMEs implementing an industry-specific ERP model using a case study approach (Wu et al., 2006).	An IS implantation model was proposed after studying the four cases and conducting a literature review. This model includes the following key points: senior management's support and participation, recognition of ERP, professional ERP products, the establishment of a common understanding among all employees, process reengineering, and the system operation model.
	Soft Systems Methodology in IT Project Management: Implementing CRM in SMEs. (Lockett et al., 2006).	Soft systems methodology covers the implantation phase. It is divided into four project phases: Project planning & definition, system configuration, system testing and training, and go-live support & review. Also, these phases have ten project milestones and a cross-cutting stage (project management & communication).

2.8 Implantation of EITA – contributions from the industry

In recent years, the software industry has grown. Nowadays it is possible to find an EITA in the market for all types of companies and their different areas. Now the difficulty is not in the development of the EITA customised to the company. These days the difficulty is in implanting the EITA correctly in the time and budget assigned for that.

For this reason, software development companies and consulting firms are developing their software implantation methodologies, which they use in their implantation projects. These methodologies are, however, proprietors and access to them is difficult. Furthermore, these methodologies are focused on the perspective of the implanter and not from the perspective of the SME.

Below is a table with a list of methodologies that can serve as a reference, but access to the content of each of them is difficult, precisely because these are methodologies proprietaries. For this reason, there is little documentation about these, and the description provided is limited.

Table 2-7: Frameworks or methodology the software development enterprise

Num.	Methodology or framework	Reference
1	Microsoft Dynamics Sure Step	(Microsoft, 2012, 2018)
2	Oracle Unified Method - OUM	(Armstrong, 2016; Oracle, 2016)

Num.	Methodology or framework	Reference
3	SAP Activate	(<i>Activate - SAP S/4HANA Deployment & Implementation</i> , 2016; SAP, 2018b)
4	Methodology Implementation Primavera - MIP	(PBSS, 2017)
5	Accenture Delivery Methods	(<i>Accenture</i> , 2012)
6	PeopleSoft's Compass Methodology	(<i>Levergent</i> , 2010)
7	Techlogix CSX Methodology	(<i>Techlogix</i> , 2016)
8	Deloitte Enterprise Value Delivery (EVD)	(<i>Deloitte</i> , 2017), page 7
9	Macroscopic Methodology (Fujitsu)	(<i>Fujitsu</i> , 2018)
10	IDEAL Implementation (SYSPRO)	(<i>Corpdev</i> , 2018)
11	IFS Implementation Methodology	(IFS, 2017)
12	Infor Deployment Method	(Infor, 2014)
13	Sage Inxion	(<i>Inxion</i> , 2016)
14	Best practices for Effective ERP Implementation	(Ultra-Consultants, 2013)
15	IBM Cognos Solutions Implementation Methodology	(<i>IBM Knowledge Center - Cognos Solutions Implementation Methodology (CSIM)</i> , 2009)
16	Odoo Implementation Methodology	(Odoo, 2016, 2017)

In the following sections, we will describe four proprietary methodologies: Microsoft Dynamics Sure Step, Oracle Unified Method (OUM), SAP Activate Methodology, and Methodology of Implementation Primavera (MIP). It is necessary to indicate that it has not been possible to obtain updated information on these methodologies (except for MIP), because they are private. For this reason, we have used publicly accessible information through official websites of the companies that own these methodologies.

2.8.1 Microsoft Dynamics Sure Step Methodology

Microsoft Dynamics Sure Step is a comprehensive implantation methodology that provides prescriptive guidance, project management library, tools, and templates that Microsoft partners can use to implant Microsoft Dynamics products for their customers. It covers from the diagnostic phase even when we are in the sale stage until all the execution and post-operation (maintenance).

Microsoft Dynamics Sure Step Methodology is encompassing in three groups of activities: *Solution envisioning*, *solution Implementation & upgrade* and *solution optimisation*. It considers two transversal axes that are the libraries and the roles. The libraries have two areas that are *project management library* and *organisational change management library*. The roles are grouped into two types: consultants and customer. Figure 2-4 depicts the image used to provide the big picture of Microsoft dynamics sure step methodology.

The **solution envisioning** includes the diagnostic phase and a set of decision accelerator offerings, which are proposed to assist the customer make decisions related to the process of implanting a Microsoft Dynamics solution.

The strength of the methodology is in the **solution implantation & upgrade** group, which consists of 5 phases: *analysis*, *design*, *development*, *deployment*, and *operation*. Besides, the methodology considers five different projects types that can be used in the implantation: standard, rapid, enterprise, agile and upgrade. It also has cross-phase processes, which can be at the level of organisation, solution, and technology.

The **solution optimisation** offerings are designed to help reduce risk and improve customer satisfaction for complex blended engagements that include consultants from several partners.

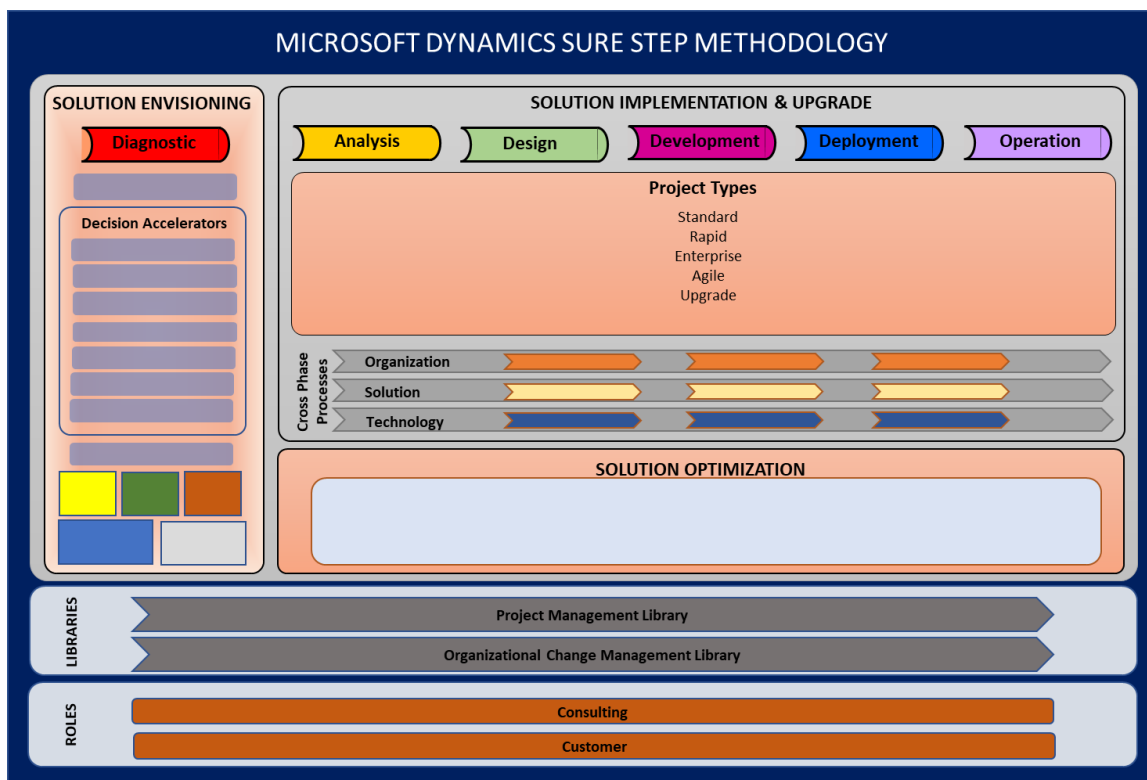


Figure 2-4: Conceptual Microsoft Dynamics Sure Step Methodology (adapted from Microsoft, 2012)

Each phase of the methodology encompasses several tasks, which are presented in Table 2-8.

Table 2-8: Main tasks carried out in each phase of the Sure Step methodology.

Phase	Tasks during phase
Diagnostic	<ul style="list-style-type: none"> Evaluate a customer's business processes and infrastructure. Assist the customer with their due diligence cycle, including ascertaining requirements and their fit with the solution, and assessing the resource needs for the solution delivery. Prepare the project plan, proposal, and the statement of work.

Phase	Tasks during phase
Analysis	<ul style="list-style-type: none"> ● Analyse the current business model and finalise the <i>functional requirements</i> document. ● Finalise the fit-gap analysis. ● Develop the environment specification documentation.
Design	<ul style="list-style-type: none"> ● Develop functional design, technical design, and solution design documents. ● Finalise the data migration design. ● Establish test criteria.
Development	<ul style="list-style-type: none"> ● Finalise configurations and setup of the standard solution. ● Develop and finalise the custom code that is required to support the solution. ● Conduct functional and feature testing of the solution. ● Create user training documentation.
Deployment	<ul style="list-style-type: none"> ● Set up the production environment. ● Migrate data to the production environment. ● Conduct user acceptance test of the system. ● Train users and finalise the user documentation. ● Conduct a go-live check and promote the system to production.
Operation	<ul style="list-style-type: none"> ● Resolve pending issues. ● Finalise user documentation and knowledge transfer. ● Conduct a post-mortem of the project. ● Provide on-going support (activities that continue through any future involvement with the customer after the project is closed).

Note: the information of this methodology has been collected from Microsoft websites, as well as from the blogs used by Microsoft partners. (Microsoft, 2012, 2018)

2.8.2 Oracle Unified Method (OUM)

The Oracle® Unified Method (OUM), first released in 2006, with roots in the Unified Process (UP). Oracle's standards-based method that enables the entire implantation of Enterprise IT Applications. OUM provides an implantation approach that is rapid, broadly adaptive, and business focused. OUM includes a comprehensive project management framework and documentation to support Oracle's growing focus on enterprise-level IT strategy, architecture, and governance.

OUM uses project phases and processes to include quality and control checkpoints and allow coordination of project activities throughout the project (cf. Figure 2-5). Projects are organized by phase, a chronological grouping of tasks in an approach, to reduce risk. Each phase allows a checkpoint against project goals and measurement against quality criteria. *The project phases for control* of OUM are:

- **Inception.** The overriding goal of the Inception phase is to have convergence among all stakeholders on the lifecycle objectives for the project. Therefore, the Inception phase is critical

for all projects because the scope of the effort, high-level requirements and significant risks must be understood before the project can proceed.

- Elaboration.** The goal of the Elaboration phase is to move development of the solution from the scoping and high-level requirements done during the Inception phase to developing the detailed requirements, partitioning the solution, creating any necessary prototypes, and baselining the architecture of the system to provide a stable basis for the design and implantation effort in the phase.
- Construction.** The goal of the Construction phase is to take the solution from detailed requirements models, through the configuration of EITA software functionality, development and testing of custom components, and integration to a system that is ready for a first release that goes into production, often a limited release and often called a beta release. In short, complete the development of the application system, validate that all components fit together, and prepare the system for the acceptance test and deployment

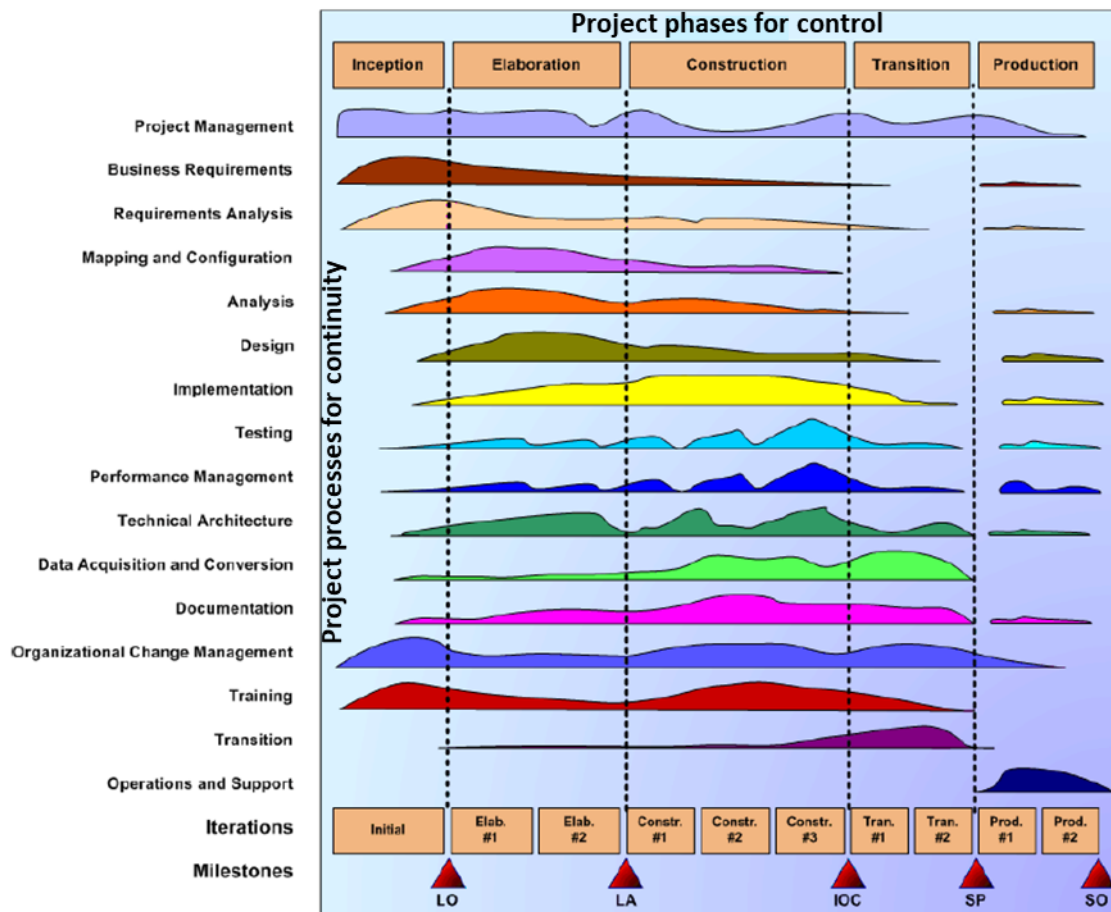


Figure 2-5: Oracle Unified Method (adapted from Oracle, 2016)

- **Transition.** The goal of the Transition phase is to take the complete solution from installation onto the production system through the acceptance test to launch the application, to be used for business. Validate that the system is tested systematically and is available for end-users. During this phase, the new system is accepted by the customer organisation, the organisation is made ready for the new system, and the system is put into production and, if the new system replaces an old one, a smooth cutover to the new application is provided.
- **Production.** The Production phase corresponds to the operation of the new EITA, assess the success, and monitor and address any raising issues. This includes monitoring the EITA operation and acting appropriately to maintain continued operation; measuring performance; operating and maintaining supporting systems; responding to help requests, error reports and feature requests by users; and managing the applicable change control process.

The *project processes for continuity* covers business requirements, requirements analysis, mapping and configurations, analysis, design, implementation, testing, performance manager, technical architecture, data acquisition and conversion, documentation, organisational change management, training, transition and operations and support.

Note: the information of this methodology has been collected from the Oracle Unified Method (OUM) (Oracle, 2016)

2.8.3 SAP Activate Methodology

SAP Activate methodology is a modular and agile framework for implantation or migration to SAP S/4HANA. It builds on its predecessors: ASAP® methodology and SAP Launch methodology (SAP, 2018b).

SAP Activate Methodology is an implantation approach for cloud, on-premise, and hybrid deployments. It provides broad coverage of SAP solutions starting with SAP S/4HANA. Its simplified, modular approach supports increased customer co-innovation and collaboration, with full support for initial deployment and continuous business innovation.

The SAP Activate Framework has three pillars, *SAP best practices*, *guide configuration* and *methodology* (cf. Figure 2-6).



Figure 2-6: Framework SAP Activate (adapted from SAP, 2018b)

- **SAP Best Practices.** Built on SAP's extensive industry knowledge and technology expertise, SAP Best Practices packages include ready-to-run, digitised business, and technology processes. Using best practices for standard processes saves time, helps deliver predictable results, and focuses efforts on innovation. SAP Best Practices packages provide clear guidance on integration and migration fundamentals and include business processes such as finance and logistics. They are designed to guide you through an optimal implantation or migration scenario, whether you are moving from a legacy SAP software system or a third-party database.
- **Guide Configuration.** It is a content lifecycle management tool that helps configure, test, and receive support in data migration processes. The users can customise pre-configured business processes – from charts of accounts to approval thresholds – without IT involvement.
- **Methodology.** SAP Activate methodology is a new software implantation methodology that is based on approaches and on the experience gained over the years to offer a consistent, agile method for any deployment type – cloud, on-premise, hybrid, or mobile. It offers support for initial implantation and continuous innovation with SAP S/4HANA. The implantation best practices walk project teams through the planning, building, and deployment of their SAP solution. SAP Activate methodology caters to customer-specific configuration and extensions requirements to reflect a customer's own business practices while remaining extremely scalable – nimble enough for smaller engagements and more robust for larger projects.

The main phases of the methodology are *prepare*, *explore*, *realise*, and *deploy*. There are two additional phases before and after the main phases: *Discover*, consists of providing the client with a trial version and a final version; *Run*, consists of the support given to the client after the implantation (cf. Figure 2-7).



Figure 2-7: Main phases in SAP activate methodology (adapted from SAP, 2018b)

- **Prepare.** The project is initiated and planned, including quality and risk plans. The EITA environment is set up, including best practices for ready-to-run processes.
- **Explore.** The customer team explores SAP solution capabilities, while the EITA integrator researches the customer's business. Together, they use fit/gap workshops to identify the configuration and extensions that best meet customer requirements.
- **Realise.** The team configures and extends the EITA, based on the prioritised requirements captured in the *explore phase*. Configuration and build are done in short cycles, ensuring regular validation and feedback from the business. Structured testing and data migration activities ensure quality.
- **Deploy.** Final preparations before cutover to production ensure that the EITA, users, and data are ready for the transition to productive use. The transition to operations includes setting up and launching support, then handing off operations to the organisation managing the environment.

Each SAP S/4HANA implantation starts with ready-to-run business processes based on SAP Best Practices, a key pillar of SAP Activate. The methodology then provides tools, templates, and examples used to structure the fit/gap workshops, confirm fit, and identify required delta configurations or extensions. These items are captured in a backlog document, which serves as a guide for planning software releases. Releases are structured in short cycles, using guided configuration, testing functionality, and data migration tools to build the required capabilities.

Note: the information of this methodology has been compiled from public websites of the SAP Activate Methodology. (*Activate - SAP S/4HANA | Deployment & Implementation*, 2016; SAP, 2018b, 2018a).

2.8.4 Metodologia de Implementação Primavera (MIP)

Primavera Business Software Solutions, is an enterprise from Portugal, which is dedicated to the development and commercialisation of management solutions and platforms for the integration of

business processes in a global market, offering solutions for small, medium, large organisations and public administration.

The PRIMAVERA Implementation Methodology (MIP) is a set of good practices for implanting PRIMAVERA solutions. This methodology aggregates the best international techniques and practices for the implantation and integration of management software, together with the horizontal extensibility characteristics and ease of vertical integration of PRIMAVERA solutions. MIP covers the entire life cycle of an application, from the sale to maintenance, monitoring and continuous improvement processes. (PBSS, 2017).

This methodology is structured in three stages, each stage has phases, and each phase encompasses activities. MIP considers two transversal processes -project management and change management- and it includes a section for identifying roles and responsibilities (cf. Figure 2-8).

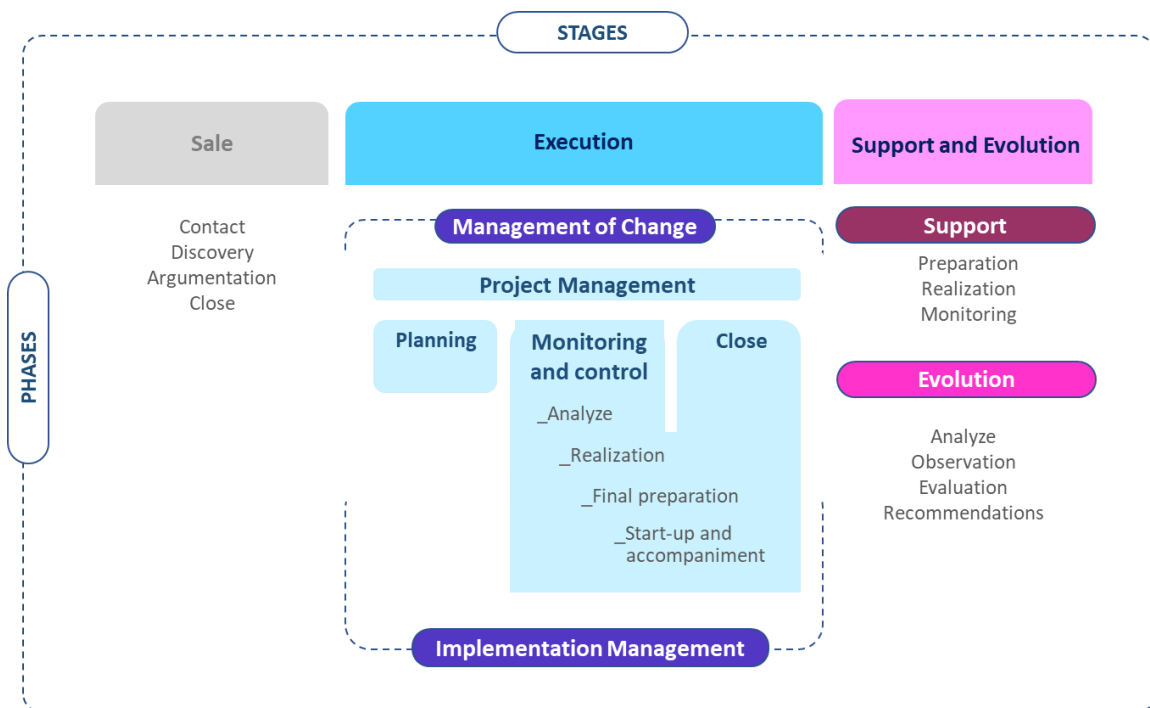


Figure 2-8: MIP methodology structure (adapted from PBSS, 2017)

The three main stages of MIP are:

- **Sale.** The sales process is initiated whenever a sales opportunity is identified, that is, whenever there is a need in a customer that can be satisfied with the PRIMAVERA solutions. Usually, the process results from contact with the potential customer, whether directly from the contact of PRIMAVERA to a commercial partner or otherwise. Once the sales opportunity has been detected, a meeting is scheduled to characterise the opportunity.

- **Execution.** The execution stage is the longest of all and where most of the efforts to implant Primavera solutions are concentrated. Here we have three major processes that are: Implementation management, change management and project management. Each process has associated phases and activities, for example, the project management process has associated the phases of planning, monitoring and control and closing, the monitoring and control phase has associated the activities of analysis, realisation, final preparation and start-up and accompanying.
 - **Planning.** The project begins with the appointment of a project manager, which should take into consideration the scope and objectives of the project, and who is responsible for organising the preparation of the project and the sizing of the resources that will be necessary for the execution of the project
 - **Analyses.** This phase aims to raise, analyse, model, and document the operation of the organisation and its sector of activity, as well as the scope of needs and business processes in which the implementation of the solution is inserted. The analysis phase will be based on a set of working meetings involving the *project manager* and *key users* to understand the functional behaviour of the organisation, the functional and operational processes of the client, as well as their needs at the level of information systems.
 - **Realisation.** The realisation phase represents the concretion of the implementation plan generated in the previous phase (analysis). Among the main activities, we can highlight: Install, parametrise, additional developments, test and presentation of prototype.
 - **Final preparation.** The final preparation phase describes the activities required for the deployed solution to be made available to its end users. The objectives of this phase is define and prepare the production environment, conversion of operational databases and training for end-users.
 - **Start-up and accompanying.** This phase describes the activities necessary for the implemented solution to be made available to its end users; the objectives are start-up in production, error correction and-or improvement, assessment of end-users in the use

of the solution, consent of the interested parties that the solution in production is finished and signing of the support agreement.

- **Support and evolution.** The support process includes the activities necessary to continue the excellent functioning and use of the solution installed in the client, starting in the final preparation phase, to get to know the client's project team, the client requirements, the business processes implemented and the pending list and improvements.

Note: the information of this methodology has been collected from the Primavera methodology website that is available to its partners (PBSS, 2017), and from the documentation the author had access with restriction regarding its disclosure.

2.9 Summary

In this chapter, we begin by characterising the SME, taking as a reference the definition proposed by the European Union. Next, we demarcate the meaning of the EITA. Later we discuss some characteristics to consider in the implantation of the EITA. Also, we analyse the players involved in an EITA implantation project. Finally, we review the contributions made by the academy and the industry to improve the process of implanting the EITA in the SME. Below, we present a summary of some ideas expressed in this chapter.

In this thesis, we propose to use the term "implantation" instead of "implementation". Our motivation to make this proposal is based on the fact that the term "implementation" is ambiguous, it can refer to the fact of building software (EITA), or also to the activity of putting the EITA into operation within a company. We propose using the term "implantation" to refer to the activity of putting the EITA into operation in the SME, that is, integrating the EITA into the company.

Due to its different financial, technological, organisational limitations, for the SME, the best option is to buy or rent an EITA instead of developing a customised one. The costs of acquisition or rent are much cheaper than the costs of developing. Also, operating costs should be considered, which are higher in the software developed. It should also be considered that the software producing companies are orienting their products to this segment. We must also note that the software and implantation methodologies produced for large companies are difficult to adapt to SMEs.

Compared with large enterprises, small and medium-sized enterprises (SMEs) have fewer financial resources, lower technical expertise and poor management skills and started to use IT relatively recently. This last fact alone explains the limited amount of research about IS/IT adoption and success in SMEs, especially in less well-developed countries, such as Portugal. (Caldeira & Ward, 2002).

- Also, As a result of the many differences between SMEs and large firms, many authors have argued that techniques and models from large firms do not apply to SMEs. (Alshawi et al., 2011; Caldeira & Ward, 2002; Derzy, 2010; G. Buonanno et al., 2005; Johansson et al., 2013; Kale et al., 2010; Leyh, 2014; Serrano et al., 2010; Shahawai & Idrus, 2011; Zach, 2011; Zach & Munkvold, 2011).
- Besides, few models of strategy making for large firms applied to small firms. Furthermore, small businesses need a different type of organisational theory. (R.-S. Chen et al., 2008; Cragg et al., 2011; Ramdani et al., 2013).
- Even researchers agree that the role negotiation process for management consultants working with SMEs is more critical and challenging than in large companies. (R.-S. Chen et al., 2008).

On the other hand, both industry and academia use a broad terminology for the process of implanting an EITA in the SME. These terms have been briefly discussed in this section because they are used in this document. Besides, these concepts are difficult to understand by SME staff in the first approach to technology.

It is also necessary to mention that software producers and consulting companies specialised in the process of implanting an EITA in the enterprise have developed their implantation methodologies, but are considered strategic assets for enterprises, which is why they are not released to be used by the general public.

Chapter 3

3. Factors that influence the implantation of EITAs: A TOE based perspective

To accurately identify the problem and propose the research objective, we carried out a literature review to determine the state of the art in the area of EITA implantation in SMEs, the review allowed to identify gaps and research opportunities on the topic. This chapter describes this review, it starts by describing the procedure followed, then presents the factors and sub-factors that were found classified according to the Technology, Organisational and Environment – TOE – framework. Finally, we present the main success factors to be considered when going to implant an EITA in the SME.

3.1 Procedure

This literature review was carried out following the recommendations of Webster and Watson (Webster & Watson, 2002). This review, we try to answer the following questions: What are the main problems in the implantation of an EITA in the SME? What are the success factors for implantation of EITA in an SME? What are success factors the most important? These questions used as a unit of analysis "the implantation process of EITA in an SME".

It should be noted that different EITAs (ERP, CRM, etc.) can be at stake. Consequently, different benefits can be intended with the implantation of the EITA. Furthermore, the emphasis is on SMEs. There is no focus on any particular economic sector.

The implantation of an EITA encompasses several stages such as preparation, search, selection, hiring, installation, configuration, technical maintenance, among others. Thus, attention had to be paid to articles that cover any of these stages.

To search for items to help understand the main issues in the process of implantation of an EITA in an SME, such as those mentioned in the previous paragraph, was carried out using Scopus and AIS e-Library search engines. Also, considering the unconventional terminology, we are using, and the lack of well-established (and appropriate) terms for the phenomenon we are interested in, the literature search had to include terms recognised as more common in the English-dominated scientific literature. Thus, we use the following search expressions:

*(Issues OR Problems OR Difficulties OR Challenges OR Success) AND
(Implantation OR Implementation OR Adoption OR Selection) AND
(Software package OR Commercial off-the-shelf OR COTS OR Enterprise application OR
Information Systems OR IT application OR ERP OR CRM OR CMS OR DMS OR ECM) AND
(Small and medium enterprise OR SME)*

The search expression includes four parts, reflecting the research question:

- The first deals with the focus of our research questions – the success of the EITA implantation process - that can also be expressed as problems, difficulties, challenges.
- The second takes into consideration the common usage of the term “implementation” to refer to what we call “implantation”.
- The third regards the implant itself - the IT artefact – where several possible search terms have been used.
- The fourth is the restriction to SMEs.

We obtained the following results (the search was carried out in April 2017): Scopus 29 items, AIS e-Library 50 items. From this set, we selected 54 articles for subsequent analysis. The remainder articles were discarded because they did not fit our research objective and-or did not refer exclusively to SMEs. To delve into some topics, have also been considered backwards and forward references. Subsequently, an update of this literature review was made in April 2018, where few articles were added.

3.2 Factors and subfactors influencing in EITA implantation

The factors and subfactors obtained in the literature review were classified according to the TOE framework (DePietro et al., 1990) in their respective contexts and sub-contexts, and it was also necessary to divide the factors into several subfactors. It is necessary to mention that some subfactors found have been left out of this classification since it is impossible to incorporate them all, in any case, the main ones have been incorporated from the perspective of the authors.

Also, be considered the line between the context and sub-context in which they are grouped is diffuse, for example, *Data* it has been classified under the *Technological context*, but some readers may consider that is an *Organisational context*.

Tables 3.1 to 3.3 show the success factors that have been identified and their classification according to the contexts considered by the TOE Framework. The following primary sub-contexts have been considered:

- Technological context - EITA (software package, Systems, COTS, RUSP, ...), data, and IT infrastructure (cf. Table 3-1).
- Organisational context - strategy, organisation structure, managerial, social and capability (cf. Table 3-2).
- Environment context - government, market, and software provider (cf. Table 3-3).

Below, each one of these contexts, sub-contexts, factors, and sub-factors are presented and discussed.

3.2.1 Technological context

The technological context refers to internal and external technology that is relevant to the implantation of an EITA in the enterprise. Technology can include equipment as well as processes. In the literature review we have identified three main subcontexts that influence the success of an implantation. These are *EITA*, *data*, and *IT infrastructure* (cf. Table 3-1).

Table 3-1: Factors and subfactors in the Technological Context

Sub - context	Factor	Sub-factor	References	No. of articles
Software Package or EITA		Definition of requirements	(Ahmad & Cuenca, 2013)	1
	Search, evaluation, and selection	Evaluation of EITAs	(Alshawi et al., 2011; Hustad & Olsen, 2013; Jha et al., 2008; Leyh, 2014; Li et al., 2012; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Salim, 2013; Seethamraju, 2014).	9
		Selection of EITA	(Ahmadi et al., 2013; Alshawi et al., 2011; Douglas et al., 2010; Gupta et al., 2018; Gupta & Misra, 2016; Hustad & Olsen, 2013; Johansson et al., 2013; Kale et al., 2010; Reicher et al., 2015; Salim, 2013; Seethamraju & Seethamraju, 2008; Shahawai & Idrus, 2010; Shaul & Tauber, 2012; Sia, 2008; Winkelmann & Klose, 2008).	15
	Best Fit between EITA and enterprise	Fit between the process of EITA and company process	(Hustad & Olsen, 2011; Johansson et al., 2013; Leyh, 2014; Seethamraju, 2008, 2014; Seethamraju & Seethamraju, 2008; Shaul & Tauber, 2012).	7
		Level of customisation / configuration	(Ahmad & Cuenca, 2013; González et al., 2015; Hustad & Olsen, 2013; Leyh, 2014; Li et al., 2012; Salim, 2013;	9

Sub - context	Factor	Sub-factor	References	No. of articles	
Characteristics of Enterprise IT Application			Seethamraju, 2014; Shaul & Tauber, 2012; Sia, 2008; Winkelmann & Klose, 2008)	5	
		Integration	(Alshawi et al., 2011, 2011; Douglas et al., 2010; González et al., 2015; Seethamraju, 2008).		
		Flexibility	(Hallikainen et al., 2002; Seethamraju, 2008; Seethamraju & Seethamraju, 2008; Shaul & Tauber, 2012; Tasnawijitwong & Samanchuen, 2018; Zach, 2011).		6
		Compatibility	(Li et al., 2012; Ramdani et al., 2013; Salim, 2013; Shahawai & Idrus, 2011).		4
		Usability	(Equey & Fragnière, 2008; Gupta & Misra, 2016; Hallikainen et al., 2002; Salim, 2013; Tasnawijitwong & Samanchuen, 2018; Zach, 2011).		6
		Reliability	(Gupta et al., 2018; Hallikainen et al., 2002; Li et al., 2012; Shaul & Tauber, 2012; Tasnawijitwong & Samanchuen, 2018).		5
		Modular	(Chatzoglou et al., 2016).		1
		Complexity	(Alshawi et al., 2011; Equey & Fragnière, 2008; Li et al., 2012; Ramdani et al., 2013; Shahawai & Idrus, 2011; Sia, 2008; Zach & Munkvold, 2011).		7
Sustainability	(Alshawi et al., 2011; Hustad & Olsen, 2011; Salim, 2013; Shaul & Tauber, 2012; Zach, 2011).	5			
Data	Data Planning	Data analysis plan	(Ahmad & Cuenca, 2013; Alshawi et al., 2011; Jha et al., 2008; Shaul & Tauber, 2012; Winkelmann & Klose, 2008; Zach, 2011)	6	
		Data migration plan	(Shaul & Tauber, 2012; Sia, 2008).	2	
	Data Quality	Data quality control	(Ahmadi et al., 2013; Alshawi et al., 2011; Gupta et al., 2018; Jha et al., 2008; Leyh, 2014; Nofal & Yusof, 2016; Nordin & Adegoke, 2015; Shaul & Tauber, 2012; Zach, 2011)	9	
		Data organisation	(Alshawi et al., 2011; Leyh, 2014; Zach, 2011)	3	
		Cleaning of data	(Hustad & Olsen, 2013; Shaul & Tauber, 2012; Sia, 2008; Zach, 2011)	4	
	Data Migration	Data conversion Import and export of data from legacy systems	(Shaul & Tauber, 2012; Terminanto et al., 2017; Winkelmann & Klose, 2008; Zach, 2011)	4	
		Documents about policies, databases, and type.	(Ahmadi et al., 2013)	1	
	Security	Security of the information	(Ahmadi et al., 2013; Douglas et al., 2010; Gupta et al., 2018; Li et al., 2012; Salim, 2013; Seethamraju, 2014; Zach, 2011).	7	
	Centralized	Centralized integrated information / transparency	(Seethamraju, 2008; Zach, 2011).	2	
	IT Infrastructure	Hardware	Datacenter, centralised structure of IT equipment	(Ahmadi et al., 2013; Nofal & Yusof, 2016)	2

Sub - context	Factor	Sub-factor	References	No. of articles
	Networking	Good network infrastructure	(Ahmadi et al., 2013; Gupta et al., 2018; Gupta & Misra, 2016)	3
	Architecture	Fragmented IS / IT architecture	(Douglas et al., 2010; Winkelmann & Klose, 2008)	2
	IS / IT available	SMEs already have an installed base of IS / IT	(Caldeira & Ward, 2002; Seethamraju & Seethamraju, 2008)	2
		Staff must have the required applications installed	(Ahmadi et al., 2013)	1

Software Package or Enterprise IT Application (EITA)

The factors that influence the implantation of an EITA that are related to the software are: *evaluation and selection of the EITA*; *better fit* between software processes and enterprise processes; and finally, the *characteristics of the EITA* must be considered. Next, we present these factors.

- **Evaluation and selection.** The selection of the appropriate EITA is one of the main factors of success in the implantation of the same. For this to happen, it is necessary to define the requirements that the enterprise considers essential and based on these perform an evaluation of the EITA that best fits the requirements. Finally, select an EITA that fits the needs and budget of the enterprise.
- **The best fit of EITA.** Once the EITA has been selected, it is necessary to implant it in the enterprise, and for this, it is necessary to make the best adjustment between the business processes supported by the EITA and the business processes used by the enterprise. It is also necessary that the EITA be customised, configure and integrate with the needs of the enterprise.
- **Characteristics of EITA.** This subfactor refers to the characteristics of the Enterprise IT Applications that influence its implantation; some factors are desirable such as flexibility, compatibility, usability, reliability, sustainability, and that it is modular. It should also be considered that the complexity of the software directly influences its implantation.

Data

Data is an important issue that influences the quality of the information provided by the EITA; it is considered that information is one of the most valuable resources of the company. Therefore, it is necessary that this information is centralised, available to users, has quality control and security policies

for access to it. Furthermore, for the successful implantation of an EITA, it is necessary to migrate the information from legacy systems, and this process must be carefully planned and executed. The factors that influence the implantation of an EITA are:

- **Data Planning.** Involves performing the data plan analysis and data migration plan.
- **Quality control.** It includes making a data quality control; data must be correct, accuracy and precise; organisation data in the legacy system; and cleaning of data.
- **Data Migration.** Data conversion import and export of data from legacy systems; documents about policies, databases, and migrate type.
- **Security and encryption.** Security of the information.
- **Centralised.** Centralised integrated information / transparency.

IT Infrastructure.

The technological infrastructure in the SME must be in accordance with the needs and requirements of the EITA since the commercial application will work in this infrastructure. For this, it is necessary to have adequate hardware and networking, in addition to being compatible with the architecture and IS / IT available.

3.2.2 Organisational Context

The organisational context refers to the characteristics and resources of the firm, including the firm's size, the degree of centralisation, the degree of formalisation, managerial structure, human resources, amount of resources, and linkages among employees (DePietro et al., 1990).

With this description, in this review of the literature, the organisational context has been classified into five sub-contexts, which are: *strategic*, *structural*, *managerial*, *social* and *capability* (cf. Table 3-2).

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
Strategic	Top management support	CEO / CIO involvement	(Ahmadi et al., 2013; Alshawi et al., 2011; Caldeira & Ward, 2002; Chatzoglou et al., 2016; Ferneley & Bell, 2005; Hustad & Olsen, 2011; Johansson & Sudzina, 2009; Nguyen et al., 2012; Nordin & Adegoke, 2015; Ramdani et	16

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
			al., 2013; Ramdani & Kawalek, 2008; Reicher et al., 2015; Sumner & Bradley, 2009; Thompson, 2013; Tulivaye Hasheela & Smolander, 2014; Wang et al., 2003)	
		Choose a "Project champion" of high level	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Caldeira & Ward, 2002; Hustad & Olsen, 2013; Leyh, 2014; Nguyen et al., 2012; Salim, 2013; Shaul & Tauber, 2012; Sumner & Bradley, 2009; Thompson, 2013; Wang et al., 2003; Winkelmann & Klose, 2008)	12
		Management and project steering committees	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Johansson & Sudzina, 2009; Leyh, 2014; Ramdani & Kawalek, 2008; Salim, 2013; Shaul & Tauber, 2012; Sia, 2008; Sumner & Bradley, 2009; Winkelmann & Klose, 2008)	10
		Understanding of needs, capabilities and limitations	(Caldeira & Ward, 2002; Ferneley & Bell, 2005; Johansson et al., 2013; Kale et al., 2010; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Serrano et al., 2010; Shaul & Tauber, 2012; Tulivaye Hasheela & Smolander, 2014)	9
		Resolving political conflicts	(Shaul & Tauber, 2012)	1
		Business vision	(Ahmadi et al., 2013; Rowe et al., 2005; Shaul & Tauber, 2012)	3
		Willingness to adopt modern technologies	(Seethamraju & Seethamraju, 2008; Shaul & Tauber, 2012)	2
		Allocating valuable resources	(Alshawi et al., 2011; Nordin & Adegoke, 2015; Shahawai & Idrus, 2011; Shaul & Tauber, 2012)	4
		Exhibiting strong commitment	(Shaul & Tauber, 2012)	1
	Strategic plan	Planning integrated and coordinated	(Ahmadi et al., 2013; Alshawi et al., 2011; Čelar et al., 2011; Gupta et al., 2018; Gupta & Misra, 2016; Jha et al., 2008; Reicher et al., 2015; Reicher & Szeghegyi, 2015; Salim, 2013; Shahawai & Idrus, 2010, 2011)	12
		Alignment between business strategy and IT strategy	(Ahmadi et al., 2013; Douglas et al., 2010; Ferneley & Bell, 2005; Shaul & Tauber, 2012; Sumner & Bradley, 2009)	5
		Planning the cost of implementation	(Ahmadi et al., 2013; Hustad & Olsen, 2011; Jha et al., 2008; Salim, 2013; Shaul & Tauber, 2012; Sia, 2008)	6
		Functional requirements are clearly defined	(González et al., 2015; Hustad & Olsen, 2013; Johansson et al., 2013; Reicher & Szeghegyi, 2015; Shaul & Tauber, 2012)	5
		Defined objectives which will be covered by EITA	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Alshawi et al., 2011; Jha et al., 2008)	4
		Planning the package selection process	(Hustad & Olsen, 2013; Shaul & Tauber, 2012)	2
		Execute the plan	Use of consultants	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Gupta & Misra, 2016; Hustad & Olsen, 2013; Jha et al., 2008; Reicher & Szeghegyi, 2015; Shaul & Tauber, 2012; Sia, 2008; Wang et al., 2003; Winkelmann & Klose, 2008)
	Focused on the plan		(Ahmadi et al., 2013; Leyh, 2014; Shaul & Tauber, 2012)	3

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles	
		Vanilla - adopts without modifications	(Seethamraju, 2014; Sumner & Bradley, 2009)	2	
		Big bang – All at the same time	(Deltour, 2012; Rowe et al., 2005)	2	
Structural	Organisational characteristics	Business size	(Alshawi et al., 2011; G. Buonanno et al., 2005; Johansson & Sudzina, 2009; Nguyen et al., 2012; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Seethamraju, 2008; Shahawai & Idrus, 2010; Zach, 2011).	9	
		Maturity / ICT experience it positively influences.	(Ahmadi et al., 2013; Johansson et al., 2013; Li et al., 2012; Nguyen et al., 2015; Ramdani et al., 2013; Thompson, 2013)	6	
		Type of industry	(G. Buonanno et al., 2005; Ramdani et al., 2013; Shahawai & Idrus, 2010)	3	
		The flat structure is better	(Ahmadi et al., 2013; Johansson et al., 2013)	2	
		Defined organisational, functional requirements	(Ahmadi et al., 2013; Leyh, 2014; Serrano et al., 2010)	3	
		Former major change experience	(Ahmadi et al., 2013; Shaul & Tauber, 2012)	2	
		Business Process Management (BPM) - Business Process Re-engineering (BPR)	The organisational structure should be modified before	(Ahmadi et al., 2013; Čelar et al., 2011; Chatzoglou et al., 2016; Christofi et al., 2009; Douglas et al., 2010; Equey & Fragnière, 2008; Gupta et al., 2018; Leyh, 2014; Nordin & Adegoke, 2015; Ramdani & Kawalek, 2008; Reicher et al., 2015; Reicher & Szeghegyi, 2015; Seethamraju & Seethamraju, 2008; Sia, 2008; Terminanto et al., 2017; Winkelmann & Klose, 2008; Zeng et al., 2017)	17
	IT business process integration		(Ahmadi et al., 2013; Seethamraju, 2008; Seethamraju & Seethamraju, 2008; Sia, 2008)	4	
	Documented business processes and roles		(Ahmadi et al., 2013; Christofi et al., 2009; Sia, 2008)	3	
	Identified key processes which influence the success		(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Christofi et al., 2009)	3	
	Standardized processes		(G. Buonanno et al., 2005)	1	
	The company is flexible to re-engineer old practices		(Gupta & Misra, 2016)	1	
	Business Process Re-engineer (BPR) experience		(Jha et al., 2008; Johansson & Sudzina, 2009)	2	
	Managerial		Project Management	Leadership	(Ahmadi et al., 2013; Gupta et al., 2018; Hustad & Olsen, 2013; Reicher et al., 2015; Sia, 2008; Sumner & Bradley, 2009; Winkelmann & Klose, 2008)
		Manage the implementation project		(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Chatzoglou et al., 2016; Gupta & Misra, 2016; Shaul & Tauber, 2012)	5
		Project scope management		(Ahmadi et al., 2013; Gupta et al., 2018; Shaul & Tauber, 2012; Terminanto et al., 2017)	4
		Clear and defined project plan		(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Gupta & Misra, 2016; Shaul & Tauber, 2012)	4
Management of conflicts		(Leyh, 2014; Reicher et al., 2015; Shaul & Tauber, 2012)		3	

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
		Interdepartmental coordination / cooperation	(Leyh, 2014; Shaul & Tauber, 2012)	2
		Project tracking - Monitoring of performance	(Ahmad & Cuenca, 2013; Leyh, 2014; Shaul & Tauber, 2012)	3
		Management of project documentation	(Jha et al., 2008; Sia, 2008)	2
		Implantations should be treated as a program	(Ahmad & Cuenca, 2013)	1
		Modification de SW package after go-live is less risk	(Čelar et al., 2011)	1
	Team skills	Multidisciplinary work team	(González et al., 2015)	1
		Team cross-functional knowledge	(Leyh, 2014; Reicher et al., 2015; Shaul & Tauber, 2012)	3
		Good relations between the project team and users	(Shahawai & Idrus, 2011; Shaul & Tauber, 2012)	2
		Team motivations and full-time team members	(Shaul & Tauber, 2012)	1
		Able to find a proficient reseller and consultant	(Hustad & Olsen, 2011)	1
	Risk management	Reduced trouble shooting	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Čelar et al., 2011; Seethamraju & Seethamraju, 2008; Shaul & Tauber, 2012; Tulivaye Hasheela & Smolander, 2014)	6
		A project of high risk and failure can be fatal	(Deltour, 2012; Hallikainen et al., 2002)	2
		Many enterprises underestimate the problems	(Chang et al., 2008)	1
		67 % of initiatives could be considered unsuccessful	(Chang et al., 2008)	1
	Change management	Change management program	(Ahmad & Cuenca, 2013; Čelar et al., 2011; Deltour, 2012; Equey & Fagnière, 2008; Gupta et al., 2018; Gupta & Misra, 2016; Kale et al., 2010; Leyh, 2014; Reicher et al., 2015; Seethamraju, 2008, 2014; Shahawai & Idrus, 2011; Shaul & Tauber, 2012; Tulivaye Hasheela & Smolander, 2014; Winkelmann & Klose, 2008)	15
		Understanding the political and organisational culture	(Shaul & Tauber, 2012)	1
		Reducing resistance to change	(Leyh, 2014; Nguyen et al., 2012; Shahawai & Idrus, 2011; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014)	5
		Issue the change management is timing	(Reicher et al., 2015)	1
	Decisional	Centralised decision making	(Ahmad & Cuenca, 2013; Reicher et al., 2015; Thompson, 2013; Tulivaye Hasheela & Smolander, 2014; Zach & Munkvold, 2011)	5
		IS/IT manager in the organisational structure	(Ahmadi et al., 2013; Caldeira & Ward, 2002)	2

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
		Decision Cycle - Short term, reactive	(Johansson et al., 2013)	1
		Decision making control	(Shahawai & Idrus, 2011; Zach & Munkvold, 2011)	2
		Making a contract with the vendor	(Hustad & Olsen, 2013)	1
	Resources constraints	Financial	(Brown et al., 2017; Caldeira & Ward, 2002; H. Chen et al., 2007; Cragg et al., 2011; Douglas et al., 2010; Gupta et al., 2018; Gupta & Misra, 2016; Hsin & Papazafeiropoulou, 2008; Johansson & Sudzina, 2009; Salim, 2013; Seethamraju, 2008; Seethamraju & Seethamraju, 2008; Serrano et al., 2010; Sia, 2008; Wang et al., 2003; Winkelmann & Klose, 2008)	16
		Technical	(Cragg et al., 2011; Douglas et al., 2010; G. Buonanno et al., 2005; Hsin & Papazafeiropoulou, 2008; Hustad & Olsen, 2013; Johansson et al., 2013; Leyh, 2014; Seethamraju, 2008, 2014; Seethamraju & Seethamraju, 2008; Winkelmann & Klose, 2008)	11
		Managerial	(Douglas et al., 2010; G. Buonanno et al., 2005; Johansson et al., 2013; Seethamraju, 2008; Seethamraju & Seethamraju, 2008; Sia, 2008; Winkelmann & Klose, 2008)	7
		Human	(Caldeira & Ward, 2002; Cragg et al., 2011; Johansson et al., 2013; Kale et al., 2010; Seethamraju, 2014; Serrano et al., 2010; Wang et al., 2003; Wiradinata, 2018)	8
		Expertise	(H. Chen et al., 2007; Nordin & Adegoke, 2015; Reicher & Szeghegyi, 2015; Sia, 2008)	4
		Time	(H. Chen et al., 2007; Nordin & Adegoke, 2015)	2
Social		Culture	The staff's positive attitude toward change	(Ahmadi et al., 2013; Caldeira & Ward, 2002; Johansson et al., 2013; Nguyen et al., 2015; Reicher et al., 2015; Salim, 2013)
	Cultural perspective to this kind of IS		(Ahmadi et al., 2013; Derzy, 2010; Ferneley & Bell, 2005; Johansson & Sudzina, 2009; Reicher et al., 2015; Tulivaye Hasheela & Smolander, 2014)	6
	Organisational values		(Ahmadi et al., 2013; Chatzoglou et al., 2016; Johansson & Sudzina, 2009; Leyh, 2014; Nguyen et al., 2015)	5
	Awareness of information technology		(Ahmadi et al., 2013; Caldeira & Ward, 2002; Derzy, 2010; Salim, 2013; Shahawai & Idrus, 2010)	5
	Domination by the CEO		(Johansson et al., 2013; Li et al., 2012; Shahawai & Idrus, 2011)	3
	Interdepartmental cooperation		(Ahmad & Cuenca, 2013; Leyh, 2014; Shahawai & Idrus, 2011)	3
	Power relationships		(Caldeira & Ward, 2002; Serrano et al., 2010)	2
	Users	User participation in the overall process approach	(Caldeira & Ward, 2002; Chatzoglou et al., 2016; Douglas et al., 2010; Gupta & Misra, 2016; Kale et al., 2010; Leyh, 2014; Nguyen et al., 2012; Reicher & Szeghegyi, 2015; Salim, 2013; Shaul & Tauber, 2012; Tulivaye Hasheela & Smolander, 2014)	11

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
		Users' trust	(Reicher et al., 2015; Reicher & Szeghegyi, 2015; Shaul & Tauber, 2012)	3
		User attitudes / acceptance	(Serrano et al., 2010; Shaul & Tauber, 2012)	2
		Interaction of users with the system is critical	(Ahmadi et al., 2013)	1
		Employees' self-efficacy to work with computer	(Ahmadi et al., 2013)	1
		The user uses the system according to guidance	(Shaul & Tauber, 2012)	1
	Communication	Good inter-department communication	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Gupta et al., 2018; Gupta & Misra, 2016; Johansson & Sudzina, 2009; Leyh, 2014; Reicher et al., 2015; Seethamraju, 2008; Sia, 2008; Tulivaye Hasheela & Smolander, 2014; Winkelmann & Klose, 2008)	11
		Infrastructure to support communication	(Ahmadi et al., 2013)	1
		Communications between the project manager and staff	(Ahmadi et al., 2013; Johansson & Sudzina, 2009; Leyh, 2014; Tulivaye Hasheela & Smolander, 2014)	4
	Education & Training	Education and training to end-users	(Ahmad & Cuenca, 2013; Ahmadi et al., 2013; Caldeira & Ward, 2002; Chatzoglou et al., 2016; Gupta et al., 2018; Hustad & Olsen, 2013; Jha et al., 2008; Leyh, 2014; Nguyen et al., 2012, 2015; Nordin & Adegoke, 2015; Reicher et al., 2015; Shaul & Tauber, 2012; Sumner & Bradley, 2009; Terminanto et al., 2017; Tulivaye Hasheela & Smolander, 2014; Winkelmann & Klose, 2008)	17
		Developing a clear education and training plan	(Kale et al., 2010; Nguyen et al., 2015; Shaul & Tauber, 2012; Tulivaye Hasheela & Smolander, 2014)	4
		Education and training to technical staff	(Caldeira & Ward, 2002; Equey & Fragnière, 2008; Leyh, 2014; Nguyen et al., 2015; Shaul & Tauber, 2012; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014)	7
		Education on future business processes	(Ahmad & Cuenca, 2013; Nguyen et al., 2015; Shaul & Tauber, 2012; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014; Winkelmann & Klose, 2008)	6
	Relations	Network relationships	(Nguyen et al., 2015; Seethamraju & Seethamraju, 2008)	2
Capability	Capability in IS / IT	Capability in the domain of information systems	(Ahmadi et al., 2013; Alshawi et al., 2011; Brown et al., 2017; Caldeira & Ward, 2002; Deltour, 2012; Douglas et al., 2010; Hustad & Olsen, 2011; Nguyen et al., 2012, 2015; Nofal & Yusof, 2016; Seethamraju, 2014; Shahawai & Idrus, 2011; Winkelmann & Klose, 2008)	13
		Existence of adequate human resources of IS / IT	(Ahmadi et al., 2013; Deltour, 2012; Gupta & Misra, 2016; Johansson et al., 2013; Leyh, 2014; Nguyen et al., 2015; Nofal & Yusof, 2016; Shahawai & Idrus, 2011)	8

Table 3-2: Factors and subfactors in the Organisational Context

Sub-context	Factor	Sub-factor	References	No. of articles
		IT maturity IS / IT	(Johansson & Sudzina, 2009; Nguyen et al., 2012; Shahawai & Idrus, 2010)	3
	Negotiation	Capacity in negotiation / purchases	(Alshawi et al., 2011; Deltour, 2012; Hustad & Olsen, 2011)	3
	Project	Capacity and ability in project management	(Ahmadi et al., 2013; Alshawi et al., 2011; Deltour, 2012; Nguyen et al., 2012; Nofal & Yusof, 2016)	5

Strategic.

The strategy provides a general course to the enterprise of how the EITA should be implanted; it includes the specification of the company's objectives, the policies and plans designed to achieve these objectives, and finally, the allocation of resources to execute the plans. Every strategy must have the support of top management. The strategic factors that have been compiled in this review are three: *Top management support*, *plan the strategy* and *implement the strategy*.

- ***Top management support.*** It refers to the support that the top management of an enterprise should give to this type of project so that its implantation is a success. Principally, the executives of the enterprise must exercise the leadership of the project, stimulate change, communicate the strategy, demonstrate commitment, establish the limitations, provide resources, among others.
- ***Plan the strategy.*** Strategic planning defines the way forward of the current situation to the desired situation of the company, that is, defines which areas and processes will be automated with the implantation of EITA taking into consideration the resources that will be invested (budget). Planning the strategy means aligning the strategic objectives of the business with the IT strategy, then the objectives that will be covered by the EITA implantation must be defined. Next, the implantation process must be planned in a comprehensive and coordinated manner.
- ***Execute the plan.*** Strategic implantation is a process that puts plans and strategies into action to reach desired goals. In this review, we have identified the most common influences that lead

to the success of the EITA; these are: use of consultants, focus on the plan, adopt the EITA without modifications and follow an implantation methodology.

Structural

The structural factors that influence the implantation of an EITA that we have identified in the literature review are two, organisational characteristics of the enterprise and the maturity of the company in Business Process Management (BPM).

- **Organisational characteristics.** The organisational characteristics that influence the implantation of an EITA are the size of the company, the degree of maturity in the use of technology, the complexity of the structure of the company, defined functional requirements and the experience of change that the company possesses.
- **BPM – BPR.** In this review, it has been recognised that SMEs do not have an adequate identification of their processes, and if they have them, these are rarely well defined. In this sense, the following recommendations are identified: Modify the organisational structure before the project starts, IT business process integration, documented business processes and roles, identify critical processes, standardised processes, and finally, a company should be flexible to do processes re-engineer. Also, it would be advisable to have experience in Business Process Re-engineer (BPR).

Managerial

In the implantation of an EITA there are many factors that must be managed for the success, among them: the administration of the project; the skills of the implantation team and the EITA users; risk management; change management; the resource constraint that exists in SMEs; and the decisions that must be made in the enterprise before and during the implantation.

- **Project management.** The management of the EITA implantation project is an essential transversal activity, since it allows planning, organising, executing and controlling the implantation process to achieve the desired objectives. The temporary nature of the EITA implantation project is contrasted with the regular operation of the enterprise and requires different techniques and management skills. The challenge of project management is to achieve the proposed objectives within the known limitations such as scope, time, quality and budget

since the success of the implantation is generally evaluated based on compliance with the scope, budget and time.

- **Team skills.** The management of team skills positively influences the implantation of an EITA. In an implantation project several teams can coexist: on the one hand, the management team, which must have the ability to find the EITA and the appropriate providers; On the other hand, the team of the implantation project is assembled, formed by a mix between personnel of the software provider and company personnel; and finally, the users of the EITA.
- **Risk management.** The implantation of an EITA is a risky and complicated project in SMEs, which are generally underestimated both by SMEs and by EITA providers, and therefore need to be considered.
- **Change management.** The acceptance of the new EITA in the SME by the users and the collaboration they provide during the project are considered high-risk variables since users are reluctant to accept changes. This is the reason why it is necessary to manage the change and prepare the enterprise for the adoption of an EITA.
- **Decisional.** In SMEs, the decisions are centralised and usually taken by their owners, have a short-term vision, and are often reactive. The difficulty of this type of project is that the management or owners of the enterprise do not know about technical issues and are exposed to making mistakes, which is why it is better if there is IT staff in the organisational structure.
- **Resources constraints.** SMEs, by their nature, have a restriction of financial, technological and human resources, also, have limited management skills and expertise in technological issues, and because of their small size and the shortage of staff, they always have just enough time for their activities.

Social

Social factors have a strong influence on the enterprise and EITA implantation projects. Among the influencing factors we have: the internal culture, the participation of the users, the level of existing communication, the education and training that is given to the end-users

- **Culture.** The influence of culture in an enterprise has to do with the attitude of the people, the values of the organisation, the perspective that the person has towards the information systems, the knowledge of the IT, the degree of interdepartmental cooperation, among others.
- **Users.** Users play an essential role in the acceptance and subsequent use of an EITA, which is why they must be involved throughout the project. It is also necessary that users can work with computers and interact with the EITA, and also, be real users.
- **Communication.** Communication is essential in these projects, from the initial stages when start to plan the project, it is necessary to interact with the company's staff to define the needs that the EITA must cover. Later, when the provider arrives, excellent communication between the implanting team and the company's personnel is needed. Sometimes projects have difficulties due to lack of communication.
- **Education and training.** Any implantation of an EITA is accompanied by the planning and training given to the final users of the application and to the technology personnel (if any). Also, it is appropriate that once the implantation is completed, the enterprise trains staff in new business processes.
- **Relationships.** Having a good network of contacts is a factor that can positively influence the implantation of an EITA.

IT Capabilities

For the implantation of an EITA in the SME, it is desirable to have capabilities in Information Systems (IS), Information Technology (IT), negotiation and project management.

3.2.3 Environment Context

In the environment context, the sub-contexts that we have identified in the literature review are the regulations that are issued by governments; external factors such as the market, and factors related to the providers, distributors and consultants of the EITA (cf. Table 3-3).

Table 3-3: Factors and subfactors in the Environment Context

Sub-context	Factor	Sub-factor	References	No. of articles
Government.	Regulations	Legislative regulations	(Alshawi et al., 2011; H. Chen et al., 2007; Johansson & Sudzina, 2009; Li et al., 2012; Salim, 2013; Seethamraju, 2014)	6
Market	Business reasons	Advantage competitive	(Ferneley & Bell, 2005; Li et al., 2012; Nguyen et al., 2012; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Seethamraju, 2014; Serrano et al., 2010)	7
		Opportunities for growth	(Nguyen et al., 2012; Ramdani et al., 2013; Seethamraju, 2008; Shaul & Tauber, 2012)	4
		Change requirements	(Seethamraju & Seethamraju, 2008)	1
		Uncertainty about the environment	(Shaul & Tauber, 2012)	1
	Market pressure	Competitors pressure	(Alshawi et al., 2011; Brown et al., 2017; Chatzoglou et al., 2016; H. Chen et al., 2007; Hsin & Papazafeiropoulou, 2008; Leyh, 2014; Ramdani et al., 2013; Ramdani & Kawalek, 2008; Seethamraju, 2008, 2014; Shahawai & Idrus, 2010; Shaul & Tauber, 2012)	12
		Customer pressure	(Hsin & Papazafeiropoulou, 2008; Seethamraju, 2014; Serrano et al., 2010; Shahawai & Idrus, 2010; Shaul & Tauber, 2012)	5
	Innovation	Pull – innovative, technology pull / competitive	Suppliers pressure	(Alshawi et al., 2011; Chatzoglou et al., 2016; Hsin & Papazafeiropoulou, 2008; Seethamraju, 2008, 2014; Serrano et al., 2010; Shaul & Tauber, 2012)
Cloud market maturity			(Li et al., 2012)	1
Software Provider	Reliability	The reputation of the provider	(Leyh, 2014; Salim, 2013; Seethamraju, 2014; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014; Zeng et al., 2017)	6
		Stability of the provider	(Douglas et al., 2010)	1
		Trust between partners	(Ahmad & Cuenca, 2013)	1
	Maturity	Experience / expertise	(Caldeira & Ward, 2002; Hustad & Olsen, 2011, 2013; Leyh, 2014; Nguyen et al., 2015; Serrano et al., 2010; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014; Zeng et al., 2017)	9
		Provider uses tools	(Ahmad & Cuenca, 2013; Caldeira & Ward, 2002; Shaul & Tauber, 2012)	3
		Partnership	(Kale et al., 2010; Shaul & Tauber, 2012; Sia, 2008; Winkelmann & Klose, 2008)	4

Sub-context	Factor	Sub-factor	References	No. of articles
		Provider support quality	(Ahmad & Cuenca, 2013; Alshawi et al., 2011; Caldeira & Ward, 2002; Chatzoglou et al., 2016; Leyh, 2014; Ramdani et al., 2013; Seethamraju, 2014; Shaul & Tauber, 2012; Sumner & Bradley, 2009; Tulivaye Hasheela & Smolander, 2014; Winkelmann & Klose, 2008; Zeng et al., 2017)	12
	Evaluation	Evaluating vendor / reseller / consultant	(Hustad & Olsen, 2011, 2013; Jha et al., 2008)	3
		Local vendors are considered better capable	(Zach & Munkvold, 2011)	1

Government

Governments are increasingly putting more pressure on enterprises, especially in tax matters, which is why SMEs are more willing to implant an EITA to meet these demands.

Market

The Market is the primary factor influencing an enterprise since on most of the occasions the reason of being of a company is there. The market demands their products or services, and it is for this reason that entrepreneurs are always attentive to look for new business opportunities, to have pressure from their customers, suppliers and competitors, also, to be in constant innovation to try to gain competitive advantage. All these aspects affect the existence of the enterprise, and an information system can be the difference between success and failure.

The provider (Software developer - Reseller – Consultant)

The EITA providers referred to in this section are software developers, distributors, and consultants who support the implantation of an EITA. The influence factors found in the literature have to do with reputation, the support they provide, the degree of experience they have, market stability, partnership, the use of tools, and local presence. Besides, buyers conduct evaluations of potential suppliers.

3.3 TOE-based influence factors from the literature review

To define the factors that most influence the implantation of an EITA, for each factor or sub-factor (mentioned in the selected articles), we have grouped it in one of the three contexts: Technological,

Organisational and Environment. Afterwards, the frequency with which the authors indicated a specific factor and based on this accounting the most named by the different authors were selected, obtaining the most influential (success) factors (cf. Table 3-4).

It is also necessary to clarify that these factors are not mentioned as "critical success factors" since the search that was carried out in the primary databases was done as "Issues" in the implementation/implantation of the different types of Enterprise IT Applications. This search resulted in several factors that different authors do not necessarily consider as critical success factors.

In this literature review, we detected that the *organisational context* is the one that most influences the implantation of EITA in SMEs. At the subcontexts level, we identified that *strategy*, *managerial* and *social issues* are the most influential.

Of the influence factors, we detected that the evaluation and selection factors are the important ones. At the level of influence subfactors, we identify that the authors give importance to the selection of EITA, CEO-CIO involvement, change management program, the organisational structure should be modified before project initiation (BPR), restriction the financial resources, the culture, the organisational characteristics, the strategic planning, the processes (BMP / BPR) of the enterprise and the management of the implantation project.

Table 3-4: TOE-based influence factors for implant an EITA in an SME

Context	Subcontexts	Factor	Sub-factor	No. of articles	
Technological	Software package or EITA	Evaluation and selection	Selection of EITA	15	
			Evaluation of EITAs	9	
		Customisation	9		
		Best fit	Fit between the process of EITA and company process	7	
	Data	Characteristics	Complexity	7	
		Data quality	Data quality control	7	
Organisational	Strategic	Top management support	CEO / CIO Involvement	16	
			Choose a "Project champion" of high level	12	
			Management and project steering committees	10	
		Understanding of needs, capabilities, and limitations	9		
		Plan the strategy	Planning integrated and coordinated	10	
	Structural	Organisational characteristics	Implement the strategy	Use of consultants	10
			Business size	9	

Context	Subcontexts	Factor	Sub-factor	No. of articles	
		BMP / BPR	The organisational structure should be modified before project initiation (BPR)	17	
	Managerial	Change management	Change management program	15	
		Resources constraints	Financial	16	
	Social	Users	Technical	11	
		Communication	User involvement	10	
		Education & Training	Good inter-department communication	11	
	Capability	Capability in IS / IT	Education and training to end-users	17	
			Capability in the domain of information systems	13	
Environment	Market	Business reasons	Advantage competitive	7	
		Market pressure	Competitors pressure	12	
	Software provider	Maturity		Provider support quality	12
				Experience & Expertise	9

From the factors and subfactors that influence the implantation of the EITA in the SME, we can conclude that most important factors are:

- Evaluation and selection of EITA
- CEO / CIO Involvement
- The organisational structure should be modified before project initiation (BPR)
- Change management program
- Existence of financial resources
- Education and training to end-users

3.4 Conclusions

From the review of the literature, it can be concluded that the most important factors for the successful implantation of an EITA are: Selection of EITA; CEO / CIO involvement; change management program; education and training to end/users; financial resources constraint; organisational structure should be modified, choose a project champion of high level, capability in the domain of information systems, provider support quality, project and risk management and competitors pressure.

The primary bibliographical references are mostly related to the ERPs, and at a great distance about CRMs, and after that, there are few documents about another type of EITA. Moreover, there is also literature that addresses problems in a specific way, such as the selection of an EITA, but there is little

literature that addresses the problem as a whole, that is, that covers the entire implantation process: pre-implantation, implantation and post-implantation

As may be seen, the acquisition and implantation of software packages or EITA is not an easy process. There are several factors, subfactors and variables that must be considered in the course of implantation, the reason why is necessary to define what is the best overall strategy to acquire and deploy an EITA in the SMEs, in summary, the findings indicate that the problems are different in a different context and they need different skills and organisational resources for their management.

A limitation of this literature review is that the success factors selected have been based on the number of times they have been mentioned, but this does not mean that they are not the most relevant.

3.5 Research Opportunities

From the literature review carried out, we can observe that in **the academic field** most of the research focuses on the pre-implantation phase, for which different frameworks (readiness, decision support, selection, requirements) have been developed according to summarised in Table 2-4. Also, there are several theoretical frameworks which are based on the TOE framework, which propose the factors that influence or impact the process of adopting an EITA in the SME, as shown in Table 2-5. Academics also offer more holistic frameworks which try to cover the entire process of taking an EITA in SMEs, but with the inconvenience of having a very general approach; Also, they do not detail the construction process of the proposed model (cf. Table 2-6).

On the other hand, the frameworks **proposed by the leading software producers** are more concentrated in the implantation phase of the EITA and with specific procedures for the software consultants that implant the EITA in the SME. Also, in the pre-implantation phase, these frameworks are more concerned with offering guidance to consultants to close the sales process to SMEs.

With this background, we identify a research opportunity, which is focused on the need to understand the process of adopting an enterprise IT application in the SME. This process must cover the three phases (pre-implantation, implantation, and post-implantation) and involve the SME and the EITA provider.

Then, once we have understood the process of implanting EITA in SMEs, and we have recognised the actors involved, the motivations and difficulties, we can move forward in the next step in research.

This step would consist of proposing specific solutions according to the type of company (micro, small or medium) and according to the phase or stage of the process of implanting an EITA in the SME.

3.6 Summary

One of the first tasks we performed in this thesis was the literature review. This in order to understand the state of the art in which the subject to investigate is found. Besides, the literature review allows us to find existing gaps, and from these, allows us to identify research opportunities.

So, after completing the literature review, we can indicate that the main success factors in a project to implement an EITA in the SME are: Evaluation and selection of EITA, CEO / CIO involvement, the organisational structure should be modified before project initiation (BPR), change management program, existence of financial resources, and education and training to end-users.

We also identify a research opportunity, which is focused on the need to understand the process of adopting an enterprise IT application in the SME. This process must cover the three phases (pre-implantation, implantation, and post-implantation) and involve the SME and the EITA provider.

PART 2

Chapter 4

4. Research Design

This chapter introduces the research design of this thesis. It is organised as follows. Section 4.1 begins by reviewing the success theory of DeLone and McLean Information Systems and the TOE Framework. Section 4.2 identifies the problem and overall objective that we address in this investigation. In this work, we used two different approaches to carry out this research: the first, used for understanding the process of implanting EITA in SMEs, and the second, encompasses the development of recommendations for addressing specific issues the EITA implantation process. So, Section 4.3 presents a basic research process (used to understand the phenomenon of interest), which consisted of conducting an exploratory case study and a field study - interviews with key stakeholders involved in the process of implanting EITA in SMEs. Section 4.4 presents an applied research process. In this case, we use a Design Science Research (DSR) approach to propose a change management artefact to extend the Primavera Implantation Methodology (MIP). Figure 4.1 provides a general view of the research design.

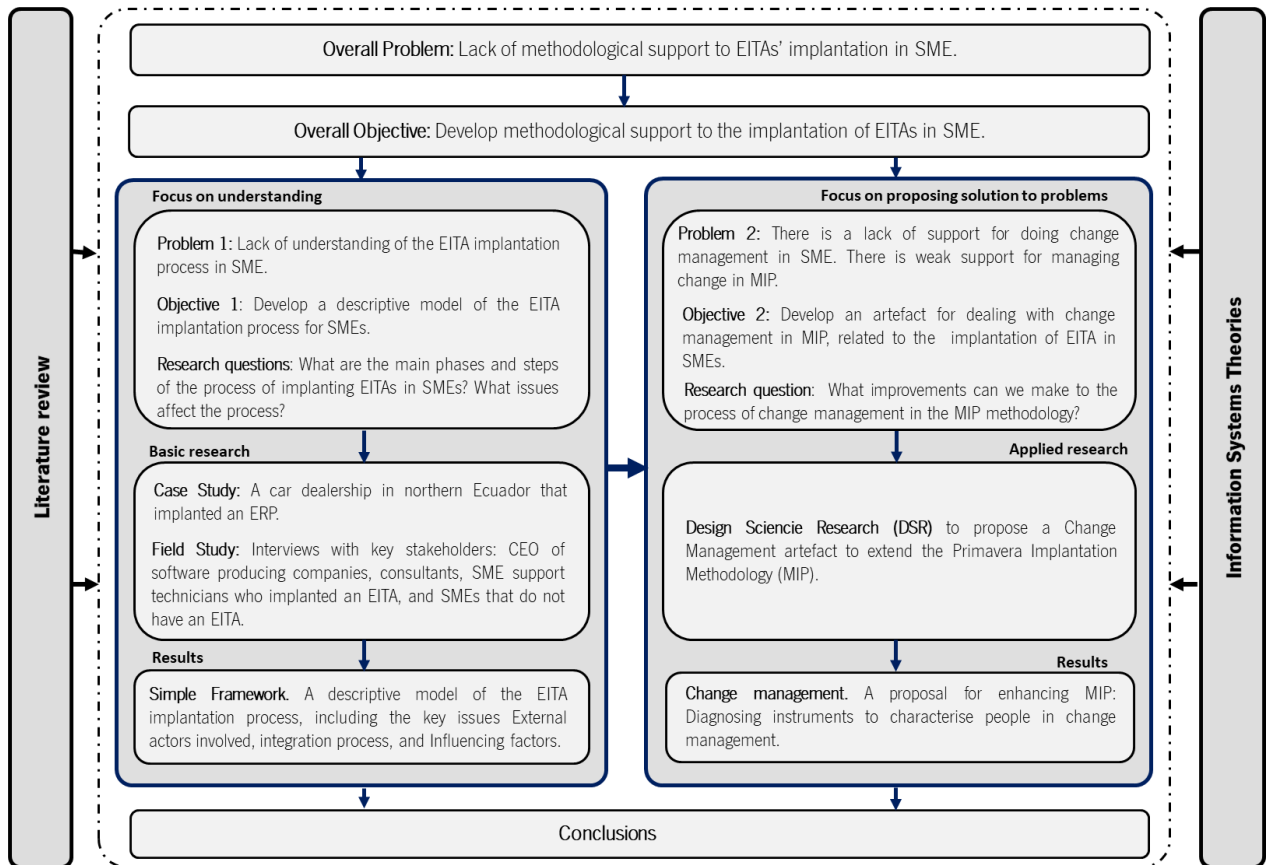


Figure 4-1: The overall research strategy

4.1 Theories related to the successful adoption of technology in enterprises

In addition to themes covered by the literature review, we felt the need to consider several theories, from the Information Systems field, that addresses the adoption of technology. The use of theory provides a frame that supports the identification of the main factors that influence the process of technology implantation.

Theories are common conceptual frameworks to describe a phenomenon relevant to a disciplinary domain (Sjøberg et al., 2008). Theories help humans to make sense of the world by defining constructs and establishing their relationships. They are the basis for providing explanations about what happened in the past and for making predictions about the future (Gregor, 2002).

The implantation of EITA in enterprises is a phenomenon that can be related to several theories from the field of Information Systems that provide concepts about what is a successful EITA and what

influences that success. In this section, we make a revision of the Delone and McLean IS success model and of the TOE framework.

4.1.1 Delone and McLean IS success model

Delone and McLean in 1992 developed a taxonomy of IS success measures. The model results from a revision of research that involved IS success as a dependent variable, published during the period between 1981 and 1990. The model considers six dimensions of IS success measurement: System Quality (technical level); Information Quality (semantic level); and Use, User Satisfaction, Individual Impact, and Organisational Impact (influence level), Figure 4-2. (DeLone & McLean, 2016).

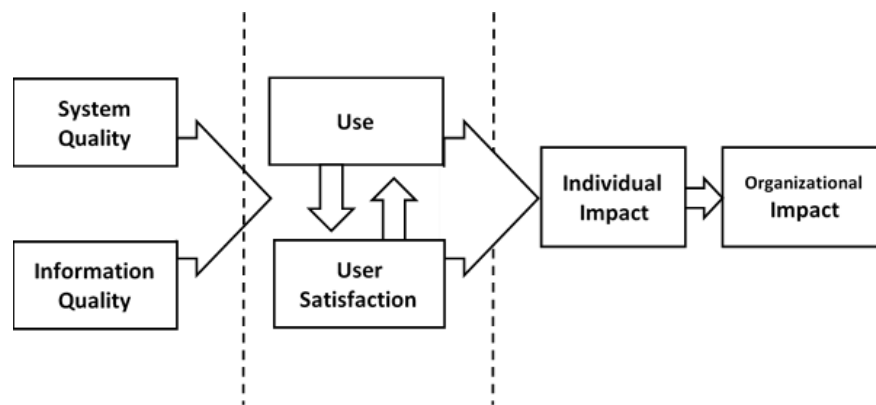


Figure 4-2: Information Systems Success Model (adapted from Delone & McLean, 1992)

After the publication of the model in 1992, several IS researchers began to propose modifications to the model. For example, Seddon (Seddon, 1997) argues that the concept of "Use" is ambiguous. Other researchers have suggested that another dimension - "Service Quality" - should be added to the model. Besides, several researchers also suggested that there are several other levels of IS impact, such as work/group impacts, inter-organisational and industry impacts, consumer impacts and societal impacts (DeLone & McLean, 2016).

In response to these suggestions, Delone and McLean in 2002 and 2003 (DeLone & McLean, 2003, 2002) modified the model. The significant changes included: adding the dimension "Intention to Use", associated to the "Use" dimension; adding the "Quality of Service" dimension; reviewing the impact dimensions in order to make it more general and capable of accommodating impacts at several levels of analysis - "Net Benefits". Delone and McLean recognised that information systems (i.e., IT applications and platforms) are dynamic, which justifies the use of a process perspective in the model. The realization of benefits (or their lack) justifies considering backwards influences to "User Satisfaction" and to "Use", reinforcing (or attenuating) the "Use" and the "User Satisfaction", depending upon whether the

“Impacts” are positive or negative. To reflect this, DeLone and MacLean added the feedback loops to their model (cf. Figure 4-3).

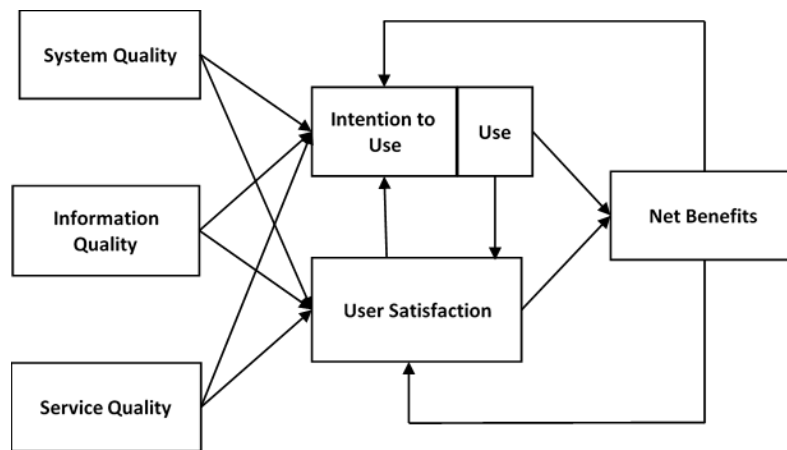


Figure 4-3: Updated Information Systems Success Model (adapted from DeLone & McLean, 2003)

After the publication of 2003, DeLone and McLean made two additional changes to their model. The first modification was the substitution of the term "Net Benefits" by "Net Impacts". The impact is a concept more general than benefit and has the advantage of better-accommodating impacts that are not positive, thus acknowledging that both, positive and negative, results can occur. A second change is to recognise the need for an additional set of feedback loops from "Use" and "User Satisfaction" back to "System Quality", "Information Quality" and "Service Quality" (cf. Figure 4-4).

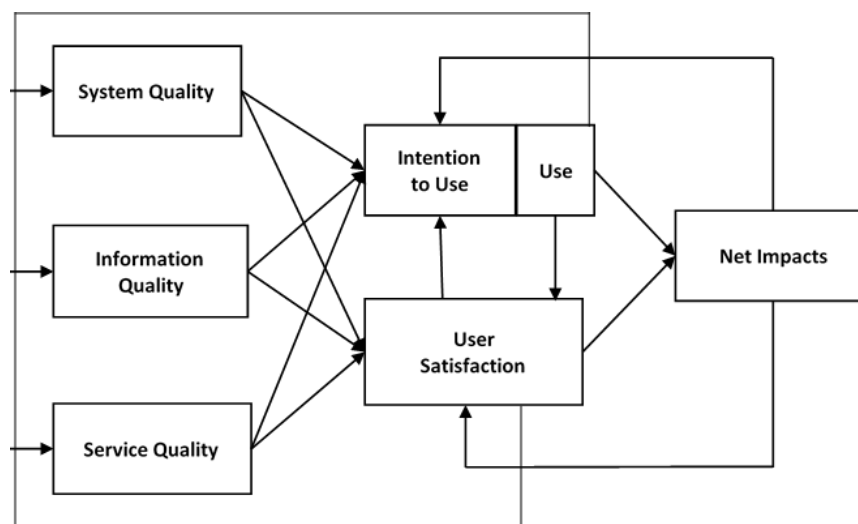


Figure 4-4: Updated Information Systems success model (adapted from DeLone & McLean, 2016)

The most recent update of the DeLone and McLean IS Success Model was published in 2016 (DeLone & McLean, 2016). In this version, the description of the success dimensions is presented as follows:

- **System Quality.** The desirable characteristics of an information system. For example, ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times.
- **Information Quality.** The desirable characteristics of the system outputs, i.e., management reports and Web pages. For example, relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability.
- **Service Quality.** The quality of the support that system users receive from the information systems organisation and IT support personnel. For example, responsiveness, accuracy, reliability, technical competence, and empathy of the IT personnel staff. SERVQUAL, adapted from the field of marketing, is a popular instrument for measuring IS Service Quality.
- **Use.** The degree and manner in which employees and customers utilize the capabilities of an information system. For example, amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use.
- **User Satisfaction** — users' level of satisfaction with reports, Web sites, and support services. For example, a couple of the most widely used multi-attribute instruments for measuring user information satisfaction.
- **Net Impacts** — the extent to which information systems are contributing (or not contributing) to the success of individuals, groups, organisations, industries, and nations. For example improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development.

This model provides a general view of the dimensions that can be considered for assessing the success of an EITA.

4.1.2 The TOE Framework for the success of EITA and their adoption

The Technology-Organisation-Environment (TOE) framework provides an explanation of the factors that affect decisions regarding technological innovations. i.e., decisions related to the successful adoption and exploitation of technologies capable of constituting the basis for organisational innovation.

The framework (cf. Figure 4-5) identifies three categories of factors: technological, organisational and environmental (DePietro et al., 1990).

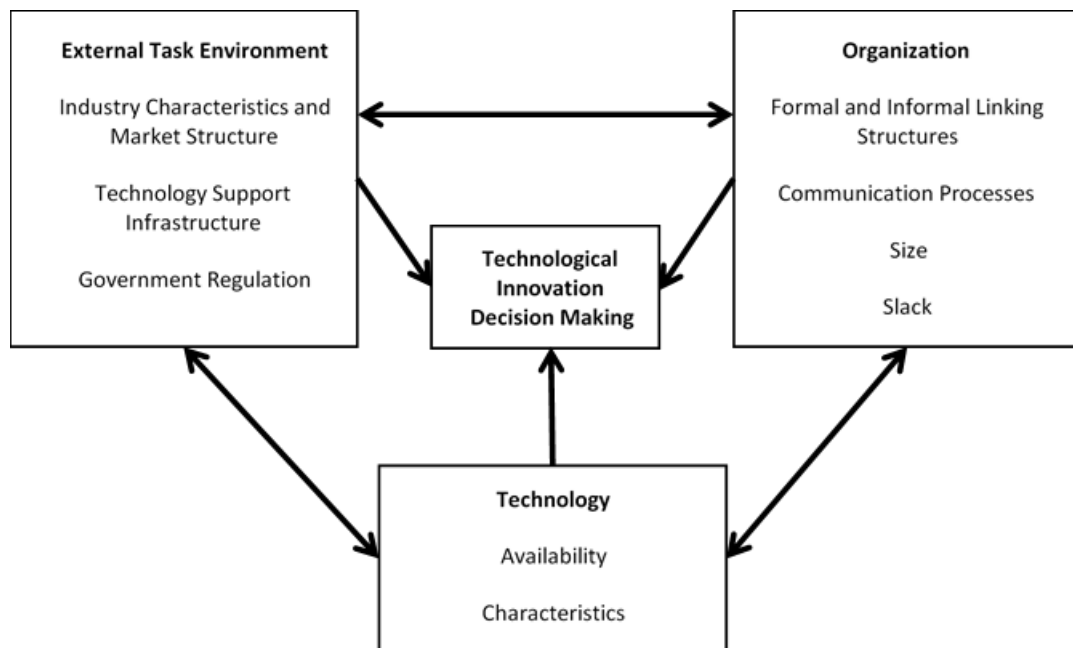


Figure 4-5: TOE Framework (adapted from DePietro et al., 1990)

These categories can be viewed as the contexts of technological innovation, namely:

Organisation context is typically defined in terms of several descriptive measures: firm size; the centralisation, formalisation, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally. Also include the informal linkages between employs, and the transactions carried out through them: decision making and internal communication. (DePietro et al., 1990)

Technological context describes both the internal and external technologies relevant to the firm. This includes current practices and equipment internal to the firm, as well as the pool of available technologies external to the firm. (DePietro et al., 1990)

Environment context is the arena in which a firm conducts its business – its industry, competitors, access to resources supplied by others, and dealings with government. All these can influence the degree to which a firm sees the need for, seeks out, and brings in new technology. The environment presents both constraints and opportunities for technological innovation. (DePietro et al., 1990)

The factors affecting decision-making related to technological innovation encompassed by the TOE framework make it a beneficial theoretical basis for the development of methodological recommendations concerning the implantation of EITA in SMEs.

4.2 Problem and Objective

SME - the vast majority of enterprises in all economies around the globe- often get involved in processes aiming at adopting IT applications. For most of their IT requirements, mainly to tackle their basic operations, SME relies on COTS software. Therefore, getting in reach of appropriate software does not correspond to a software development process involving requirements identification and software design and construction. Making a parallel to medical procedures, the process can be described as implantation of an IT product. The process involves the selection of an IT (mainly software, in most cases) package adequate to the aims of the SME; installation and configuration; adjustment between the IT package and the organisation (configuration of the IT package and introducing changes in organisational processes and procedures); stabilisation and support (rehabilitation) to assure the success of the IT package and the realisation of the expected benefits.

The adoption and success of information technology are widely studied phenomena. However, most studies are concerned with large companies. On the other hand, the IT adoptions if often viewed as involving the development of the IT applications that will be used.

Our research identified a gap in the literature concerning the implantation of EITA in SME. In particular, there is a lack of methodological support to the implantation of EITA in SME. Such methodological support is crucial to the success of EITA products, to the success of the implantation process and, eventually, to the success of the SME.

Thus, the general objective of this research is to develop methodological support to the implantation of EITAs in SME. This support must be suitable to a wide range of situations faced by SMEs with little information technology (IT) capabilities and resources when getting involved in processes that include the selection of commercially available EITA, its acquisition, installation, and exploitation.

To achieve that objective, the research has been organized in two phases:

Phase 1 - Improve the existing understanding of the phenomenon of EITA implantation in SME.

This phase can be described as aiming at answering a set of research questions, namely: What are the main motivations for an SME to implant an EITA?; What are the main difficulties SMEs face when implanting EITAs?; What factors are facilitators in the process of implanting EITA in SMEs?; What are the main phases, stages and activities of the process of implanting EITAs in SMEs?

The last question is viewed as particularly interesting as it leads to an important research result: a general model for the EITA implantation process in SMEs. Such model should take into consideration the answers to the previous questions.

The resulting model – SIMPLE – is herein described as a descriptive model, produced through a research process that addressed the aforementioned research questions.

However, being a general model, SIMPLE can also be viewed as a prescriptive model. It can be used as a general framework for planning an EITA implantation process in SMEs. Therefore, SIMPLE contributes to the general objective of the thesis

Phase 2 – Provide methodological recommendations to specific aspects of the EITA implantation process in SMEs

Although the development of methodological recommendations to the EITA implantation process in SMEs was a general aim of this research project since its inception, the identification of the specific aspects to address had to wait until the end of the first phase.

The aspect that was elected as deserving special attention was change management, an area that is too often presented as crucial to the success of organisational improvement but lacks adequate support.

The unfolding of the research project, and especially the fieldwork carried out during the first phase, brought up an opportunity to focus on an already existing methodology related to the implantation of EITA in SMEs: the consultancy division of a software house developed a methodology for the EITA implantation in SMEs. This methodology – MIP – fails to provide the sought answers to the questions stated for phase 1. MIP takes the perspective of an EITA provider, thus lacking the independent perspective an SME should start with.

However, MIP was recognised as constituting a suitable ground for the second phase of this research. MIP considers the change management dimension in EITA implantation processes, but the provided support is rudimentary. As MIP owners recognise both, the importance of change management in EITA implantation processes and the basic state of MIP regarding this aspect, a research opportunity arose: to develop methodological recommendations related to change management to be incorporated in MIP.

This research opportunity was seized as it is completely aligned with the research objectives of the thesis, and it brought short term value to the project.

The result of the second phase -methodological recommendations related to change management- can be described as design theory as they are used in a situation that involves design: the design of new organisational configurations that accommodate the implantation of EITA. Managing the ensuing change is a key aspect of EITA implantation processes.

Figure 4-6, based on (Gregor & Hevner, 2013), attempt do depict the general structure of the research design of this thesis' research, encompassing a phase of production of descriptive knowledge and a phase addressing the production of prescriptive knowledge.

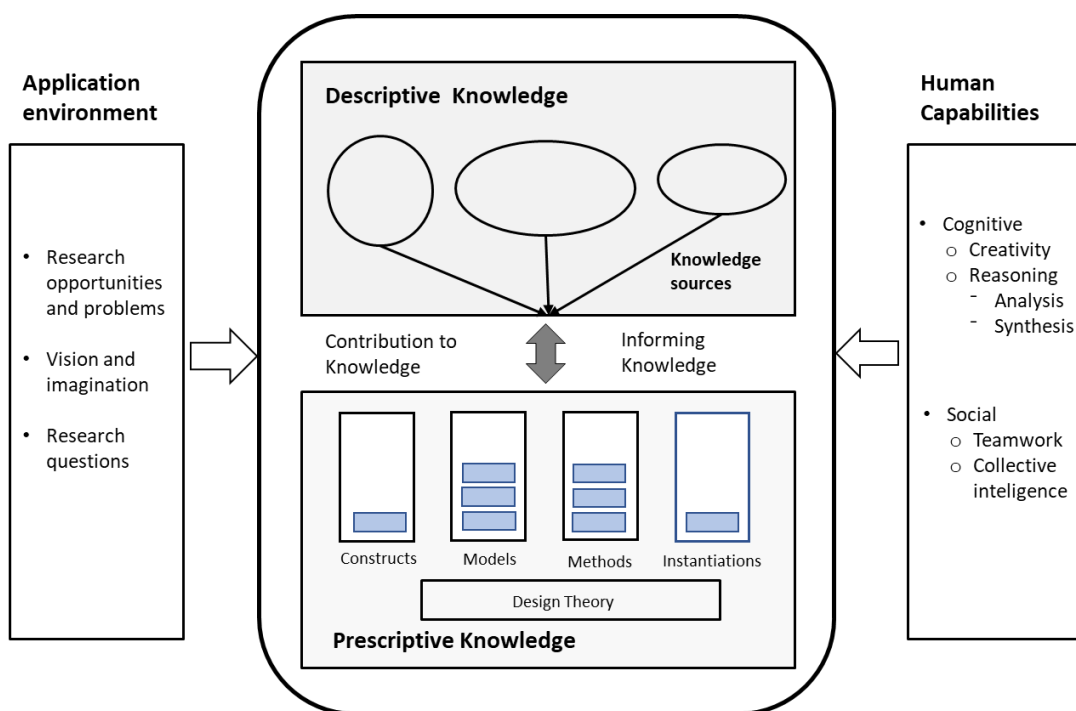


Figure 4-6: The roles of knowledge in Design Science Research (adapted from Gregor & Hevner, 2013)

Table 4.1 presents a summary of the phases of this research.

Table 4-1: Summary of the research phases

	Phase 1	Phase 2
Problem	Lack of understanding of the EITA implantation process in SME.	There is a lack of support for doing change management in SME.
Objective	Answer the following research questions: <ul style="list-style-type: none"> - What are the main motivations for an SME to implant an EITA? - What are the main difficulties SMEs face when implanting EITAs? - What factors are facilitators in the process of implanting EITA in SMEs? - What are the main phases, stages, and activities of the process of implanting EITAs in SMEs? 	Develop an artefact for dealing with change management related to the implantation of EITA in SME.
Main result	Describe the model of the EITA implantation process for SME.	Methodological artefacts for dealing with change management in the MIP methodology.

4.3 Basic Research – understanding the implantation of EITA in SME

This basic research aims to improve the understanding of the process of implanting EITA in the SME, and also contributes to the accumulation of knowledge in this area. For this, we use two qualitative research methods: An exploratory case study and field study.

In this research, we use a qualitative approach since this type of research is used to understanding issues or situations by investigating the perspectives and behaviour of the people in these situations and the context within which they act. To accomplish this, qualitative research is conducted in natural settings and uses data in the form of words rather than numbers. Qualitative data are gathered primarily from observations, interviews, and documents, and are analysed by a variety of systematic techniques. This approach is useful in understanding causal processes, and in facilitating action based on the research results (Kaplan & Maxwell, 2005).

Exploratory case study

The purpose of conducting an exploratory case study is understanding in situ the implantation process of EITA, the problems that arise and the decisions made to overcome those problems in a SMEs.

This case study was conducted in a medium-sized car distribution enterprise in northern Ecuador. The result of this case study was a simplified version of the SIMPLE framework.

Whatever the field of interest, the distinctive need for case study research arises out of the desire to understand complex social phenomena. In brief, a case study allows investigators to focus on a “case” and retain a holistic and real-world perspective – such as in studying individual life cycles, small group behaviour, organisational and managerial processes, neighbourhood change, school performance, international relations and the maturation of industries. (Yin, 2014).

The case study research design is presented in Figure 4-7.

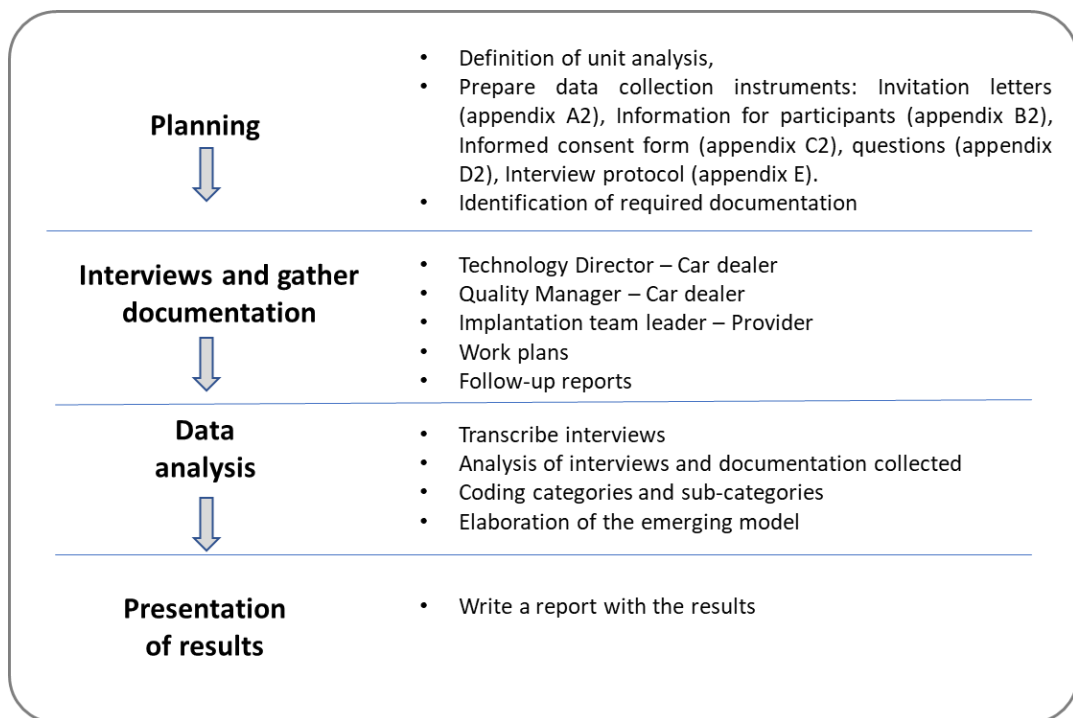


Figure 4-7: Case study research design

Field study

Subsequently, based on the results of the Case Study (a first version of the SIMPLE framework), we conducted a field study. This study consists of performing interviews with the stakeholders involved in the process of implanting an EITA in the SME. In total, we conducted forty-eight interviews that included different stakeholders that participate in EITA implantation processes in SMEs. The stakeholder interviewed are divided into one of the following groups: CEO of software producing enterprises, consultants, SME support technicians who implanted an EITA, and SMEs that do not have an EITA.

The research design for this study is presented in Figure 4-8.

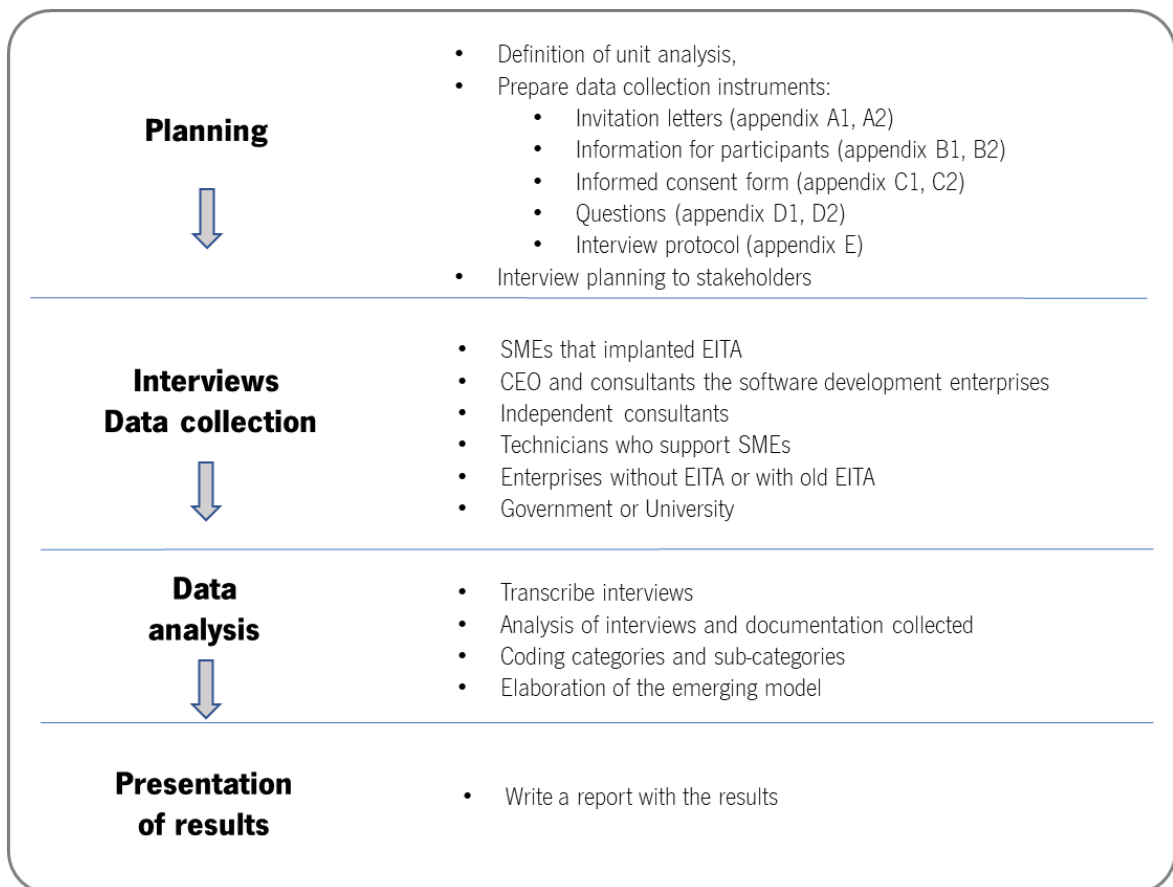


Figure 4-8: Field study research design

With the completion of these two studies, the SIMPLE Framework (Simple implantation the EITA in SMEs) emerges. It is necessary to highlight that this Framework is descriptive; that is, it describes as EITA providers and SMEs implant EITAs in enterprises. However, being a general model, SIMPLE can also be viewed as a prescriptive model. It can be used as a general framework for planning an EITA implantation process in SMEs.

4.4 Applied Research – using the achieved understanding to propose prescriptive knowledge.

Once the problem is understood and characterised, we move on to the next stage - propose and evaluate solutions - thus involving knowledge as a purpose (Prescriptive).

For this, we detected in the field study that a software producing enterprise had its methodology to implant its software. We also detected that this methodology had flaws in issues related to change management in the process of implanting an EITA, which was confirmed by the company's executives.

Here the opportunity arose to propose an improvement to the MIP methodology on issues related to change management in the process of implanting an EITA.

Based on the SIMPLE Framework, we proposed an improvement to the Change Management process existing in the Primavera Implantation Methodology (MIP). To make this proposal, first, we had to analyse the structure and the way of working of the MIP methodology and based on this, we propose an improvement to the change management section of the MIP. For this, we have used the Design Science Research (DSR) model, which allows applied research. In this case, it allowed us to create a proposal that complements the Primavera methodology.

For the development of this applied research, we use the Design Science Research Process (DSRP) proposed by (Peffer et al., 2007), which consists of the following activities: identify the problem, define solution objectives, design and development, demonstration, evaluation, and communication (cf. Figure 4-9).

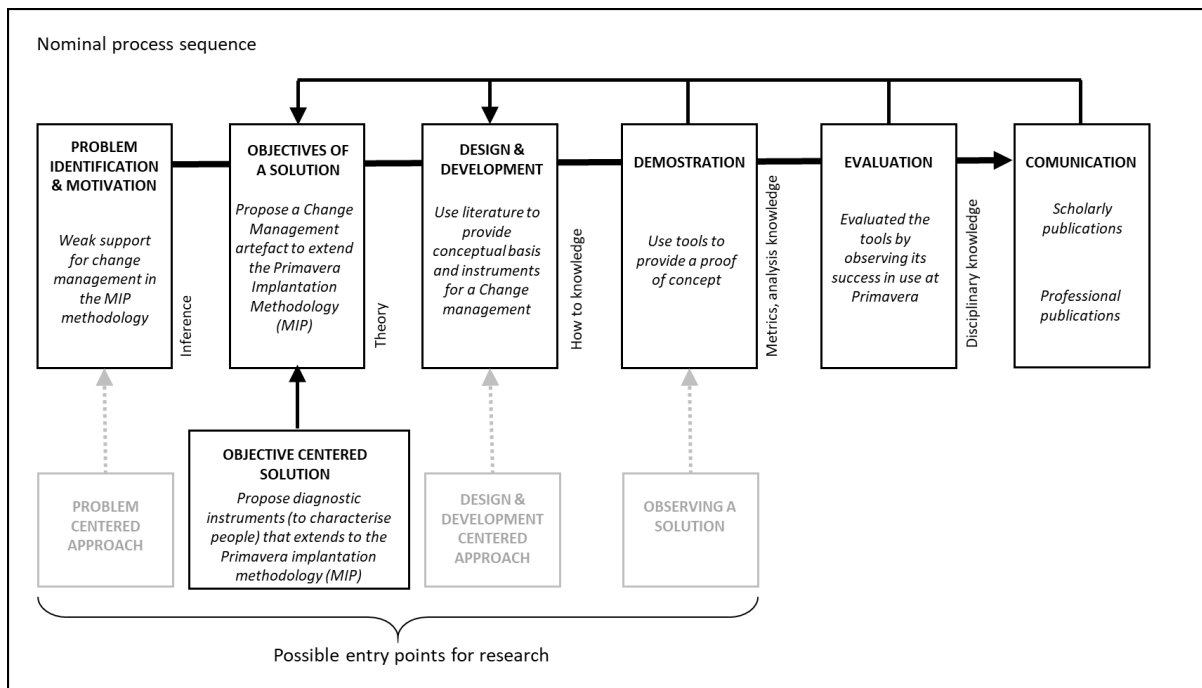


Figure 4-9: DSRP proposed by this research (adapted from Peffer et al., 2007)

4.5 Summary

In this chapter, to propose the research design, we begin by reviewing the Delone and McLean Information System success model and the TOE framework. Later we raised the general problem “Lack

of methodological support to EITAs' implantation in SME" and the general objective that guided this research "Develop methodological support to the implantation of EITAs in SME".

Next, we propose the problem and the specific objectives from two approaches. The first focused on understanding the problem and the second focused on proposing solutions to the problems. In this way, from the general problem we obtained the specific problems "Lack of understanding of the EITA implantation process in SME" and "There is a lack of support for doing change management in SME". Once we identify the problems, we define the specific objectives, which are "Develop a descriptive model of the EITA implantation process for SME" and "Develop an artefact for dealing with change management related to the implantation of EITA in SME".

In the next step, we define the type and methods of research to use. Thus, according to the problem and the specific objectives, we use basic research and applied research. For basic research, we use a Case Study (A car dealership in northern Ecuador that implanted an ERP) and Field Study (Interviews with key stakeholders: CEO of software producing companies, consultants, SME support technicians who implanted an EITA, and SMEs that do not have an EITA.) For applied research, we use DSR to propose a Change Management artefact to extend the Primavera Implantation Methodology (MIP).

PART 3

Chapter 5

5. Case Study – The Northern Ecuador car dealer

The present case study tries to contribute to improving the understanding of the process of search, evaluation, selection, contracting, integration, and operation of an EITA. Also, try to recognise the main difficulties encountered in this process and how SMEs deal with those difficulties.

The study was carried out in an enterprise that recently substituted an ERP. This enterprise is a car dealer in northern Ecuador that represents an American brand, and therefore, it must abide by the processes and policies imposed by the brand. The enterprise has three main business activities: the sale of vehicles, the sale of spare parts, and car repairs. At the time the study was carried out, the enterprise had around 200 employees distributed in six cities in the north of the country (Ibarra, Tulcán, Otavalo, Esmeraldas, El Coca and Lago-agrio).

The enterprise has more than 30 years of experience in the sale of vehicles. In 2007 they installed their first ERP; on that occasion, the board of directors decided to implant an ERP without consulting with the Information Technology (IT) area. The board informed the IT area that an ERP provider would come to implant the application.

At the end of 2012, the enterprise decided to change ERP due to new requirements of the superintendence of banks of Ecuador. The company that provided the previous ERP was not able to respond to the new demands of the car dealer enterprise. For this reason, the migration to the new ERP was done in 2013.

5.1 Research design - plan

We conducted this research as an exploratory case study. A Case study research is the most common qualitative method used in information systems field (Myers, 1997); besides, the case research strategy is well-suited for capturing the knowledge of practitioners and developing theories (Benbasat et al., 1987).

The purpose of the case study is to understand how SMEs carry out the process of search, evaluation, selection, contracting, integration, and operation of an EITA. The following are the research

questions that drive the study: What are the main phases and steps of the process of implanting EITA in SMEs? What problems affect the process? What lessons were learned with the implantation of a new ERP?

To conduct this case study, we used the recommendations suggested by Yin (Yin, 2014). The study can be described as a single case under a rationale of which this case is typical. A holist design was chosen to deal with the unit of analysis: "*the project of implantation of an enterprise IT application in an SME*". Besides, we assume that the project starts with the identification of business need by the enterprise. It encompasses the search, evaluation, and selection of a commercial software package (EITA), its acquisition, and implantation. The project ends when the enterprise considers that the new EITA works satisfactorily, and it is fully embedded into the enterprise's activities.

To carry out the case study, we obtained an authorisation from the general manager, which was requested through the IT director (Appendix A3). Several key players in the implantation project were interviewed, including the technology director, the quality manager, and a consultant from an external enterprise that carried out the implantation process. Later, a second interview with the technology director of the enterprise was necessary to clarify some issues and extending into others. Each interview had an approximate duration of 60 minutes (Table 5-1)

Table 5-1: Summary of interviews with personnel of the car distribution enterprise

Nº	Type of actors interviewed	Interviews	Average (min)	Min (min)	Max (min)
1	Technology Director	2	63	36	90
2	ERP Implanter	1	60	-	-
3	Quality Manager	1	30	-	-
Total		4			

The interviews were carried out by teleconference via Skype. Each interview had an approximate duration of 60 minutes. Interviews were transcribed using two software tools: one to reproduce the audio slowly and the other to dictate the reproduced audio to a word processor. The tools were, respectively, **Transcribe** (<http://otranscribe.com/>) and voice writing from **Google Docs** (<https://www.google.com/intl/en/docs/about/>).

Transcripts of these interviews were analysed together with the documents generated during the implantation process; we used MaxQDA qualitative analysis tool following the recommendations of

Kuckartz (Kuckartz, 2014) for this purpose. The analysis of the interviews involved the establishment of coding that included categories and subcategories, which arose from the data with an inductive approach (cf. Figure 5-1).

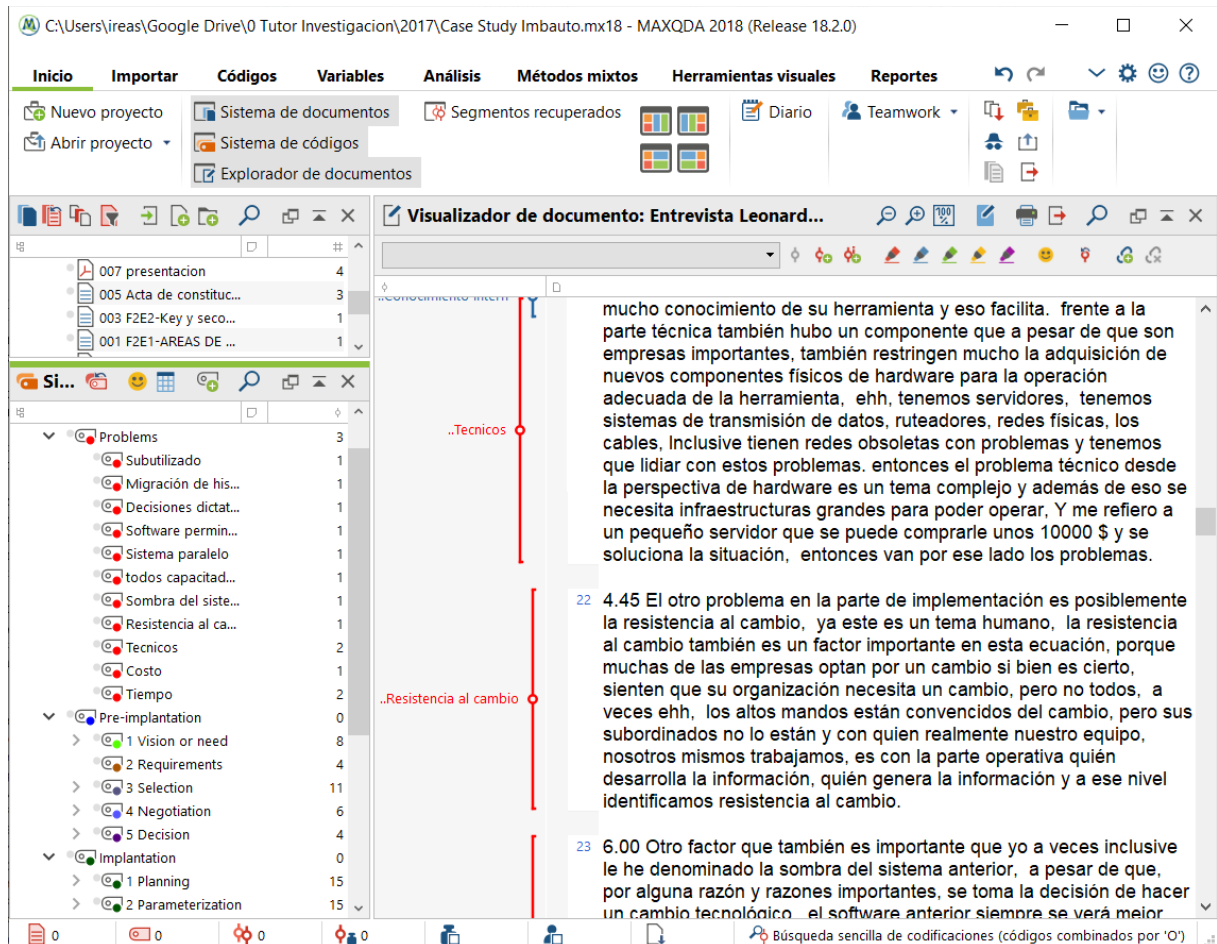


Figure 5-1: Case study codes using MaxQDA

Besides, we chose the holistic design to work with the unit of analysis; if the case study examined only the global nature of an organisation or a program, Yin recommends using a holistic design (Yin, 2014).

5.2 Implantation process

Based on the interviews conducted and the documentation reviewed in this case study, it was possible to identify the implantation process that was carried out in this enterprise (cf. Figure 5-2). This process consists of three perfectly differentiated phases (pre-implantation, implantation, and post-implantation) and a set of cross-cutting concerns (leadership & communication, change management, and project management).

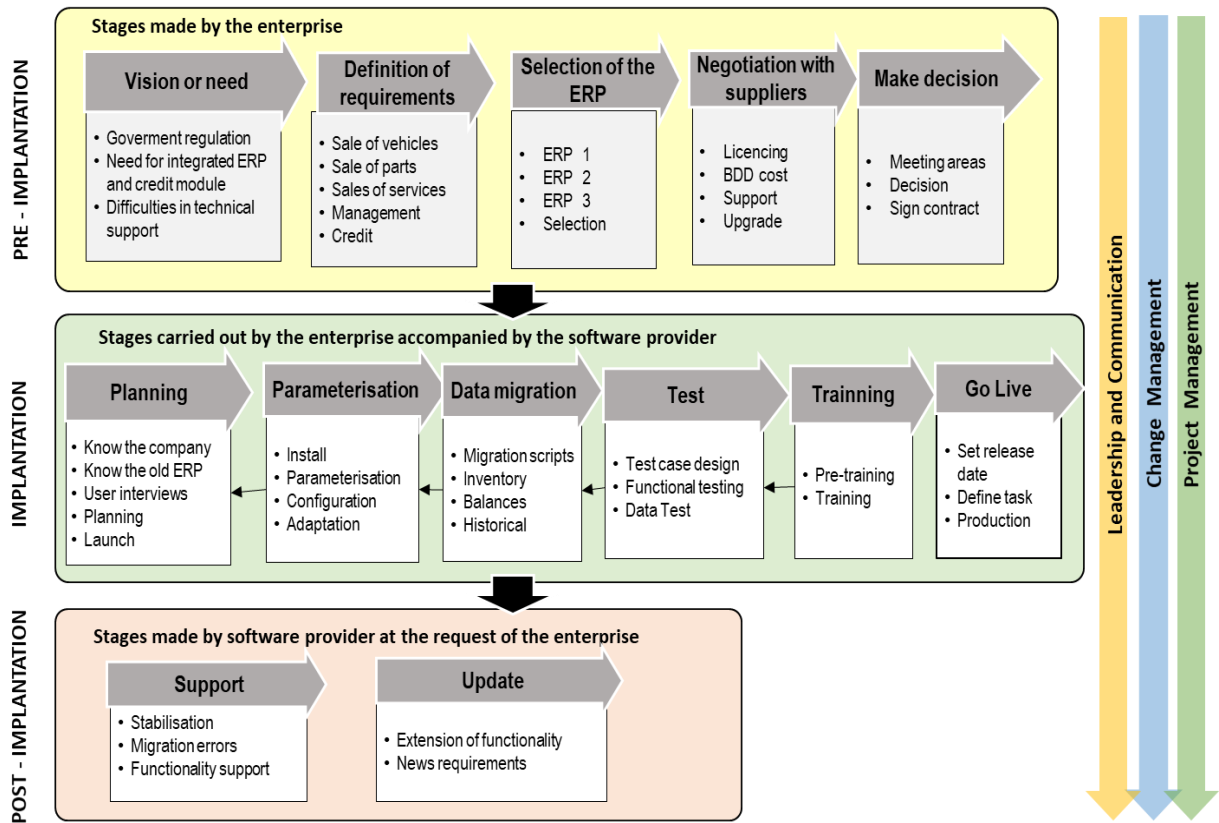


Figure 5-2: Implantation process of the EITA in a car deal

5.2.1 Pre-implantation phase

The internal staff of the enterprise conducts the first phase. The objective of this phase is to search, evaluate, select, and contract the new EITA and your provider. For which the following stages are carried out

Vision or need

The main reason for the implantation of a new ERP in the organisation was that government issued a regulation through the superintendence of banks, which required that companies that provide credits should have an IT application that allows to control them, and the ERP that it had at that time did not have this module.

On the other hand, since some time ago, the enterprise was having difficulties in technical support with the ERP provider. The enterprise was not satisfied with the service received. Also, this service increased in cost. Due to this new need, was made some requests and even requested a face-to-face

meeting with the manager of the supplier company to deal with this issue (Credit module development) but in the end, the supplier confirmed that they could not assist in that need specified.

To solve this problem, the company had two options. The first option was to buy a credit module and integrate it with the current ERP (could have been through a web service or other technology that allows it). The second option was to look for another ERP that has all the integrated modules, including the credit module. The vision was to have one or several IT applications that have the information of the enterprise in an integrated way.

Definition of EITA Requirements

In general, the system that the organisation was looking should have three main areas (vehicle sales, spare parts sales, and services sales), in addition to a general area of business management and the credit module requested by the superintendence of banks, in summary, the modules are:

- **Vehicle sales.** The sale of vehicles (light, heavy, and used) has some scenarios. The customer can buy a vehicle and add several accessories; then there are several forms of payment: cash, credit, and credit with other financial sources. Depending on that, the enterprise needs to create an amortisation table.
- **Spare parts sales (inventories).** The vendor can sell a spare; it is not the same as a vehicle bill. It can sell the spare or could assemble kits and sell these kits.
- **Services sales (car workshop).** This module requires the client to make reservations for the maintenance of his vehicle. Then, when the client arrives, this reservation becomes a workshop order. Finally, this module must bill the replaced parts and the services offered.
- **Credit module.** This module allows managing a customer's credit, registers the credit application, its approval, amortisation table, among others.
- **Management modules.** For the financial and human resources department.

ERP Selection

Due to the particularities of this enterprise, it is difficult to find an ERP that fits all areas and is integrated. The company can find suitable software for specific areas, but the drawback is that does not work together, for example, the car workshop has specific issues of its own of the enterprise, it is difficult

to find software that meets these requirements and work together with other modules. With these considerations, the enterprise analysed three options:

- **Option 1: Maintain the current ERP and buy a credit module**

Work on the integration of these systems through web services or other technology. This involves working with two software suppliers to perform integration. The advantage is that the ERP system was in operation, and the external module was sound. The disadvantage is the difficulty of integrating these two applications, the high integration costs and the uncertainty that the apps work integrated.

- **Option 2: Find another ERP that has the integrated modules, including the credit module**

Enterprise staff searched an ERP in the automotive sector; they found another ERP that worked in a concessionaire of characteristics like theirs. The advantages are that the modules are already integrated. The disadvantages were the high cost of this application and that the entire ERP should be migrated.

- **Option 3: Search for a top-level ERP**

Identify a ERP recognised nationally and internationally as top level that meets the needs of the enterprise. As an advantage of this ERP was the prestige, it possesses as a brand. The disadvantage is the high costs and the uncertainty that it can adapt to this type of requirements.

In a meeting of executives, they concluded that option one (buy another IT application and integrate with the existing one) would be challenging to carry out. They would possibly end up using the two systems independently, so this option was ruled out. Option three was immediately rejected due to its high costs. Option two was the most viable for them, which is why they asked for a more detailed analysis.

All areas intervened in this analysis. For this reason, each area travelled to another city (200 km away) to review the operation of the possible new ERP in a dealership with similar characteristics. Finally, the areas prepared an integrated report. This alternative (option two) was suggested in a meeting of the areas with management and the presidency.

It is necessary to indicate that the cost of the second option was higher by 25% of the first option. Besides, to that the software provider came from a different city (200km), implying that the implantation

process needed of additional logistics. With this information, the board approved the purchase of a new ERP.

Negotiation with the supplier

In this ERP, the mode of licensing of the selected software was per user and depending on the number of users, the costs varied, the more users the cost per user decreased. In addition, another cost that was considered was that of the DBMS (Data Base Management System), which almost equalled the cost of the ERP itself, this cost at the beginning was not considered due to lack of knowledge of the managers, here the director of the information technology intervened to clarify this issue.

Other parameters that are negotiated, and that each year a contract is renewed, is the cost of updating and the cost of technical support.

Make the decision

Initially, the president refused to change enterprise applications; he said *“They have to adapt with the system that is working, and with that, we will work”*, the president had information that is transmitted between owners of this type of business and justified saying that apparently with the same ERP another company was working, and from there, he resisted.

However, the need forced to find a solution. So, based on the second option, a meeting was held between all areas. A joint presentation and report were made to the president and general manager. At this point, the IT director said: *“Manager was possibly convinced of the change but needed the criteria of all.”* In that presentation, the message they conveyed was that the option to change platform was the most convenient. The directors agreed to hold a meeting between the board, and after about a week they said YES.

5.2.2 Implantation phase

Once the provider (for the software and for its implantation) is hired, it goes on to the next phase, which is carried out by the provider's staff accompanied by the company's technology staff and guided by the provider's implantation methodology. In this phase, the provider identifies the following stages: Planning (knowledge of the enterprise), parameterisation, data migration, testing, training, and the go-live of the EITA. Also, in the course of the implantation, problems are detected with the technological infrastructure (servers, communication equipment, structured cabling).

Planning

The software provider carried out some activities to recognise the current state of the enterprise. So, the provider visited all areas involved with the new ERP, to understand the structure and how the enterprise operates. Interviews were conducted in each area (manager and assistant manager), which are more informed in the daily operation of the enterprise. Another activity is to understand how the old ERP it works and what data structure has. At this point, the implantation head by the supplier said: *“Understanding the strengths and weaknesses of old EITA is essential for the provider.”*

Besides, the supplier, with the support of the management staff, carries out the constitution, planning and launching the project.

Configuration and parameterisation.

The ERP provider went on to determine the areas and assemble the data structures by cost centres so that the information delivered by the system is useful. At this stage, meetings were held with key users to gather information; also, with their support, the system is restructured, designed, and coupled with the requirements that the brand (vehicles supplier) imposes.

Once the system was installed, the modules needed in the first stage were defined. In this case, the area of sale of vehicles and the financial sector with their respective subsystems were the main ones; others remain for a second stage.

Next, it was the personnel of the enterprise that initiates the input of parameters and data. The following data was entered: agencies, chart of accounts, lines of business, work areas, etc., this with the participation of each manager who knows his area of business. The accountant was included since any inconvenience in any of the areas ends in the accounting area.

Besides, it is necessary to emphasise that there was no need to do a re-engineering or adjustment of the processes. Since the new ERP has the procedures determined by the brand, and the previous one also had these requirements.

Migration

For data migration, the data structure of the old ERP was reviewed by the software provider in conjunction with the company's technical manager. For data migration, several scripts were generated

from the old DBMS (SQL Server) and a tool developed by the provider in FoxPro transformed and adapted the data to the new DBMS (Oracle), next, it is verified that the information is in the correct place.

In theory, migration was easy, but due to a management suggestion, it was decided to migrate all the data from the previous ERP, that is, not only balances but also historical. This type of data migration which was not contemplated in the project, caused additional efforts and lack of information in the new ERP and obviously delayed project launch three times.

Moreover, due to the large amount of data, the migration scripts were done by areas, checks were made on the previous system and the new system, and if something failed, it was returned to verify the script. Once they had the scripts ready for migration, they tried to migrate the data to an available server in the organisation, but due to the amount of existing data and the limited features of the equipment, this process took a week and did not end.

It is there that it was decided to buy a new server, the same one that was prepared with seven virtual machines running parallel to perform the migration and the final migration of the data took three days

In conclusion, performing full historical migrations took five months of additional work. Furthermore, some parts of the system there were missing information, which was solved by putting comments to clarify doubts to users and due to these factors, the company contracted an external audit to verify that the data were correct.

Once the ERP already had information, the provider said, "*When the data starts to appear in the new system, there begins, we could say the magic of all this, we started to see real information, we started to see the customers, we started to see the products, we started to migrate Portfolio, we begin to migrate transactionally, shopping, sales and that causes that begin to reactivate each point of information*".

Test

The initial tests were carried out on the servers that the company owned, in this stage, it was detected that the enterprise did not have the adequate physical infrastructure at the level of servers and communications equipment for the operation of the ERP. To solve this problem was decided to improve the physical infrastructure by acquiring a new server and improving the communications infrastructure.

The tests were carried out by areas and were closely related to data migration. For example, the implantation team designs the test, then the data is migrated from one system to another, and finally, it is verified that the data match on the two systems. At the same time, the functionality of the EITA is checked.

Training

The training was done in conjunction with migration and testing. The provider, together with the technology department migrated information from a specific area. Then met with key personnel in this area, explained the operation of the new EITA, verified data and that EITA is working correctly, this was done cyclically. In this point, the key personnel were already trained, the technology director called it a pre-training.

The final training took place approximately three weeks before passing the ERP to production. To this end, all enterprise personnel involved with the ERP were gathered at the company's headquarters.

Go live

Before the ERP went out to production, all areas met to determine the date by which the new system should begin operating. At this meeting, the launch date and the tasks that each area must perform to achieve this objective were determined. Also, at the suggestion of management, it was decided that the previous ERP will work only for consultations.

The output to production was carried out with all the ERP modules at the same time. Since if it is done in phases, it requires much effort from the staff (it involves working with the two ERPs). According to the software provider: *"Putting the new ERP into production in parallel with the old ERP is exhausting, inconvenient and does not give good results."*

At this stage, the provider accompanied the enterprise for six months to explain the operation of the ERP, solve some functionality problems, correct migration errors and missing information.

5.2.3 Post-implantation phase

The third phase is carried out by the software provider in response to a requirement of the enterprise. Also, the costs of this phase are renegotiated every year with the provider. In this phase are the stages of support and update.

Support

Initially, the support of the software provider was dedicated to stabilising the system and solving problems that arose in the migration of data. Subsequently, the support focuses on answering concerns about the operation of the system. In support of functionality, there is no inconvenience, i.e., the enterprise requests assistance and the supplier resolve it quickly.

Update

The provider assumes the costs of updating the application for three types of contingencies: Tax requirements imposed by the government, requirements imposed by the mark, and any specific needs suggested by the client. In this last option, the provider evaluates if it applies to the enterprises that have the EITA, then the cost is absorbed by the provider.

For specific issues of functionality expansion, the contractor must assume these values, however, as with the previous provider, this type of support is difficult to achieve with the current provider.

5.2.4 Cross-cutting stages

This study also identifies transversal stages that are carried out, such as leadership & communication, project management, and change management. The individual stages are presented below:

Leadership and communication

The documents show that the manager is the leader of the project, but in practice, the project was led by the technology area together with the financial area. In addition, to inform all the employees of this project, a launch was made that was called the project *Evo 27* that was a strategy of the people of processes and in which all employees of all the areas were present, the president, the general manager, the software provider, the IT manager and the process manager participated in this launch. According to the head of IT, *"this meeting was crucial for engaging all people"*.

On the other hand, the ERP provider preferred to conduct face-to-face rather than virtual interviews, according to his words: *"it is not the same to see the person on a screen, to be in the company, to feel and understand their processes, and in the function of that to make implantations."*

Project management

Once the new ERP was selected, and the corresponding contract was signed; a project charter was drawn up between the enterprise and the provider. This document includes the managers of the project by the provider and the enterprise, the description of the project, activities to be carried out, deliverables, milestones, establishes the means of communication, a risk assessment, areas, and human resources participants and finally the times that should take the project.

The implantation of the ERP was planned to be carried out in 6 phases: Project planning, parameterisation, migration, testing, training, and go-live; The scheduled time was 127 days, information that appears in the documents *"Certificate of the constitution of the project"* and *"Plan of management of the project."*

However, due to the decision taken by the administration to migrate historical data, the project had a delay of five months. Also, while the system was in operation, they continued to work on historical migration, according to the IT director: *"Historical migration took almost a year."* According to the provider: *"when there is a need to load historical information, demand a lot of effort and time; which the enterprise is not willing to accept. Besides that, the principal users cannot allocate the necessary time to the project, due to its multiple occupations."*

Change management

The enterprise has experience in the implantation of an ERP (which was replaced). Based on this experience, to reduce the resistance to change, it is decided to involve all areas during the process of search, evaluation, selection, contracting, integration, and operation of the new EITA-ERP.

Subsequently, for the implantation, primary users and secondary users were designated by each one of the existing areas in the enterprise. The primary user was the manager, and the secondary was one of the people who know the whole process of their area. In the meetings that were held, the two users generally attended. For this reason, there was not much resistance to change. Instead, there was a collaboration from the people.

On the other hand, with the new ERP, officials reported loss of functionality in some areas. Which is why some claims were justifiable since users were accustomed to having functionality that the new

system did not have. However, in general, with the new system, the enterprise gained more functionality and integration than with the previous one module.

When asked if there was resistance to change, the technology director states: *"Yes, as in any change. I was also involved in the change of the previous system, and there was also resistance. There will always be resistance. First, the screens are not equal; the application is not the same; the way to call the application is not the same, then if there is a resistance from users. Even users who are not so complicated complain. Also, users who are complicated say the application does not work, and many times, that is not true. It is because they do not know how to use it. "*

Resistance to change is a human issue, it will always exist because many people feel that their organisation no needs a change, but not all. The software vendor mentions the following on this topic: *"Senior managers are convinced of the change, but their subordinates are not. And with whom the consultant works is with the operative people, they are the ones who generate the information, and at that level, we identify the resistance to change".*

On the other hand, there were also drawbacks in the loss of functionality in some areas, so there were some reclaims that were justifiable as users were accustomed to having some feature that the new system did not have, but overall, they earned more than lost. Since the whole company is functioning in an integral way.

Another critical problem which the ERP vendor identifies as the shadow of the previous system means that the previous software will always look better than new software, practically because of the lack of knowledge of the tool in the initial stages, and that lasts about three months to be overcome. *"You must deal with the shadow of the previous system, this shadow is a difficult subject to jump, difficult to overcome, although we have more robust tools than the previous ones".*

Technology infrastructure update

In the course of the implantation of the new ERP, obsolete technological equipment is detected or that does not meet the minimum requirements that ensure the proper functioning of the ERP, which is why it is necessary to update the technological infrastructure.

5.3 Difficulties and lessons learned

Before continuing with the following sections, it is necessary to mention some background information on this implantation: 1. As the second ERP that was installed in the company in a period of 5 years the staff already had the experience to carry out this type of activities, reason for which it did not contract external consultants that support this process; 2. it was not necessary to perform a process re-engineering since the processes existed and were very similar between the two ERPs, which is why only the processes were adapted to the new ERP. In this sense, the Software Vendor mentions *“that the processes are determined by the brand manufacturer of the vehicles”*. 3. The IT application provider has its own implantation methodology, which is reflected in the implantation project.

Difficulties

- Data migration: The cost and time of data migration were not planned correctly. In the first instance, only initial data was intended to be loaded into the new ERP. However, during the implantation, the manager decided to migrate the historical data, and this delayed the project in approximately five months. Consequently, costs also increased.
- ERP underutilization: There are many functionalities that the system has, but unfortunately, they are not being used yet.
- Weak technological infrastructure: The existing technological infrastructure was not enough for the new system. For this reason, it was necessary to acquire a new server and update the network of communications.
- Lack of Time: Due to the multiple tasks performed by personnel in the enterprise, it is difficult for people to allocate time to the project. According to the software provider: *“one of the main problems was the time factor, because usually an enterprise that wants to change software, wants to do so as soon as possible, but when there is a provision, a need for change with historical information, demand a lot effort and time, which the management is not willing to accept”*.
- Resistance to change: This is a social issue because many people feel that their enterprise needs a change, but not everybody. For example, Senior managers are convinced that a change needs to be made, but their subordinates are not; this produces difficulties if we consider that they are the ones that generate information. Besides, in this case, the president of the enterprise (at the beginning) resisted the change to the new ERP.

- Shadow of the previous system: A problem, which the ERP vendor identifies as the shadow of the previous system, *"The previous software will always look better than the new software, practically because of the lack of knowledge of the tool in the initial stages, then for about two or three months you have to deal with the shadow of the previous system. This shadow is a difficult subject to jump, Difficult to overcome, although we have more robust tools than the previous"*.

Learned lessons

- Involve key personnel; for example, the IT director remembers that in the implantation of the previous ERP, there was a financial director who knew in detail the operation of all areas in the enterprise. In the actual implantation, IT director mentions: *"In the implantation process, we decided to include the accountant, since any inconvenience found in any of the areas ends in the accounting area, so we decided to include this person there."*
- Involve all areas and communicate about the project to reduce the resistance to change. Besides, users are informed of what is being done. In this case, the launch of the project committed people to work on the change of ERP.
- Resistance to change is an inevitable issue; in this case, the president of the enterprise was reluctant to change ERP. To convince him, the staff made a joint presentation in which all the areas presented their points of view.
- The top executives of the enterprise were not aware that the database had an extra cost; which was not part of the ERP negotiation. It was necessary the intervention of the IT director to clarify this issue.
- Ask for a demo to perform functional tests of the application in all areas, since it is not enough to see the presentations. Although it may look attractive and easy to use at first look, people can appreciate the complexity of the system as well as their advantages and disadvantages when using the application.
- Verify that the functionality truly suits what the enterprise needs. In this case, it was not necessary to perform a process re-engineering since the processes existed and were very similar between the two ERPs, which is why only the processes were adapted to the new ERP. In this sense, the software provider mentions that: *"the brand manufacturer of the vehicles determines the processes."*

- In the negotiation, the functional support requirements must be well established, as well as for the new developments, and even compromise acts that support these extensions of functionality should be signed.
- Although this enterprise treated the issue of technical support very carefully (due to the negative experience with the previous supplier), there is still a degree of dissatisfaction with the new supplier.
- Deciding to migrate historical data took months of work, delayed the launch of the project up to three times and increased costs. Even after putting into production, it was necessary to continue working on this issue. This decision put the entire project at risk.
- When the enterprise changes its application, some areas may sacrifice functionality, in favour of integrating all areas of the enterprise.
- To obtain a superior performance of the EITA, in parallel with the implantation, an update of the existing technological infrastructure must be carried out.
- A good cost benefit analysis should be done, for example the enterprise detected that if it chose option 1 although it was more economical, in the immediate future they could have drawbacks due to lack of integration between two systems.

5.4 Summary

In this chapter, we presented a case study that we carried out in a car distribution company located in northern Ecuador. This company has three main activities: Vehicle sales, spare parts sales and vehicle repair service.

The objective of conducting the case study was to have an initial approach to the research problem posed. With this case study, we try to contribute to improving the understanding of the process of search, evaluation, selection, contracting, integration, and operation of an EITA in the SME. We also try to recognise the main difficulties encountered in this process and how SMEs deal with these difficulties.

To carry out this case study, we interview three people directly involved in the EITA-ERP implantation process: the company's IT director, the company's quality director, and the provider responsible for the implantation. We also collected some documents that were generated during the implantation.

From this case study, our first model of EITA implantation in the SME emerged. It encompasses three phases (pre-implantation, implantation, and post-implantation) and a set of transversal activities (leadership & communication, change management and project management), (cf. Figure 5-2).

Chapter 6

6. Motivations, difficulties, facilitators, and actors involved in EITA implantation

The phenomenon of interest of this research is the EITA implantation in SMEs. This phenomenon typically corresponds to a project that starts with the identification, by an enterprise, of its needs and aspirations; involves the search, evaluation, and selection of a commercial software package (EITA); includes its acquisition, and implantation in the enterprise; and ends (hopefully) when the enterprise considers that the new EITA works satisfactorily and it is fully embedded into the enterprise's activities.

The process model for the implantation of EITAs in SMEs, outlined above and comprehensively described in chapter VII, covers one facet of the EITA implantation phenomenon. In addition to the process model, there are other facets to explore, such as: what are the motivations, what are the difficulties, what factors do they facilitate, and which actors are involved in the implantation of an EITA in SMEs.

Knowledge about these aspects is crucial for carrying out EITA implantation projects as they emphasize aspects that should be taken into consideration to assure the success of an EITA implantation process.

6.1 Research design - plan

The objective of the study is to develop a descriptive model of the EITA implantation process for SMEs. In this study, we must identify the actors involved in the process. Also, we must recognise the factors that motivate, hinder, and facilitate the process of implanting the EITA in SMEs. These objectives can be expressed as research questions:

- What are the primary motivations for an SME to implant an EITA?
- What are the main difficulties?
- What factors are facilitators?
- What actors (acting individually or institutionally) might be involved in EITA implantation processes.

- What are the main phases of the process of implanting EITAs in SMEs?

To address these questions, we carried out a field study based on interviews with a wide range of informants with experience and/or interest on the implantation of EITAs in SMEs, namely:

- Personnel of SMEs that have been or are involved in the implantation of EITAs (22 respondents).
- Owners/CEO of software development enterprises and consultants working in partnership with the software developers, acting as software resellers and consultants in EITA implantation projects (15 respondents).
- Independent consultants (dedicated exclusively) in EITA implantation projects (4 respondents).
- External SME consultants who provide support in all IT areas (4 respondents).
- SME staff with limited EITA knowledge (2 respondents).
- University faculty with academic interests in IT in SMEs (1 respondent).

The interviews followed the protocol presented in appendix E, and included several open questions (appendix D1 – Portuguese, D2 – Spanish)

To process the collected data, we used a qualitative approach. *“Qualitative research typically involves a systematic and detailed study of individuals in natural settings, instead of in settings contrived by the researcher, often using open-ended interviews intended to elicit detailed, in-depth accounts of the interviewee’s experiences and perspectives on specific issues, situations, or events. Qualitative methods employ data in the form of words: transcripts of open-ended interviews, written observational descriptions of activities and conversations, and documents and other artefacts of people’s actions. Such data are analysed in ways that retain their inherent textual nature. This is because the goals of qualitative research typically involve understanding a phenomenon from the points of view of the participants, and in its particular social and institutional context”* (Kaplan & Maxwell, 2005).

Considering the phenomenon of interest, the unit of analysis of this *field study* consist of a project that involves the implantation of an EITA. The project starts with the identification of business needs by the enterprise. It encompasses the search, evaluation, and selection of a commercial software package (EITA), its acquisition, and implantation. The project ends when the enterprise considers that the new EITA works satisfactorily, and it is fully embedded into the enterprise's activities.

This field study encompassed 4 phases: Planning, conduct interviews, data analysis and presentation of results (cf. Figure 6-1):

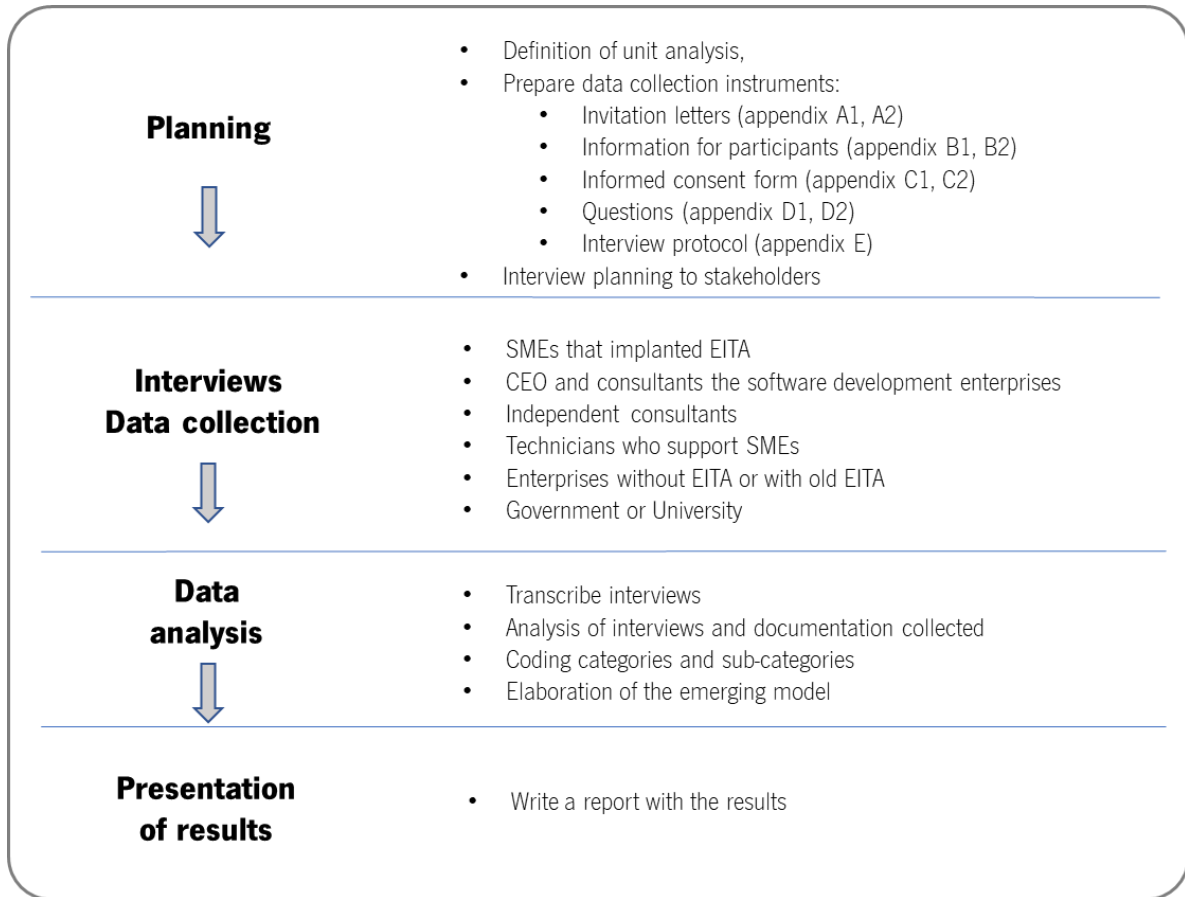


Figure 6-1: Field study research design

6.1.1 Planning.

The planning of the field study began with the definition of the unit of analysis. Next, we prepared the instruments for data collection such as the interview protocol, informed consent documents and the interviewer script with the questions to be asking in the interview.

In the next step, we defined who should be interviewed. This involved identifying groups of key informants, that is, people who could provide us with relevant information about the implantation of EITA in SMEs. In this way, we identify the following groups, which we describe in section 2.4:

- Owners/CEO of software development enterprises that produce EITA software, typically sold as COTS
- IT specialists working in partnership with the software developers, acting as resellers and implantation supports, typically acting on a consultancy basis.
- IT specialists, with no commitments to the EITA provider, hired by the SME that is implanting the EITA, typically acting on a consultancy basis

- Personnel that provides IT support to SMEs.
- Personnel (non-IT) of SMEs that implanted or are implanting EITAs.
- Personnel (non-IT) of SMEs that have little or poor knowledge from EITA.
- University faculty with academic interests in IT in SMEs.

After identifying groups of key informants, we searched for people belonging to these groups, willing to collaborate with this research. The search included:

- Contacting software development companies in the Minho region (Portugal), especially those that maintain a regular cooperative relationship with the University of Minho.
- Browsing through the personal contacts of the researcher, people who are participating or have participated in processes of implantation of EITAs.
- Search in the professional social network - LinkedIn - for people who mention to have participated or are participating in EITAs implantation processes. The search was carried out as follows: First, to use the LinkedIn professional network, the premium service was activated for a couple of months. In this period, we looked for professionals who meet the following criteria "Implantation of ERP or CRM" (most important EITAs). With the results obtained, and depending on their profile, friend requests were sent to each of the professionals found. Then, if the request was accepted, an interview request was sent. For the acceptance of the interview (some cases), we had to send additional documentation such as the "Informed consent form". Finally, after this process, 17 interviews were conducted.

Interviewees were opportunistically selected, based on their acceptance to participate in the study. The set of respondents included 48 persons from 6 countries (Ecuador (35), Portugal (7), Spain (3), Mexico (1), Argentina (1), and Cuba (1))

One of the main difficulties of this study is related to gaining access to data sources, i.e., on finding people willing to spend some of their time to be interviewed about their experience and perceptions on EITA implantation projects in SMEs. For example, in the LinkedIn social network, around one hundred requests were sent to IT and management professionals. However, only twenty-three invitations were answered, and, eventually, only seventeen agreed to be interviewed.

The bias towards Iberian and Latin-American participants can be explained by this difficulty and also due to the mother tongue of the researcher. That bias is perceived as not being critical a critical limitation as, with more time available, the study can easily be expanded to other countries.

To those who agreed to participate in the study, we sent an "Informed consent" form (appendix C1 – Portuguese; C2 – Spanish) and, in some cases, the issues to be addressed in the interview. In the end, we obtained a total of forty-eight interviews organised in different groups. We are aware that the distribution of participants throughout the groups is not uniform. The explanation for this is that interviews started being done with the respondents that agreed to participate.

6.1.2 Conduct of interviews

Once we obtained people's acceptance of participating in the research, the next phase was to conduct the interviews. Some interviews were carried out personally and others through videoconference, depending on the availability of time and the country of residence of the interviewee. Table 6-1 shows a list of all the interviewees arranged by the group they fit in.

The interviews were recorded and transcribed. They were anonymised, as recommended for qualitative research methods (Kuckartz, 2014; Yin, 2014)

Table 6-1: List of interviewees arranged by the group they fit in

Nº	Sector of the interviewee	Interviewed	Time (min)
1	Interviews with SME staff who have implanted an EITA	SME professional 1	35
2			25
3		SME Professional 2	44
4		SME Professional 3	52
5		SME Professional 4	45
6		SME Professional 5	27
7		SME Professional 6	50
8		SME Professional 7	80
9		SME Professional 8	30
10		SME Professional 9	35
11		SME Professional 10	15
12		SME Professional 11	42
13		SME Professional 12	41
14		SME Professional 13	30
15		SME Professional 14	40
16		SME Professional 15	34
17		SME Professional 16	15
18		SME Professional 17	45
19		SME Professional 18	44

Nº	Sector of the interviewee	Interviewed	Time (min)
20		SME Professional 19	30
21		SME Professional 20	20
22		SME Professional 21	45
23	Interviews with CEOs and Consultants the Software Development Enterprises.	CEO and Consultants 1	65
24		CEO and Consultants 2	65
25		CEO and Consultants 3	74
26		CEO and Consultants 4	65
27		CEO and Consultants 5	59
28		CEO and Consultants 6	67
29		CEO and Consultants 7	59
30		CEO and Consultants 8	40
31		CEO and Consultants 9	21
32		CEO and Consultants 10	17
33		CEO and Consultants 11	40
34		CEO and Consultants 12	50
35		CEO and Consultants 13	55
36		CEO and Consultants 14	23
37		CEO and Consultants 15	53
38	Interviews with independent consultants (dedicated exclusively) in EITA implantation projects	Independent consultants 1	30
39		Independent consultants 2	30
40		Independent consultants 3	58
41		Independent consultants 4	80
42	Interviews with external SME consultants who provide support in all IT areas	Support Technicians 1	50
43		Support Technicians 2	55
44		Support Technicians 3	30
45		Support Technicians 4	23
46	Interviews with SME staff with limited EITA knowledge	SMEs without EITA 1	12
47		SMEs without EITA 2	30
48	Interviews with university staff interested in implanting an EITA	University professor 1	25

In Table 6-2, we present a summary of the actors interviewed. This table shows the number of interviews conducted for each group. It also shows the minimum, maximum and average duration of the interviews.

Table 6-2: Summary of interviews with actors involved

Nº	Type of actors interviewed	Interviews	Average	Min (min)	Max (min)
1	Interviews with SME staff who have implanted an EITA	22	37,45	15	80
2	Interviews with CEOs and Consultants the Software Development Enterprises.	15	50,2	17	74
3	Interviews with independent consultants (dedicated	4	49,5	30	80

	exclusively) in EITA implantation projects				
4	Interviews with external SME consultants who provide support in all IT areas	4	39,5	23	55
5	Interviews with SME staff with limited EITA knowledge	2	33,5	12	55
6	Interviews with university staff interested in implementing an EITA	1	25	-	-
Total		48	39,19	12	80

6.1.3 Data analysis

Interviews were recorded and transcribed using the clean verbatim technique. This type of transcription offers a fluent reading by eliminating unnecessary sounds, muffins, repetitions, among others, which usually occur in oral language, without losing its meaning. A clean verbatim transcript is ideal for qualitative research.

Content analysis of transcriptions was supported by the MaxQDA v.18 software tool. Following the recommendations of Kuckartz (Kuckartz, 2014), the analysis of the interviews involved the establishment of coding that included categories and subcategories (codes, sub-codes), that emerged from the data with an inductive approach, according to the researcher's understanding of the phenomenon.

Data analysis of the interviews' transcripts took a basis the codebook established in the exploratory case study described in chapter V. During the analysis, new categories and subcategories were created to tackle aspects that appeared for the first time in the interviews. As the analysis progressed, it became necessary to reorganize the coding, because the researcher was incorporating more information, and was improving his understanding of the phenomenon.

Finally, when performing the analysis of the coding obtained, it was also necessary to reorganize (debug) the codes and sub-codes, sometimes because there were repeated codes, at other times to group the coding into broader categories or to improve its structure coding.

The categories and subcategories that emerged were also influenced by the literature. The TOE framework (DePietro et al., 1990) was particularly useful as it provided a well-established perspective for the analysis of the adoption of technology, covering three different contexts: technology, organisation and environment.

We end up with twelve categories (master codes): SME characterisation, software applications (EITA), actors involved – external, influence factors, process, pre-implantation, implantation, post-implantation, leadership, communication, change management, and project management. These codes are presented in Figure 6-2, in an image drawn from the MaxQDA tool.

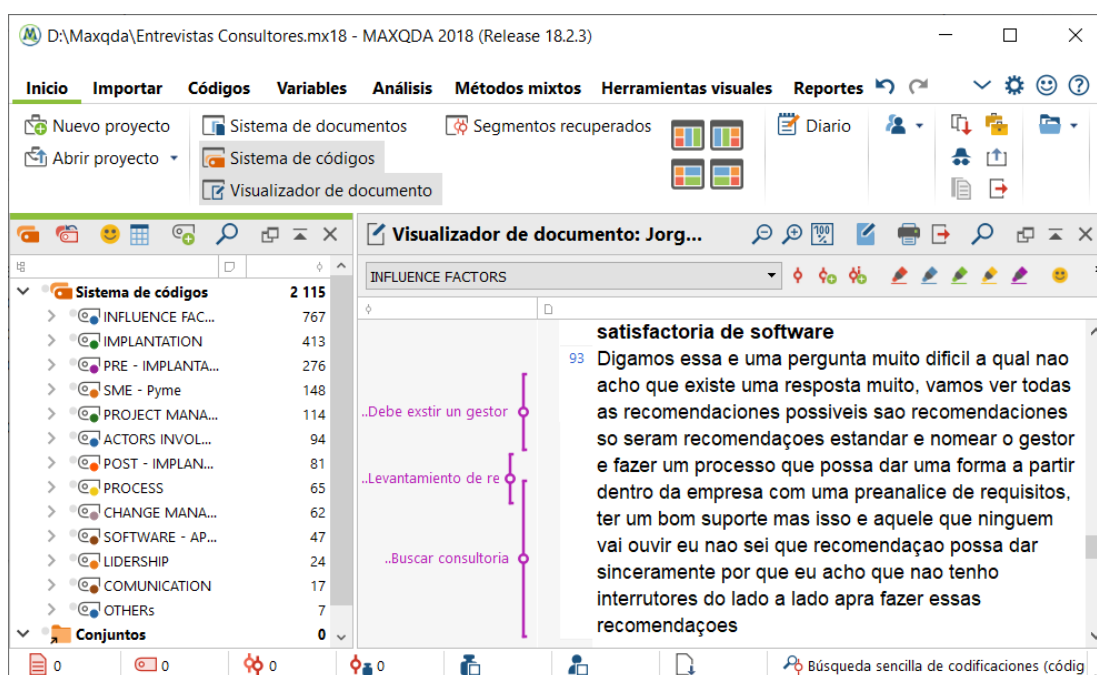


Figure 6-2: Master codes result of the analysis immersed in the MaxQDA tool.

Table 6-3 presents the result of the analysis. It includes the twelve categories of codes with their respective sub codes. Depending on the topic, we have defined up to three levels of sub codes.

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
SME characterisation	Technological	Software application - EITA	Develop or buy software
			There is no software that fits the need of the SME
			They do not have management software
	Organisational	Strategic	Home Developers
			Dedicated to operational issues
			IT Showman Coordinate
		Technological infrastructure	
		Free software	

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
			The priority is the infrastructure to produce
		Structure	The SME lacks structure
			The software orders the business processes
		Management	Resource Restriction
			Outsourcing for technological services
	Environment	Government	Comply with the law
		Provider	Producers already standardize the software
	Type of solution	Local servers	
		Software as a service	
	Characteristics	Quick	
		Modular	
		Autonomous	
		Easy to use	
		Flexible	
		Integrated	
	The EITA organizes the enterprise	Implant software changes the organisation	
	Software developer	Concerned about commercial issues	
		Software product	
		They have their own methodology	
	Software provider (reseller - partner)	Partner Recognition	
		Partner sells to the SME	
		Business language specialist	
	Organisations that support	Chambers or business associations	Association promotes selection
			Open for training
			They try to approach with universities
			Graduation projects
		University	Development of individual modules
			Assistance in administration issues
		Government	SME support policies
	Technological	System integration	
	Organisational	Strategic	Modernisation, information for decision making, grow
		Structure	Optimise processes
		Management	Disagreement product and / or provider, control, improve management and expand service

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3	
Difficulties	Environment	Government requirements		
		The provider offers new solutions		
	Technological	Technical support		
		EITA underutilisation		
		Infrastructure		
	Organisational	Strategic	Lack of vision, enterprise wants immediate results	
		Structure	Lack processes – procedures, enterprise structure	
		Management	Project, information, enterprise, change, and lack of resources	
		Skills	Lack of internal technical skills, and lack of negotiation skills	
		Social	Cultural problems, people resistance, lack of boss capacity, staff instability	
	Environment	EITA provider	Consultant's experience, who supports the SME is also SME, instability of consultants-programmers	
	Facilitators	Technological	EITA	Flexible, mature, tested, easy to use
			Infrastructure	
		Organisational	Strategic	Planning, see how to invest, opening to change, leadership
			Structure	Define processes, adequate adaptation of the EITA
Management			Decision making, change, project, information, enterprise	
Skills			Negotiation	
Social			(Training, work team, teamwork, permanent communication)	
Environment		EITA Provider	Provider experience	
			Requirements survey	
			Good technical support	
	Stability of implantation equipment			
Process	SME and EITA provider	Organise the enterprise	Processes are born with technology	
		Raise business process	Identify processes	
			Use of standards	
			Refine processes	
		Process reengineering	Implant software is accompanied by reengineering	
			SMEs do not want or do not reengineer	
		The micro-enterprise has no processes	Limited process knowledge	

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3	
Pre-implantation	SME	Small and medium enterprises already have processes	Small and medium enterprises are already valuing processes	
		Establish needs and plan	Strategic plan Define budget	
		Definition and selection of processes	Processes definition Process checklist	
		Define requirements	Functional requirements Produce requests for proposals	
		Search and evaluations of proposals	Disseminate the requirements Search for EITA and EITA provider Evaluation and selection of the EITA Risk in the selection of the EITA	
	EITA Provider	Simple Analysis of enterprise	Identify SME needs	
		Delineate suitable solution	Suppliers have a checklist	
		Delineate implantation plan	Estimate project dimension	
	SME and EITA provider	Submit proposal	Send proposal to the client	
		Negotiation between provider and SME	Cost Financing Provider Proposal Agreement	
			Decide on EITA & EITA provider	Decide management advised by the areas
		Implantation	SME and EITA provider	Analysis of enterprise
	Solution Design			Lift the process Based on the core of the business Define responsible by area
	Adjust of process between EITA and Enterprise			Adaptation of the enterprise to the EITA Adaptation of the EITA to the enterprise Mutual adaptation Adaptation of the EITA to government regulations.
	Installation, customisation, and			Install Customisation Parameterisation

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
		parameterisation of EITA	
		Load and migrate information	Data loading Migrate Historical Testing and data quality control
		Test and Training	Test (functionality, by modules, integral) Training (embedded in the implantation, staff trains colleagues, training by areas, with acceptance forms)
		Go live	Requirements to go to production Define start date Ways to go to production – conversion approach (big bang, parallel, pilot, phased)
		Recondition of technological infrastructure	Analysis and update of technological infrastructure Analysis of software use licenses.
		Stabilisation	Stabilize the application Accompaniment to SME staff Fulfil business cycles
Post-implantation	SME and EITA provider	Support	Technical-administrative support Functional support Types-forms of support Maintenance contracts
		Update	Updates due to change of laws
		Extension of EITA	Increased functionality Support of new developments
		Recognise new possibilities	Expectations for new features Never ends
		Team	Firm leadership Promotes teamwork Know the operation of the enterprise Share the vision Establish enterprise policies Motivate the work team
Leadership	SME and EITA provider	Individual	Comply and enforce the planned Convinced of the change Manage expectations Transmit confidence and security Transparent and minimizes uncertainty Be an agent of change
		Task	Establish the scope and objectives of the project Efficient resource management

Table 6-3: Codes and sub codes resulting from the field study.

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Communication	SME and EITA provider	Communication plan	Capability to make decisions
			Vision, reasons, final goal, project stages
		Policies and channels	Define policies (internal and external)
			Define channels (newsletters, memo, phone, email, conference, social networks, etc)
			Briefings, presentations, and meetings
		Socialisation	Communicate the purpose
			Launch of the project
			Presentation of the implantation team
		Internal marketing	Integration workshops (consultants, enterprise staff)
			Inform how work change
Benefits	Pen and t-shirts		
	For users (before)		
Change Management	SME and EITA provider	Prepare the enterprise for change	For the enterprise (after)
			Adaptation to change
		Resistance to change	Led by executives
			Choose appropriate key users
		User persuasion	Change resistance is normal
			Generational barriers
		User must be involved	Convince people
			See the benefits
		Launch of the project	Involve the customer
			Presentation - project launch
Training	Presentation of the implantation team		
	Constant training		
Project Management	SME and EITA provider	Initiating	Project constitution
			Project management
		Project planning	Development of the project
			Schedule Definition
			Adequate estimate
		Project execution	Risk identification
			Interlocutor
			Implantation Methodology
			Hire external consultants
		Monitoring and controlling	Work with leading users
Joint Project Management			
Closing	Project control		
	RFP help meet the times		
			Project closure

Two codes deserve special attention: “people” and “processes”. The “process” code is included in the master codes. Not so the code “people”, and this is a code deserves special mention. It has not been considered among the master codes, but it appears transversely as a sub-code in most of the master codes. This is because “people” are directly involved in the process of implanting of the EITA in the SME. The Table 6-4 presents the sub-code “people” that appears transversely in most of the master codes.

Table 6-4: Sub-codes related to “People”

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Difficulties	Organisational	Strategic	Lack of vision, enterprise wants immediate results)
		Skills	Lack of internal technical skills, and lack of negotiation skills
		Social	Cultural problems, people resistance, lack of boss capacity, staff instability, lack of communication
Facilitators	Organisational	Skills	Negotiation
		Social	Training, work team, teamwork, permanent communication
Implantation	SME and EITA provider	Analysis of enterprise	Enterprise knowledge (identify users, necessities analysis, expectation analysis)
		Solution Design	Define responsible by area
		Test and Training	Training (embedded in the implantation, staff trains colleagues, training by areas, with acceptance forms)
Post-implantation	SME and EITA provider	Stabilisation	Accompaniment to SME staff
		Support	Technical-administrative support
Leadership	SME and EITA provider	Team	Firm leadership
			Promotes teamwork
			Know the operation of the enterprise
			Share the vision
			Establish enterprise policies
		Individual	Motivate the work team
			Comply and enforce the planned
			Convinced of the change
			Manage expectations
			Transmit confidence and security
Task	Transparent and minimizes uncertainty		
	Be an agent of change		
	Establish the scope and objectives of the project		
		Efficient resource management	
		Capability to make decisions	

Table 6-4: Sub-codes related to "People"

Code	Sub-code - level 1	Sub-code - level 2	Sub-code - level 3
Communication	SME and EITA provider	Communication plan	Vision, reasons, final goal, project stages
		Channels	Briefings, presentations, and meetings
		Socialisation	Communicate the purpose
			Launch of the project
			Presentation of the implantation team
			Integration workshops (consultants, enterprise staff)
		Internal marketing	Inform how work change
		Benefits	Pen and t-shirts
			For users (before)
		Change Management	SME and EITA provider
Adaptation to change			
Led by executives			
Resistance to change	Choose appropriate key users		
	Change resistance is normal		
User persuasion	Generational barriers		
	Convince people		
User must be involved	See the benefits		
Involve the customer			
Launch of the project	Presentation - project launch		
	Presentation of the implantation team		
	Training		
Project Management	SME and EITA provider	Project execution	Constant training
			Interlocutor
			Work with leading users
Hire external consultants			

6.1.4 Presentation of results.

The results of data analysis will be shown in two segments:

- The first segment will be devoted to the motivations, difficulties, facilitators, and actors involved (external), which will be analysed later in this chapter.
- The second segment refers to the SIMPLE framework, which emerged from the analysis we conducted to the interviews. We present this framework in chapter VII.

6.2 Motivations

The primary motivation to implant an EITA in the SME is of *Organisational context* and is related to strategic factors (modernisation and growth), structural factors (process optimisation), and management factors (improvement and control). Besides, other factors motivate the implantation of an

EITA and have to do with the environment (government requirements) and with technological aspects (systems integration).

Somehow in the motivations, the strategic objectives of the enterprise are reflected. An exception occurs when the enterprise is motivated to change, due to disagreements with the EITA or its supplier. Motivations were classified according to the TOE framework (cf. Table 6-5).

Table 6-5: Sub-codes related to "Motivations"

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3		
Motivations	Technological	System integration	Modernisation		
			Information for decision making		
	Organisational	Strategic	Structure	Grow	
				Structure (Optimise processes)	
		Management		Disagreement product and / or provider	
				Control	
					Improve management
					Expand service
	Environment		Government requirements		
			The provider offers new solutions		

Technology

One of the main technological motivations to implant an EITA is the integration of systems (seeking that the different EITAS work in a synchronized way and they share data). This has been exposed in different ways by several interviewees, for example:

"Not having integrated platforms is a big problem for enterprises; in this case, having isolated software that does not interoperate with each other is a headache."

SME professional 17.

"The company's processes were isolated; for example, the purchasing processes were isolated from financial management. To solve this problem, they had the idea of looking for a solution that will somehow integrate all the company's processes. There arises the idea of implanting an ERP".

Independent consultant 3.

"That business reason is mostly the integration of something ... which can be the integration of processes or integration of information."

Independent consultant 2.

"We had a system developed by us, which began as an accounting system. However, it was growing according to the need of the business, but there was still a lot to do. So, there we saw the need to look for an ERP so that the integration is native and not isolated. "

SME professional 9.

Organisational

At the organisational level, we find three types of motivations to implant an EITA: strategic, structure, and management.

- **Strategic.** The strategic motivations of SMEs to implant an EITA are modernisation (adaptation to change), the need for information for decision-making and the need to grow.

"Companies do not have real information; for example, they do not know which customers have debts and to which suppliers they must pay."

CEO and Consultants 12.

"If managers had real information, they could delegate, give control to a person and can view management reports; With this information, they can make decisions."

CEO and Consultants 10.

"SMEs are forced by globalization, by trends, by innovation that comes to us."

CEO and Consultants 13.

- **Structure.** One of the main motivations to implant an EITA at the enterprise structure level is process optimisation.

"In the present time, it is noticed that the enterprises are going through the phase of having software by legal reasons and today are already trying to automate the process"

CEO and Consultants 5.

"First, look for solutions to situations that they currently have in their processes; it can be in the way they work."

CEO and Consultants 9.

- **Management.** The motivations at the management level to implant an EITA are disagreement (with the product or with the current supplier), gain greater control of the enterprise, improve management and expand the service.

"The system we had before was not ... it was giving us a lot of information problems, you know that the information part ..., a company without information cannot take out its analyses, especially commercial ones, for the application of strategies. So, this system brought us many bone information problems, it was not reliable information".

SME 15.

“They are mainly about organisational efficiency and process automation and having management information. To run a business is always the efficiency and availability of information for management.”

CEO and Consultants 1.

Environment

At the environmental level, we find two types of motivation: The first imposed by the demands of governments and the second motivated by the provider, since they are always offering new solutions.

“Legal and fiscal compliance with any companies is obliged. So let us say this is the first motivation.”

CEO and Consultants 3.

“The controlling entity began to regulate us a lot, this motivated the need to change the system, because one is the fidelity of the information and another is that the fines and penalties that came from the controllers are quite hefty.”

SME 5.

6.3 Difficulties

The difficulties identified in the process of implanting an EITA in the SME listed in order of priority are **organisational**, those that are related to management factors (project management, information management, change management, lack of resources), social factors (cultural problems, people's resistance, staff instability, lack of communication), structural factors (lack of processes - procedures), strategic factors (lack of vision - strategy) and factors related to the lack of internal technological capabilities. Another difficulty is **technology** and is related to technical support, the under-utilisation of EITA and the weak technological infrastructure of the SME. Finally, there are also difficulties related to the **environment**, which are mainly related to the EITA provider (experience, instability of consultants and programmers). The difficulties were also classified according to the TOE framework (cf. Table 6-6)

Table 6-6: Sub-codes related to “Difficulties”

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3	
Difficulties	Technological	Technical support		
		EITA underutilisation		
		Infrastructure		
	Organisational	Strategic	Lack of vision	
			Enterprise wants immediate results	
		Structure	Lack processes – procedures	
			Enterprise structure	
			Project management	
		Management	Information management	
			Enterprise management	

		Change management
		Lack of resources
	Skills	Lack of internal technical skills
		Lack of negotiation skills
	Social	Cultural problems
		People resistance
		Lack of boss capacity
		Staff instability
Environment	EITA provider	Consultant's experience
		Who supports the SME is also SME
		Instability of consultants-programmers)

Technology

The main difficulties encountered at the technological level are the poor technical support, underutilisation of the EITA and limited technological infrastructure (Servers, computers, communication equipment, etc.).

"I paid for the EITA, the provider implanted the EITA, and then I got tired of this program, because the technician has to come on Monday, he said he cannot; then on Tuesday, he cannot; Wednesday the technician goes, and so on."

SME 21.

"At this time, my most challenging point is the support issue and response times to the new requirements."

SME 18.

"There is much underutilization that is usually blamed on software vendors and software producers. However, often the responsibility lies in the business component, it usually negotiates low prices, because there is fierce competition."

CEO and Consultants 4.

Organisational

At the organisational level, we find five types of difficulties to implant an EITA in SME: strategic, structure, management, skills and social.

- **Strategic.** One of the main difficulties at the strategic level to implement an EITA in SMEs is the lack of vision or strategy that these types of companies have and their need to obtain immediate results.

"If the SME does not have a vision of the future or possible growth, I believe that trying to induce a technological action is not justified".

SME 19.

"I believe that there is a very great need to make those responsible for companies want to grow, one of the problems of entrepreneurs is that growing a lot or not growing or growing a little is all the same. I think they feel the year they are decreasing; they do not like that. But having a vision of growth is not something that I recognise with the people with whom I speak in the industry, it is a shame because if I am going to want to present a project of a particular dimension, I am left without reason."

CEO and Consultants 2.

"In the companies I have visited, they cannot say 'we have a 3-year plan, a plan'. That is a difficulty, that means that the company has not thought about digitalization, digital transformation or internationalization processes with the help of technologies."

CEO and Consultants 2

"The main difficulty is the lack of sensitivity on the part of those who are in charge of the company, to use what informatics can do."

CEO and Consultants 6.

"The main objective of the owners was only to reach electronic invoicing and nothing else, and believe that with that they solve everything."

SME 4.

- **Structure.** At the level of SME structure, the difficulty is its organisational style and the lack of processes and procedures.

"However, we have found cases where they have no defined processes; they do things as they come out."

CEO and Consultants 11.

"Moreover, this is a challenge because the solution perse will not solve their problem, so there is a whole evolution of the organisational structure, the processes... , and this is perhaps a significant challenge."

CEO and Consultants 3.

"We have to herd a little bit the client processes and adjust them to the realities, so software adjusting is one of the difficulties we often encounter."

CEO and Consultants 5.

"The ideal is first to do a process reengineering and then implement an ERP, but obviously, that means a project of more than one year. So, we have to do this kind of thing in parallel."

SME 18.

- **Management.** At the management level, the SME has deficiencies on several fronts, such as management of the company itself, project management, change management, information management (updated data, migration and information security), in addition to its lack of resources.

"The number of projects that do not come to an end, particularly in large companies, is fantastic huge, there are great projects that never came to an end, why? There were shortcomings of project

implantation details; this issue is critical, brutal shortcomings in project implantation and the problem will always fall into the same, whether big or small."

CEO and Consultants 4.

"It is that people often do not load the information as it should be; this may be due to haste or reluctance."

Support Technicians 4.

"What complicates me a lot about customers is that they do not have the information up to date. For example, we have to move from the system they now have to our system, and we do not have that exact amount from the ABC provider, we do not know how much they owe, we do not know about the checks issued and that are already cashed, they do not have an adequate inventory. When a report is taken from the systems to know the stock, sometimes negative numbers appear."

CEO and Consultants 12.

"However, the best way is always to migrate historical data. However, when migrating history, you find many things, with a lot of junk information, with many issues that complicate you, so the migration was hard because we decided to migrate history."

SME 6.

"First, they do not have an orderly, organized, systematized information that allows them to have timely information for decision making. The records they have are by obligation, because they have to comply or if they have no penalty."

University professor 1.

"One of the difficulties is the management of the company, many of the SME are companies with non-professional management teams (family management) and not with what should be more professional management, and that does not help."

CEO and Consultants 1.

- **Skills.** In addition to management difficulties, due to its nature, SME personnel lack of technical skills, SME does not know what it is that it needs and lack negotiation skills.

"Sometimes we have projects where we have to make a decision, and the SME tells us that we have to wait because they have to recruit a person X, or they have to organize the team. The SME also says we do not have a quality director; we do not have a maintenance director. The SME knows that they have to improve a particular area, but they do not have the necessary internal capacity or internal knowledge."

CEO and Consultants 3.

"Lack of sensitivity in the company for the technical component, because if there were sensitivity about information systems in the company, these problems diminish considerably."

CEO and Consultants 6.

"Internally at that time, we were five people in the IT department, and we did not have the technical capacity to learn an EITA and implant it. For this, the company used external suppliers."

SME 1.

- **Social.** The main difficulties at the social level are: Cultural factors such as lower-priced culture, lack of education of SME staff, lack of confidence in technology, inadequate work environment. Personal factors such as lack of collaboration of people, people are reluctant to change, staff see the EITA as a threat, people are accustomed to work in a way and can no longer do what they did before, staff instability, people with many activities and do not follow established processes. Another factor that makes it difficult is the lack of knowledge of the boss; they are entrepreneurs with primary education and lack of administration guidelines.

"In SMEs, business culture is based on the lowest price of the EITA."

CEO and Consultants 4.

"When an information systems technology consultant wants to lift the processes of the SME to determine the requirements, the staff does not give importance; They do not realize that from the process, the software is built or adjusted."

Independent consultants 1.

"People, by definition, are conservative; people are reluctant to change. If you change the way a person works, he will not like it. Surely the first impression will always be conservative."

SME 1.

Environment

The main difficulty we find in the process of implementing an EITA in the SME at the environment level is related to the EITA provider. Because suppliers also have internal difficulties (staff instability, lack of experience in these types of projects). Another factor related to the supplier is that the companies that support an SME are also SMEs; that is, they also lack the organisational and technical knowledge to guide the implantation process.

"The provider left us with the junior consultants, who accompanied the senior consultants, and those juniors did not measure up. The truth that they with their short experience tried to do what they could."

SME 14.

"There was even a problem of instability of the supplier because the consultants were leaving, so the supplier could not meet our requirements".

SME 9.

"These companies usually have no internal IT department; they are accompanied by small IT companies. Thus, this is also an obstacle because those who serve them are small businesses as well; Those who support small businesses are usually also small IT companies."

CEO and Consultants 1.

6.4 Facilitators

The main facilitators in the implantation of an EITA in the SME, identified in order of priority, are organisational issues. These are related to management factors (decision making, change, project, enterprise, information), strategic factors (planning, investment), social factors (training, work team, teamwork, communication), structural factors (definition of processes - procedures). Another facilitator has to do with the supplier and is related to the experience, technical support, and stability of the work team. At the technological level, what facilitates is the technological infrastructure of the enterprise and that the EITA meets some characteristics such as flexible, mature, easy to use, tested, among others). Facilitators were classified according to the TOE framework (cf. Table 6-7).

Table 6-7: Sub-codes related to "Facilitators"

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Facilitators	Technological	EITA	Flexible, mature, tested, easy to use
			Mature
	Infrastructure		Tested
			Easy to use
	Strategic		Acceptable
			In cloud
	Structure		Planning
			See how to invest
	Management		Opening to change
			Leadership
	Skills		Define processes
			Adequate adaptation of the EITA
	Social		Decision making
			Change management
	Environment	EITA provider	Project management
			Information management
	Organisation		Enterprise management
IT staff in the company			
Social		Negotiation	
		Training, work team, teamwork,)	
Organisation		Work team	
		Teamwork	
Environment		permanent communication	
		Provider experience	
Organisation		Requirements survey	
		Good technical support	
Environment		Stability of implantation equipment	

Technology

One of the aspects that facilitates the implantation of EITA in SME is EITA itself, that is if it is flexible, mature, tested in some enterprises and easy to use. It is also necessary that the technological infrastructure is adequate to support the new EITA.

“For me, the success lies in the fact that the EITA is proven, that it is not an initial idea, that it has already been implanted. Also, the EITA is flexible so that it can adapt to the processes of the organisation.”

SME 13.

“First, we recommend that the client have his server in his business, then what we do is check the network, now we also require the electrical wiring. I mean, one would think that they are simple things, that it should be working well, but we should check everything.”

CEO and Consultants 12.

Organisational

At the organisational level, we find five types of facilitator to implant an EITA in SME: strategic, structure, management, skills and social.

- **Strategic.** One of the main facilitators at the strategic level to implant EITA in SMEs is the implantation planning; view the EITA as an investment, not as an expense; be open to change and that there is effective leadership on the part of the administrators of the SME.

“First define what we want as an enterprise, align with the objectives of the company and departments.”

SME 8.

“Many companies see these systems as an expense; It is not an expense but an investment. It is an investment because the system is automating its processes and additionally ensuring the quality of the information.”

CEO and Consultants 10.

“First, predisposition to change from the owner, from the senior managers in the SME, the same owners must be predisposed to change.”

CEO and Consultants 15.

“The head of the organisation must feel the project, that is, to internalize it. Because he is going to have to make decisions, firm decisions at some time and if he does not have it internalized the supreme authority of the company, the project can go to failure.”

Independent consultants 2.

- **Structure.** At the structure level, what facilitates the implantation of an EITA in the SME is that the SME defines its processes and an adequate adaptation of the EITA.

“Define your processes well and define well what are the processes that contribute to the value chain.”

Independent consultants 4.

“One option is that you choose what you need and not what they sell you and another thing is that you know how to adapt the software to the needs of your company.”

SME 2.

- **Management.** At the management level, it is essential to highlight decision making, especially in the evaluation and selection of the software and its provider. Subsequently, some challenges must be managed, such as change management, project management, information management and enterprise management.

“To choose a software, you have to follow a process as conscientiously as possible, because you will live 7, 10 or even 15 years with the provider; then you have to make the selection process very thoroughly”.

Independent consultants 2.

“The SME also has to validate the experience of the consultants in the implantation of the tool. That is backed by other implantations, which are not new, that the company has its trajectory here in the country and cannot leave them in the middle of implantation.”

SME 9.

“A business owner or someone who is selecting software, before making the purchase decision, want to see the software, wants to make sure the software works in his business, asks, asks for maps, does everything”.

CEO and Consultants 5.

“That the company knows that it is going to change, that people are informed that they are going to suffer a huge change and that that change is for the better, besides, that jobs will not be in danger.”

Independent consultants 2.

“Define a transparent methodology from the beginning, a methodology for everything, not only for supplier selection but for monitoring, the definition of milestones and definition of deadlines (which is essential). If you do not have that in your project, it is doomed to failure. To do projects, a methodology is necessary because otherwise, it is risky it is precarious.”

SME1.

“I always recommend first defining the scope in black and white; the scope and limits of the project must be clear. It must be clear how far the project reaches in the initial negotiation.”

SME 18.

“It is the people who assemble the master data; these master data must be refined. For this, users need to be 100 per cent available.”

SME 17.

- **Skills** that facilitate the implantation of an EITA in the SME is the existence of personnel who know about technology in the company, another skill that favours is that the staff can negotiate favourable conditions for the SME in terms of contracting and implanting an EITA.

"The truth is that we have not encountered great difficulties, if I had not had a technician in the company, I would have had many difficulties in choosing or identifying the best solution."

SME 2.

"It is also essential to know what to do when the provider does not deliver things on time; this is very important. The penalty should be defined in the contract if the provider does not deliver on time, that is very important and is not usually done. Here we all trust everyone if everything goes very well, but when there are problems, you have to know whom to ask for responsibilities and how to ask."

SME 1.

- **Social.** The social aspects that favour the implantation of the EITA are the training of personnel, the work team that will participate in the implantation, besides, the work team leading the implantation of the EITA must be dedicated full time to this activity, and that the communication is permanent.

"Training of staff and owners. I think that the fundamental thing before implanting is to give them training about the functionalities of the EITA."

SME 4.

"For this type of implantation, the success, I consider that the success is in two factors: first, the work team is a fundamental piece, the key users assigned in each of the areas must be the people who know more about the business; and second, that they are very committed to the company and the project."

SME 17.

"That the work team is complete, in our case we were two people, and for all the work that existed, it was too much work. In fact, in some things, it got out of hand because the work is strong, powerful. In many cases, the fact that the work team is not complete can cause the implantation to fail."

SME 7.

"To implant software, in this case, an ERP that is a reasonably large application, you need a person who is 100% dedicated to that."

Independent consultants 1.

"We prepare communications with human resources; that is, we were always informing. I think it was a success factor because we always had complications."

SME 17.

Environment

At the environment level, what facilitates the implantation of an EITA is the provider. That is to say; it is necessary that the provider has experience in this type of activities, that it performs an adequate survey of the requirements (customer needs), that it provides excellent technical support to the SME and that its work team is stable.

"I believe that the central aspect is the relationship with the client, understanding what the client needs, I think that is essential."

CEO and Consultants 9.

"The provider understands the client's processes and identifies critical success factors."

SME 14.

"The key was that the supplier's company already had some time in the market, so he had the knowledge and information on how companies should deal with this issue."

SME 4.

"That the supplier enterprise provides good support and has an excellent development department to generate new applications."

Technology Director – case study.

"One of the reasons for the project's success is also the stability of the del provider company team."

CEO and Consultants 4.

Table 6-8 summarises the motivations, difficulties, facilitators, and influence factors, which provide valuable information for the implantation team and SMEs.

Table 6-8: Summary of motivations, difficulties, facilitators and influence factors an EITA implantation project in SMEs.

Context	Sub-context	Motivations	Difficulties	Facilitator	Influence Factors
Technology	EITA	-System integration	-Technical support -EITA underutilisation -Data migration	-EITA (flexible, mature, tested, easy to use)	-Fit between the process of EITA and enterprise process
	Infrastructure		-Weak or outdated	-Good technological infrastructure	
Organisational	Strategy	-Modernisation -Information for decision making -Grow	-Lack of vision – strategic -Enterprise wants immediate results	-Planning -See how to invest -Opening to change -Leadership	-CEO / CIO Involvement -Choose a “project champion” of high level -Project steering committees
	Structure	-Optimise processes	-Lack processes – procedures -Enterprise structure	-Define your processes -Adequate EITA adaptation	-Organisational structure should be modified before project initiation.
	Management	-Disagreement (product, provider) -Control -Improve management and expand service	-Project management -Information management -Enterprise management -Change management -Lack of resources	-Decision making -Change management -Project management -Information management -Enterprise management	-Evaluation and Selection of EITA -Change management program -Financial resources
	Capability		-Lack of internal technical skills -Lack of negotiation skills	-IT staff in the enterprise -Negotiation skills	-Capability in the domain of information systems
	Social		-Cultural problems -People resistance -Lack of boos capacity -Staff instability -Lack of communication	-Training -Work team -Teamwork -Permanent communication	-Education and Training to end-users
Environment	Government	-Government requirements			
	EITA provider	-Offer new solutions	-Consultant’s experience -Who supports the SME is also SME -Instability of consultants - programmers	-Provider experience -Requirements survey -Good technical support -Stability of the work team	-Provider support quality

6.5 Actors involved

A general code obtained in the field study is **actors involved – external**. This code has three sub codes: *Software developer* or editor; the *software provider* that can act as a distributor and/or consultant; and *organisations* that can provide support for the successful implantation of the EITA (cf. Table 6-9). Next, we describe each of these actors.

Table 6-9: Code and sub codes the actors involved - external

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3	
Actors involved - external	Software developer	Concerned about commercial issues		
		Software product		
		They have their own methodology		
	EITA or Software provider (reseller - partner)	Partner Recognition		
		Partner sells to the SME		
		Business language specialist		
	Organisations that support	Chambers or business associations	Association promotes selection	
			Open for training	
		University	They try to approach with universities	
			Graduation projects	
Development of individual modules				
Government	Assistance in administration issues			
		SME support policies		

6.5.1 Software developer

Companies that develop software are known as software developers or software editors. Depending on their business model, software developers use their distribution channels to place their products in different ways. Small software developers sell and implant their products directly to SMEs. As they scale up, they can have distributors that carry out these tasks.

One of the main concerns of a software developer is that their products are easy to implant. For this reason, they work with modular and integrated products to increase functionality over time. For them, innovating the market and defining forms of software evolution are their priorities.

Another issue of interest of software developers has to do with marketing. Getting new clients is very important as like it is likely that they will buy new products.

Also, the software developer is concerned with the management of the implantation project. Some companies developed their implantation methodologies. Even small software producers have their implantation guides (not necessarily formalized).

On the other hand, some software producers (depending on size) have distributors, either specialized by type of software, by geographical area, or both. These producers protect the market from their distributors; the most common way is not to market their products directly.

Finally, a recurring concern expressed by software developers is to guarantee the retention of the work team and the lack of qualified human resources.

6.5.2 Provider (Software – Services)

The providers are companies or individuals that market and sell software products and provide consulting services in management and technology matters. These companies, or typically individuals, know the market and are specialists in specific business areas (two or three). One of the difficulties of providers is to define how many business areas they should address since they are small. These companies or individuals can be of two types: Software resellers and management consultants.

Software Resellers act as an intermediary between software developers and the SME. These companies are responsible for the sale and implantation of the EITA, have an established structure to make the sale and specialists in different areas for support SMEs in the implantation of the EITA.

Management consultants provide services that involve technological and management issues. They can work on the side of the producers and distributors of the EITA to carry out the implantation or they can be hired by the SMEs to advise on this process

6.5.3 Organisations that support

Among the associations that can help the implantation of an EITA in SMEs, the following have been identified: Chambers or business associations, universities, and government entities.

The **chambers or business associations** can serve as a pivot to carry out various activities related to the implantation of the EITA. We have identified the following: Promote the selection of the EITA, open to facilitate training, promote approaches between partners and software vendors. On the other hand,

these institutions try to handle themselves carefully so as not to provoke a conflict of interest between their associates.

Universities make isolated efforts for the automation of SMEs. We have detected that students with the guidance of teachers in informatics engineering develop individual modules (applications) as a final degree project; in addition, there are isolated efforts to provide support in other areas.

Governments also have public policies to support SMEs. Unfortunately, often, SMEs are unaware of those policies.

6.6 Summary

In this chapter, we have presented two essential components in the implantation of the EITA in the SME: Influence factors and actors involved - external.

We have divided the influence factors into three categories: motivations, difficulties, and facilitators, which complement the success factors that we identify in the literature review. These factors are summarised in Table 6-4. Knowing the success factors and the influence factors (motivations, difficulties, and facilitates), help the implantation team and the SME to manage the implantation projects in a better way.

Besides, we have identified actors involved (external to the SME); who participate in the distribution chain of the EITA until its implantation in the SME; either acting as software developers, resellers, consultants, or organisations that provide support.

A case of the actors involved (external to the SME) are the different organisations (associations, universities, government) that can provide support for the SME to implant the EITA. Still, unfortunately, the SMEs do not know about these benefits.

Chapter 7

7. Framework SImplE.

This chapter presents one of the significant contributions of this thesis - the framework for the Successful Implantation of EITA in the SME (SImplE). The development of the SImplE framework has its roots in the field study. It emerged from the content analysis of the transcriptions of the interviews carried out. In this chapter, codes and subcodes obtained during content analysis are used to illustrate the development of the SImplE framework.

The SImplE framework (cf. Figure 7-1) encompasses three components: i) actors that may be involved in an implantation project (software developer, software provider and support organisations); ii) process model, areas of concern, and areas of focus (three phases - pre-implantation, implantation, post-implantation; cross-cutting areas of concern - leadership, communication, change management and project management; areas of focus - persons and process); finally, iii) factors that influence the success of the EITA implantation process – technological, organisational, and environment.

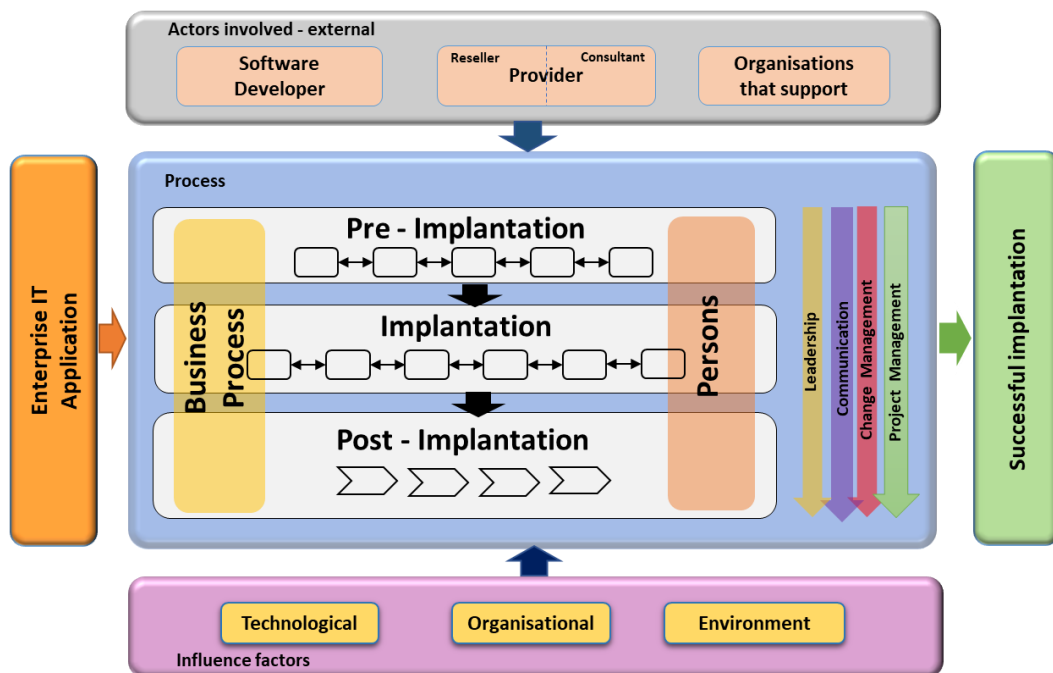


Figure 7-1: SImplE - Framework for the Successful Implantation of EITA in the SME

The first (actors involved) and the third component (influence factors), were already discussed in the previous chapter. In this chapter, we will focus on explaining the process of EITA implantation.

The process aims at covering all the activities necessary to accomplish the implantation of EITAs in SME. The model considers three phases (pre-implantation, implantation, and post-implantation), four cross-cutting areas of concern (leadership, communication, change management and project management), and two areas of focus (persons and business process). Each of the three phases is further decomposed in stages, as illustrated in Figure 7-2.

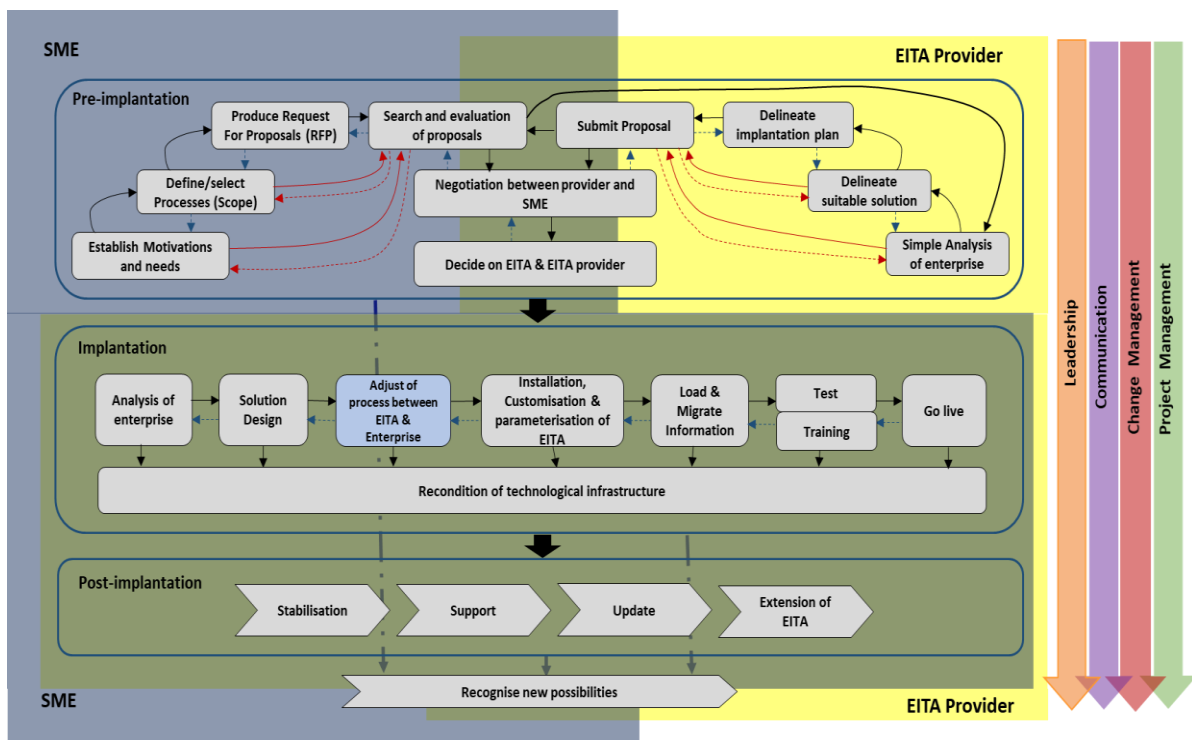


Figure 7-2: Process model of EITA in the SME

Phases succeed to each other in time. One phase can only start when the previous has finished. On the other hand, once one phase is finished, there is not an easy return, as that would involve reviewing entirely decisions made in the previous phase.

The objective of the first phase - pre-implantation - is to select and hire the EITA and the EITA provider. This includes defining the needs of the enterprise, selecting the EITA to be implanted and to commission its provider. All these activities must be achieved before starting the second phase: the implantation, in which, the objective is to put the EITA into operation. The last phase - post-implantation - involves stabilizing the EITA and its usage, besides providing support for its users.

Within the first two phases, their composing stages can be viewed as carried out iteratively, advancing and receding, as necessary. For example, in the pre-implantation phase, to make an appropriate selection, the SME can start by defining their basic needs. Then it starts identifying its business processes, preparing an RFP (request for proposals) and searching the market. This might include inquiring providers, attending presentations, analysing demos, visiting other enterprises that already use similar EITAs. This way, the SME will gain a deeper understanding of the potential benefits of using an EITA, that will likely be used to return to earlier stages and to review their needs, business processes and the RFP.

Similarly, during the implantation phase, during the execution of each stage, there might be a need to return to previous stages. For example, in the stage that addresses the load and migration of information, gaps in the EITA can be identified, which require to return to previous stages to solve those gaps. Such an approach is compatible with the principles of agile methodologies that facilitate the early access to some functionalities of the EITA.

It is envisaged that different patterns of iteration among stages will exist depending on the size of the enterprise. Enterprise size typically determines the existing competencies, skills and resources. For example, a micro-enterprise, after establishing its needs, can skip intermediate stages and go straight to the search for a suitable EITA. An EITA provider can advance with a standard proposal for the micro-enterprise that can be used to start a negotiation. The low cost of standard solutions suitable for well-established needs of micro-enterprises does not justify spending time in detailed descriptions of business processes and an RFP.

7.1 Pre-implantation phase

This phase was elaborated from the analysis of the codes and sub codes obtained in the field study, specifically from the *pre-implantation category* (cf. Table 7-1). This phase consists of ten stages, four carried out by SMEs, four carried out by the software provider, and two carried out jointly by SMEs and the software provider (cf. Figure 7-3). Below there is an overview of this phase and a short description of each stage.

Table 7-1: Code and sub codes the pre-implantation phase

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3	
Pre-implantation	SME	Establish needs and plan	Strategic plan	
			Define budget	
		Definition and selection of processes	Processes definition	
			Process checklist	
		Define requirements	Functional requirements	
			Produce requests for proposals	
		Search and evaluations of proposals	Disseminate the requirements	Search for EITA and EITA provider
				Evaluation and selection of the EITA
				Risk in the selection of the EITA
		EITA Provider	Simple Analysis of enterprise	Identify SME needs
				Delineate suitable solution
				Suppliers have a checklist
		SME and EITA provider	Delineate implantation plan	Estimate project dimension
				Submit proposal
				Send proposal to the client
SME and EITA provider	Negotiation between provider and SME	Cost		
		Financing		
		Provider Proposal		
		Agreement		
SME and EITA provider	Decide on EITA & EITA provider	Decide management advised by the areas		

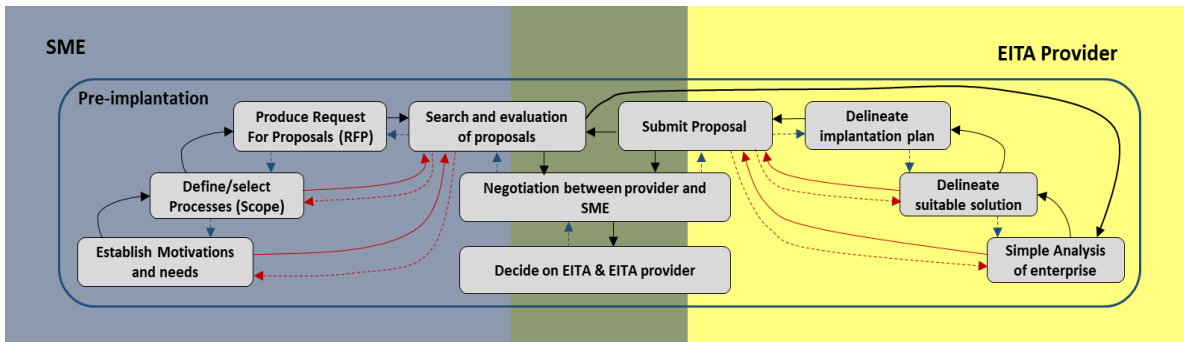


Figure 7-3: Pre-implantation phase of the SImplE framework

Although there might be some variation, mainly due to the size of the SME, the typical stages of the pre-implantation phase include: establish motivations and needs; definition/selection of the processes that will be supported by the EITA; elaboration of guidelines for the RFP - request for proposals; search, evaluation, and selection of the EITA. The stages carried out by the software provider normally include: Basic analysis of the SME; delineate an IT configuration that fits the RFP; present a proposal to the SME. The stages carried out jointly by the SME and the software provider are: negotiate the proposal

addressing technical, financial, support and other issues; make the decision, if the negotiation is successful for the parties, the SME and the provider of the EITA decide (together or separately) to move on to the next phase (implantation), otherwise they can continue negotiating or terminate the negotiation. Each of these stages is elaborated below.

7.1.1 Establish the motivations and needs

Establishing the motivations and needs corresponds to the definition of a business plan. The business plan is the basis for justifying the investment, thus establishing the Why? What is the need of the enterprise? To optimize the production process? To sell more? To improve customer service? To improve control over inventories or handle orders, etc. Once established the Why, it is necessary to define the amount to be invested. The amount to budget for the EITA acquisition and implantation should consider the size of the enterprise, the turnover and the objectives set. Generally, in this stage, there is important participation by the SME's executives.

7.1.2 Define and select the business processes

The business processes to be supported/automated should be described with care. The ideal is that the processes are reviewed and re-engineered. However, in enterprises with limited resources, the process description can be briefly carried out.

This stage allows defining and prioritizing the business processes to be supported/automated. This definition is crucial for selecting the EITA to be acquired.

7.1.3 Produce Request for Proposals (RFPs)

The RFP describes what has been defined in the previous stage and should be prepared in conjunction with all the business areas involved. Besides presenting what the enterprise is looking for, RFPs facilitate the evaluation and selection of EITA proposals presents by software providers.

7.1.4 Search, evaluation, and selection of EITA

This stage starts by disseminating the RFP to potential software providers through different means (invitations, media, social networks, professional contacts, related companies, etc.). The micro-enterprises do this informally. Most often they will directly contact a software provider already know, or that has been suggested by someone they trust. As the size of the enterprise grows, the formality of the

way the RFP is presented increases. After communicating the need, proposals are received from software providers. Software providers can also make presentations of the product and in some cases can provide demos of the EITA. As interest increases, SME staff might visit enterprises where the EITA can be seen in operation. These activities help to understand the benefits that can be obtained from the EITA.

The next step is the evaluation of the proposed EITAs. In these types of enterprises, the recommendations received and the price (lowest) weighs heavily. SMEs with greater maturity will use a selection matrix based on the RFP. An essential factor that is present in the evaluation is the origin of the software (brand). This stage is one of the most delicate of the entire implantation process since the success of the subsequent stages will depend on this. Furthermore, the selection of the EITA and its provider will initiate a long-term relationship between the SME and the EITA provider.

7.1.5 Simple analysis of the SME

The software provider -candidate to be the EITA supplier- contacts the SME and starts a rapid stage of information gathering (needs, processes, areas they have, et al.). It will try to know the enterprise as quickly as possible. A typical problem for the software supplier, at this stage, is that the SME rarely has its requirements formalized, and software supplier cannot dedicate much time to study the SME and identify those requirements since the deal is not made yet. Experienced suppliers use templates, adjustable to the size and sector of the SME, that facilitate the identification of the SME needs and requirements.

7.1.6 Delineate suitable solution

With the requirements obtained, the software provider prepares a proposal that meets the needs of the SME. This is about dimensioning and configuring the EITA that will be implanted, determining the adjustments and customisations that will be necessary. The disadvantage (risk) in this stage is that the supplier must prepare a proposal with limited information about the SME.

7.1.7 Delineate implantation plan

Based on the solution prepared in the previous phase, the software provider makes a plan for the implantation of the EITA and prepares an estimation of its cost, where software modules, personnel and execution time are considered.

7.1.8 Submit proposal

Finally, the supplier prepares and sends a proposal to the SME to try to achieve the negotiation and decision stages. As the size of the SME grows, the risk increases for the supplier, since it is more difficult to shape the proposal.

7.1.9 Negotiation between the supplier and the SME

Once the SME has selected the EITA and its provider, a negotiation stage begins, defining the cost of the application, implantation, financing, contract details, the scope of the proposal, types of licensing, and implantation time among others. The parties must write a contract that has established the scope of the proposal, which states: implantation time, ways of payment, responsibility for data migration, type of technical support, service level agreement, updating of the tool, obligations and penalties to each of the parties, among the main ones.

7.1.10 Decide on EITA and its provider

The final decision the EITA implantation is made by the enterprise's managers advised by the areas involved (depending on the size of the company). In a small SME, the decision will be made by the enterprise owner. In other enterprises, with a more elaborate structure, the decision process will be more complicated.

7.2 Implantation phase

As in the pre-implantation phase, this phase was elaborated from the analysis of the codes and sub codes obtained in the field study, specifically from the *implantation category* (cf. Table 7-2). The implantation phase comprises nine stages carried out jointly between the experts from the EITA provider and the SME staff (cf. Figure 7-4). The experts from the EITA provider are responsible for guiding this process. Below there is an overview of this phase and a quick description of each stage.

Table 7-2: Code and sub codes the Implantation phase

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Implantation	SME and EITA provider	Analysis of enterprise	Enterprise knowledge (identify users, necessities analysis, expectation analysis)
			Analyse current situation
			Identify the processes
			Define the scope of the project

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
			Implantation Plan
			Modules to be implanted
		Solution Design	Lift the process
			Based on the core of the business
			Define responsible by area
		Adjust of process between EITA and Enterprise	Adaptation of the enterprise to the EITA
			Adaptation of the EITA to the enterprise
			Mutual adaptation
			Adaptation of the EITA to government regulations.
		Installation, customisation, and parameterisation of EITA	Install
			Customisation
			Parameterisation
		Load and migrate information	Data loading
			Migrate Historical
			Testing and data quality control
		Test and Training	Test (functionality, by modules, integral)
			Training (embedded in the implantation, staff trains colleagues, training by areas, with acceptance forms)
			Requirements to go to production
			Define start date
		Go live	Ways to go to production – conversion approach (big bang, parallel, pilot, phased)
		Recondition of technological infrastructure	Analysis and update of technological infrastructure
			Analysis of software use licenses.

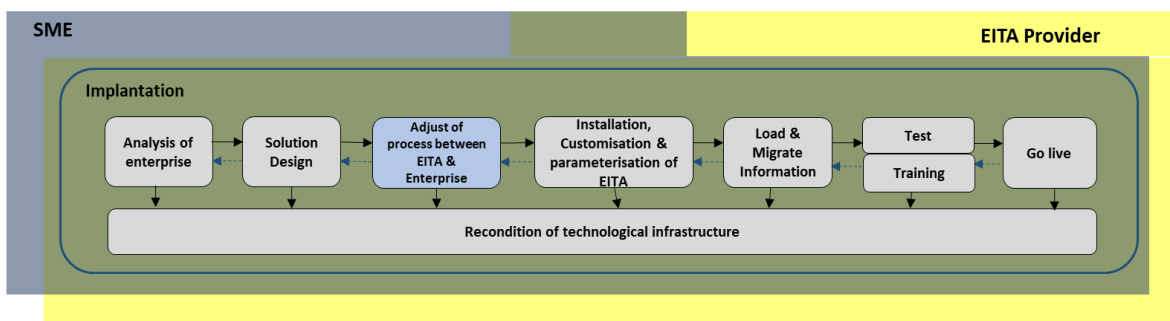


Figure 7-4: Implantation phase of the SImplE framework

7.2.1 Analysis of the enterprise

This stage consists of knowing the enterprise. It includes the following activities: identify the enterprise’s structure; analyse and document the functions and processes performed by the enterprise;

document the interaction among the enterprise's units; build an inventory of existing IT applications; investigate information needs; identify the future users of the EITA to be implanted and who will be affected by the EITA (important for the second objective of the PhD project).

Those activities are typically carried out by the experts from the EITA provider. They involve a set of meetings with section managers and key users, those involved in the enterprise's operations that will be affected by the EITA. Depending on the experience of the experts of the EITA provider, they can use pre-established templates to accelerate this process.

7.2.2 Design of the solution

With the information raised, the solution that is going to be implanted is designed. Considering that the solution involves an EITA, designing a solution means defining the set of functionalities to be made available, defining a configuration for the software and other aspects that are relevant for the customisation of an EITA to a particular SME.

This stage is carried out by the experts from the EITA provider, communicating and agreeing with the final design with the SME. This stage is critical since this is where the current scope of the implantation of the EITA will be determined. With this base, the implantation plan is created, in which the areas and processes involved are determined. For example, modules that will be used, key users, end-users, duration, milestones, and implantation strategy, among the main ones.

7.2.3 Adjustment of processes between the EITA and the enterprise

The activities of this stage aim to adapt and configure the business processes embedded in the software to adjust it to the business processes of the company.

A COTS-EITA offers software based on general requirements and widespread business practices. Furthermore, the proposed software product has already been tested in other companies where it is operating. COTS EITA are products that have accumulated knowledge over the years. For this reason, it is preferable to adapt the processes of the SME to the processes of the EITA without any adjustment, as it is more economical and decreases the risk of implantation failure.

SMEs often see themselves as unique and try to adapt the EITA to their way of working. Such action is recommended only in situations where the SME way of working constitutes its differentiation

with their competitors and brings a competitive advantage. However, in most situations, it is not the case, and the adaptation of the EITA to the SME specific way of working is not recommended. It is also necessary to recognise that there will be occasions where the provider will need to increase functionality to the EITA for adaptation with the SME.

7.2.4 Installation, Customisation and Parameterisation of the EITA

This stage encompasses the installation of the EITA. This will depend on the license model followed (if the EITA is made available in the cloud, under a SaaS model, this activity is not performed). Then the EITA is customised (adapting colours and logos of the SME, etc.). Finally, the EITA is parameterised (entering tax values, determining types of inventories, etc.) depending on the options that it has for that.

7.2.5 Loading and migration of information

This stage begins with the loading of initial and necessary information (e.g. products, customers, suppliers, etc.) so the EITA can work properly. The creation of a quality information policy is advised so that the system is fed with good quality information and on time. If it is necessary to migrate data from other IT applications, quality control of that information should be performed beforehand. For the EITA to go to the production environment, the recommendation to load information with initial balances, for example, inventories, customers, suppliers, etc. Migrating all the historical data of an inherited application must be considered as a project separated by the difficulty that represents.

7.2.6 Testing and Training

Testing and training area carried out in parallel. They should start with a selection of the principal users of the IT application. These users actively participate in various activities of the implantation phase, during this time, users become familiar with the new EITA. These users actively participate in various activities of the implantation phase, during this time, users become familiar with the new EITA. When it is necessary to test the operation of EITA, the principal users already know many aspects of the EITA. Which is why they only need basic training to understand its service.

At this point, the principal users already know the operation of the application, being necessary to train the end-users. If the end-users are few, the training is done by the provider's implantation team.

If there are many end-users to prepare, this responsibility can be transferred to the principal users or unit managers.

7.2.7 Go Live

In this stage, the date in which the EITA will go out to production is defined. The requirements for the correct operation of the EITA and the necessary activities that must be met to launch the system are indicated. Usually, the go-live is adjusted to the begin of fiscal periods, whether annual, semi-annual or monthly, depending on the enterprise's need.

7.2.8 Recondition of the technological infrastructure

Along with the implantation phase, it will be necessary to identify restrictions imposed by the IT technological infrastructure and limitations to its capacity. Such restrictions and limitations might lead to changes to the IT technological infrastructure, particularly to the upgrade of some of its features

7.3 Post-implantation phase

The codes and subcodes that emerged from the content analysis of the field study are presented in Table 7-3. As in the implantation phase, this phase requires close collaboration between the experts of the EITA supplier and the SME staff. The post-implantation phase encompasses four stages: stabilisation of the EITA; EITA support; EITA update; extension of the EITA. Another stage can be added to post-implantation phase: recognizing new business possibilities (cf. Figure 7-5)

Table 7-3: Code and sub codes the Post-implantation phase

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Post-implantation	SME and EITA provider	Stabilisation	Stabilise the application
			Accompaniment to SME staff
			Fulfil business cycles
		Support	Technical-administrative support
			Functional support
			Types-forms of support
		Update	Maintenance contracts
			Updates due to change of laws
		Extension of EITA	Increased functionality
			Support of new developments
Recognise new possibilities	Expectations for new features		
	Never ends		

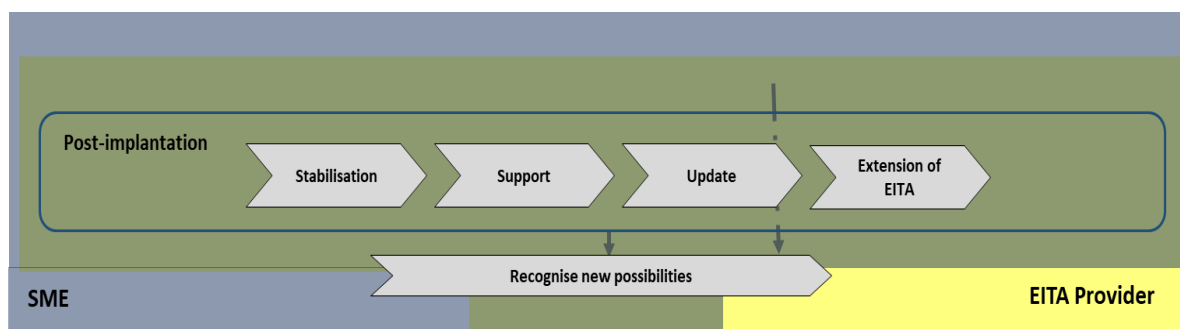


Figure 7-5: post-implantation phase of the SImpIE framework

7.3.1 Stabilisation

The stabilisation phase is generally coordinated by the implantation consultants – the experts from the EITA provider. It is common that in the early days of the EITA operation, the EITA is unstable, and SME staff do not use it correctly. This stabilisation stage must be carried out intensively after the launch of the EITA and then by cycles. This is because the problems appear at the end of the business cycle. For example, if the company has a monthly accounting cycle, issues related to the accounting closing will be detected at the end of the month.

7.3.2 Support

Once the stabilisation stage has ended, a technical support stage begins, which it is advisable to hire, together with the implantation of the EITA, at least one period. To have technical support guarantees that there will be personnel to provide help in technical and functional aspects. The initial support will be carried out by the key users that accompanied the implantation phase since they have a global vision of the system within the enterprise. Support for higher levels is carried out by the enterprise that implanted the EITA.

It is advisable to hire, together with the implantation of the EITA, at least one period of technical support. This is because some inconveniences are likely to appear in the EITA in the first year.

7.3.3 Update

This stage ensures the continuity of the EITA for several years. It may be required for several circumstances, especially when the government regulations change, and the application must be adapted to the new rules. Usually, these updates are made by the EITA providers at no extra cost if the SME has a support contract.

7.3.4 Extension of the EITA

Once the SME already operates the EITA, it will begin to recognise and demand more functionalities. This is typically addressed by the addition of new modules. As the EITA suppliers are aware of this evolution, they usually offer a set of basic modules at accessible prices, with the expectation of supplying more modules in the future.

7.3.5 Recognise new possibilities

Besides, it should be mentioned that during the three previous phases (pre-implantation, implantation, and post-implantation), the SME with or without the support of the EITA provider can recognise that there are several business possibilities, not contemplated in the initial project and that can be addressed later. This will lead to starting another implantation cycle.

7.4 Cross-cutting areas of concern

We have identified four cross-cutting areas of concern: leadership, communication, change management and project management (cf. Figure 7-6). These cross-cutting areas emerged from the analysis of the codes and sub codes obtained in the field study, especially from the following categories: *leadership, communication, change management and project management.*

These cross-cutting areas must be carefully considered by the implantation team during the entire EITA implantation process. Neglecting these areas will hinder the success of the EITA implantation and can lead to failure.

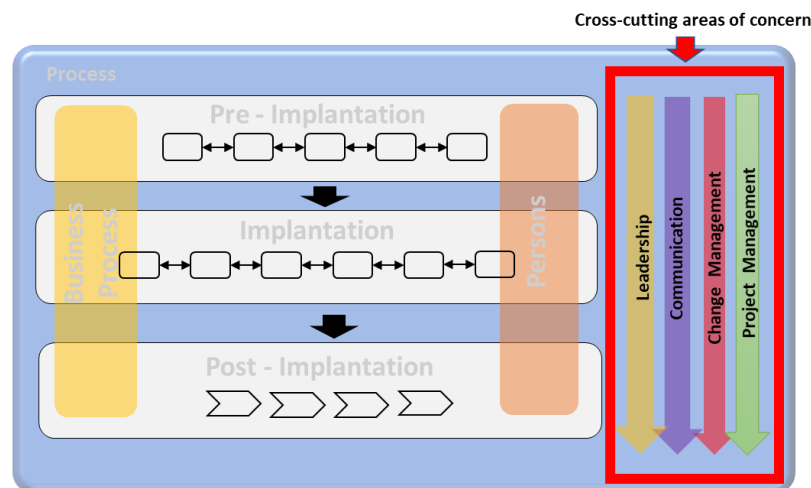


Figure 7-6: Cross-cutting areas of concern

7.4.1 Leadership

In Table 7-4, we present the codes produced during the content analysis of the transcriptions of the interviews. The codes make use of the Action Centred Leadership (ACL) framework (Adair International, 2017), in which, the leader’s role is to get the right balance between these three areas of need in order to achieve the **Task**, build and maintain the **Team**, and develop the **Individual**.

Table 7-4: Code and sub codes the Leadership

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Leadership	SME and EITA provider	Team	Firm leadership
			Promotes teamwork
			Know the operation of the enterprise
			Share the vision
			Establish enterprise policies
			Motivate the work team
		Individual	Comply and enforce the planned
			Convinced of the change
			Manage expectations
		Task	Transmit confidence and security
			Transparent
			Minimizes uncertainty
			Be an agent of change
			Establish the scope and objectives of the project
			Efficient resource management
		Capability to make decisions	

An EITA implantation process aims at improving the enterprise. Therefore, if the project involves the whole enterprise, it should be led by the enterprise’s general manager. In case the project addresses a specific area, it should be led by the area manager. Leadership in these projects is fundamental because, at certain times, difficult decisions must be made for the continuity of the project. Delegating this responsibility to persons that lack the power to decide, hinders the EITA implantation process.

The leaders of the EITA implantation process must be aware of the expected benefits, and they must have specific knowledge of the processes to be supported/automated.

7.4.2 Communication

Adequate communication can be the difference between success and failure of the project. From the field study we have obtained the following codes and sub codes (cf. Table 7-5).

Table 7-5: Code and sub codes the Communication

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Communication	SME and EITA provider	Communication plan	Vision, reasons, final goal, project stages
		Policies and channels	Define policies (internal and external)
			Define channels (newsletters, memo, phone, email, conference, social networks, etc)
			Briefings, presentations, and meetings
		Socialisation	Communicate the purpose
			Launch of the project
			Presentation of the implantation team
			Integration workshops (consultants, enterprise staff)
		Internal promotion	Inform how work change
		Benefits	Pen and t-shirts
For users (before)			
		For the enterprise (after)	

For successful communication, it is necessary to define a communication plan where the leader communicates the vision, the reasons, the final objective, and the phases of the EITA implantation project in SMEs. The objective of the communication is to carefully explain to all those involved what are the objectives of the project, how it is going to be done and what are the expected results.

For this, it is necessary to define communication policies and channels (e.g., work meetings, email, internal social media groups). Also, it is vital to carry out socialisation of the project, which involves carrying out the project launch, presentation of the implantation team and eventually integration workshops between the EITA provider team and the company staff.

Another recommended aspect is to carry out internal promotion so that the company's employees are aware of what is being done. For this reason, the benefits for the employees and the company must always be communicated.

7.4.3 Project management

The consultants who implant the EITA guide the implantation project based on the five PMBOK macro processes: Initiating, planning, executing, monitoring & control, and closure (PMI, 2017). Table 7-6 presents the codes and sub codes obtained from the case study.

Table 7-6: Code and sub codes the Project management

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Project Management	SME and EITA provider	Initiating	Project constitution
			Project management
		Project planning	Development of the project
			Schedule Definition
			Adequate estimate
			Risk identification
		Project execution	Interlocutor
			Implantation Methodology
			Hire external consultants
		Monitoring and controlling	Work with leading users
			Joint Project Management
			Project control
		Closing	RFP help meet the times
Project closure			

This type of project requires two sub-projects: The first one during the pre-implantation phase in which the objective is to select the EITA and its provider. This sub-project must be managed exclusively by the SME or with the help of an independent expert.

The second sub-project encompasses the phases of implantation and post-implantation, in which the objective is to implant or put into operation the EITA in the SME and provide technical support. The EITA-provider manages this sub-project involving of the SME staff. The success of the project depends on several aspects: adequate planning; monitoring and control from the two parties (EITA provider and SME); use of an implantation methodology; communication between SME staff and the EITA provider's implantation team.

Furthermore, we identify that these projects can vary from smaller to larger, depending on the size of the enterprise and the application to be implanted.

Besides, a significant part of the professionals who implant an EITA, carry out the planning of the implantation project following the regulations of the Project Management Institute (cf. Figure 7-7) from a technical and business perspective. That is, the consultants concentrate their efforts on technical and business side, leaving aside people, who in our opinion, are who facilitate or hinder the EITA implantation process.

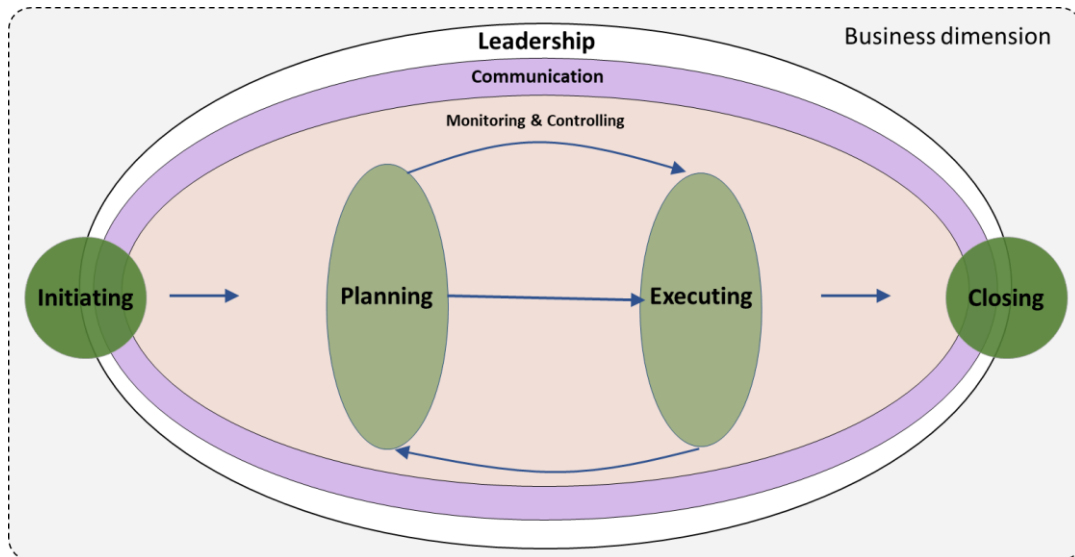


Figure 7-7: Process for project management in the implantation of EITA, based in PMI

7.4.4 Change management

Many of our interviewees in this study agree that change management is a significant activity to carry out in the implantation of the EITA in SMEs. In Table 7-7, we present the codes obtained from this study.

Table 7-7: Code and sub codes the Change management

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Change Management	SME and EITA provider	Prepare the enterprise for change	Adaptation to change
			Led by executives
		Resistance to change	Choose appropriate key users
			Change resistance is normal
		User persuasion	Generational barriers
			Convince people
		User must be involved	See the benefits
			Involve the customer
		Launch of the project	Presentation - project launch
			Presentation of the implantation team
Training	Constant training		

The importance of change management is too often underestimated in the implantation of EITAs. It is assumed that everybody will accept the new EITA without any opposition, and this is far from reality. The implantation of an EITA may involve structural changes in the company and requires more discipline from the personnel involved. This is because the EITA can change the way of working, and if there is previous software, the user interfaces will also change. It should also be considered that during the

implantation of an EITA, there will be more workload since the employee must perform their activities and participate in the implantation project.

Based on the analysis of the interviews, we built the following change management process for the EITA implantation in SMEs, in which people are considered the central axis (cf. Figure 7-8).

The components of this process include: Leadership, communication, prepare the enterprise and prepare the person. It should be noted that leadership and communication are two cross-cutting areas of concern also addressed in this section. On the other hand, people correspond to the central axis of the process, thus emphasizing the key role of the human side in the management of an EITA implantation project.

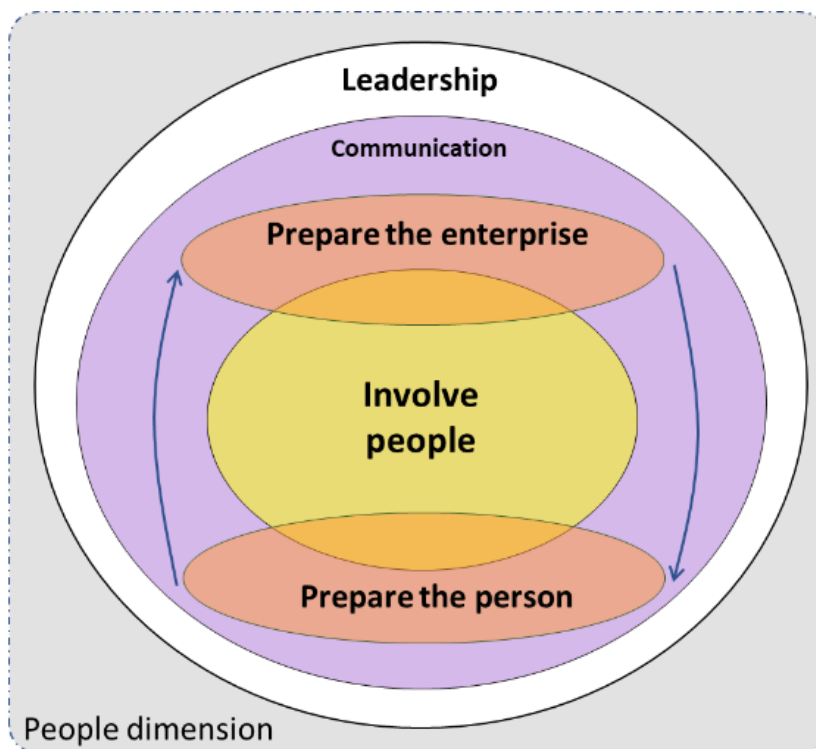


Figure 7-8: Change management process for the EITA implantation in SME,

7.5 Areas of focus

In the implantation process, we identify two critical focus areas: *people* – the persons that work in the SME; *processes* – the structure of the work executed by the persons and by IT products and other equipment (cf. Figure 7-9). Most of the activities carried out during the process of EITA implantation will affect these two areas. Therefore, they deserve special attention.

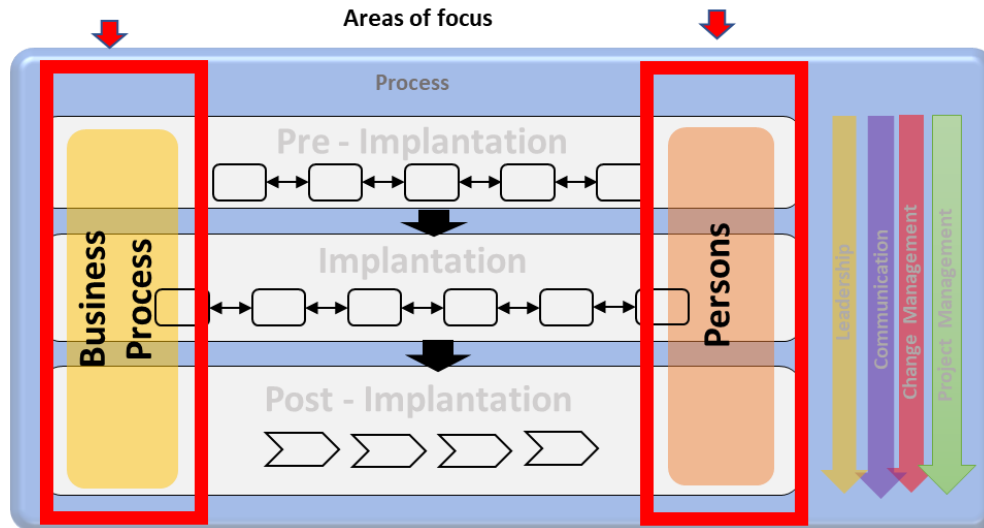


Figure 7-9: Areas of focus

7.5.1 Persons

This focus area was elaborated from the analysis of the codes and sub codes obtained in the field study. However, it is necessary to indicate that we do not encode the category people. This is because people are directly involved in the entire implantation process. Table 6-4 shows the codes and sub codes concerning people.

A sensitive issue in the implantation of an EITA is the persons that will use the EITA and/or will be affected by its use. Persons have differences (generational, cultural, social, among others). Therefore, they must be treated differently.

We must also consider that this type of project generates resistance to change (characteristic of human nature). This is due to circumstances such as the fear of experiencing new forms of work, loss of power, insecurity due to lack of knowledge, doubts about job stability, among others.

For this reason, when a project of this nature starts, it is necessary to plan, in an appropriate way, how to deal with the persons and how the change will be managed. The workload during the implantation period can double, as, besides their regular duties, they will have to dedicate time to activities related to the implantation process.

One of the critical aspects of the implantation process to be successful is to prepare people, that is, to provide training and coaching—this demand defining the training needs of future EITA users and

SME managers. The training must cover different areas such as management, processes, technology, and the EITA.

In case the enterprise has many employees, the training can be carried out in two stages: first, to train the primary users or heads of areas; later on, those that are already trained will train the rest of the staff in their work area.

One aspect to highlight is that training should be constant, that is, it should be done before, during and after the implantation of the EITA.

7.5.2 Business Processes

This focus area was developed from the analysis of the codes and sub codes obtained in the field study, specifically from the *process category* (cf. Table 7-8).

Table 7-8: Code and sub codes the Process

Code	Sub-code – level 1	Sub-code – level 2	Sub-code – level 3
Process	SME and EITA provider	Organise the enterprise	Processes are born with technology
		Raise business process	Identify processes
			Use of standards
			Refine processes
		Process reengineering	Implant software is accompanied by reengineering
			SMEs do not want or do not reengineer
		The micro-enterprise has no processes	Limited process knowledge
	Small and medium enterprises already have processes	Small and medium enterprises are already valuing processes	

For the successful implantation of an EITA in an SME, it is first necessary to establish what are the SME needs and to define the processes that will be supported/automated. The problem in SMEs is that their management is carried out in a very informal way, lacking the formalization of work structures and processes.

This makes it difficult to identify/define technological needs and hinders the search, evaluation, and selection of the EITA. The proposal for SME is to determine its processes according to their needs. These processes will be the basis for selecting the software to obtain. Otherwise, the SME processes will be governed by the EITA, that usually embeds common, widespread practices for operations and management.

In case the SME has a typical operation and administration, it is better and more profitable to adjust to the EITA processes. But if the SME bases its competitive advantage on differentiated processes and agile management practices, implanting an EITA can result in the loss of its competitive advantage. In these cases, it is better to develop custom software that fits differentiated processes and agile management practices.

In some SMEs, the formalisation of processes appears with the implantation of EITA. That is, the business application is the engine of change and therefore organises the enterprise based on the process models embedded in the software.

Before the implantation of the EITA, it is advisable to prepare the enterprise for the change. Doing that, besides studying the persons that will be affected by the change, involves documenting the processes or even reengineering them, taking into consideration the needs of the company and the potential of current technologies. After the definition of the processes, the SME must search, evaluate, and select the EITA that meets the established processes.

In Figure 7-10 we illustrate how the four cross-cutting areas (leadership, communication, project management and change management) and the two areas of focus (people and processes) influence each other in an integrated way and affect the successful implantation of the EITA in an SME. It should be noted that persons are presented at the centre of these activities, thus highlighting their importance.

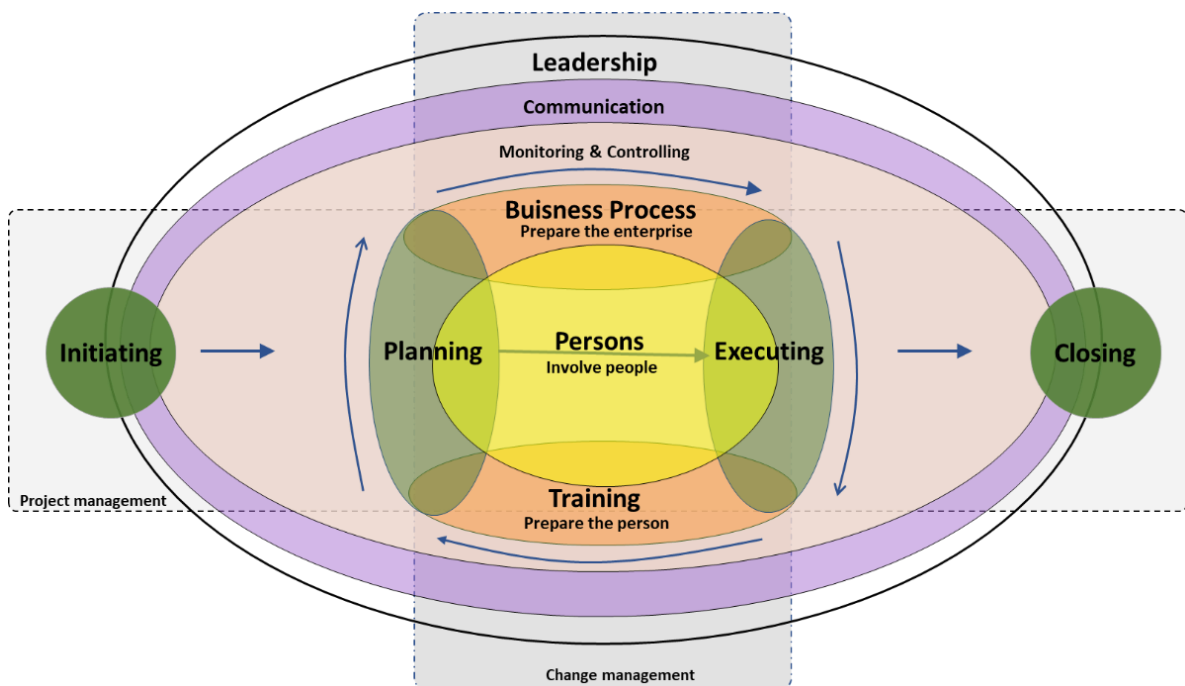


Figure 7-10: Cross-cutting areas of concern and area of focus for EITA implantation in SME

7.6 Summary

In this chapter, we presented the SIMPLE framework (Simple Implantation of the EITA in SMEs), which emerged from the field study. The framework covers the actors involved, the process of integration of the EITA in the SME and the influence factors. Actors involved and influence factors were covered in previous chapters

The process aims at covering the activities necessary to accomplish the implantation of EITAs in SME. The model considers three phases (pre-implantation, implantation, and post-implantation), four cross-cutting areas of concern (leadership, communication, change management and project management), and two areas of focus (persons and business process).

The pre-implantation phase has ten stages; four carried out by the SME, four carried out by the supplier and two carried out jointly (SME supplier). The objective is to hire the EITA; it begins by establishing motivations and needs, ends with the decision to hire the EITA and its supplier. The implantation phase has nine stages and is led by the software provider. The objective is to put the EITA in operation; It begins with the analysis of the company, ends when the EITA enters operation. The post-implantation phase has four stages. This phase is not necessarily linear and is performed by the provider in response to a request from the SME.

These cross-cutting areas (leadership, communication, project management and change management) must be carefully considered by the implantation team during the entire EITA implantation process. These areas are often neglected in the EITA implantation processes.

The focus areas (people and processes) deserve special attention. Most of the activities carried out during the process of EITA implantation will affect these two areas.

PART4

Chapter 8

8. Change Management. A proposal for enhancing MIP - Metodologia de Implementação Primavera.

Implanting Enterprise IT Applications (EITA) in enterprises, including SME, involves altering the enterprise's situation in several of its dimensions. Most likely, the distribution of work between persons and EITAs will change. This means changing the work structure, affecting habits and expectations, impacting on the existing power arrangements and leading to modifications in the enterprise's rituals (Ramos et al., 2005). Any project that involves the implantation of an EITA must contemplate the management of the change. This is widely acknowledged in the literature (Ahmadi et al., 2013; Gupta & Misra, 2016; Leyh, 2014; Seethamraju, 2014; Shaul & Tauber, 2012) and recognised in practice.

For example, Primavera BSS², a successful developer of business software, proposes a methodology for the implantation of their EITAs (MIP - Metodologia de Implementação Primavera), that encompasses a change management dimension. MIP is presented to Primavera BSS's partners (resellers and implanters of Primavera's EITAs) as a guide to the successful implantation of EITAs. However, Primavera BSS recognises that MIP's change management dimension needs to be enhanced in order to provide more comprehensive support to those that have the duty of managing change in such projects (J. Batista & J. Dionisio, personal communication, 2017).

The need presented by Primavera BSS' co-CEOs is the focus of this chapter. The aim of the work reported in this chapter is to translate existing scholar knowledge about knowledge management into means of action to be incorporated in the MIP, enhancing its knowledge management features.

This chapter provides an overview of change management and presents contributions to MIP's change management dimension. The contributions mainly address instruments for diagnosing an enterprise focusing on the risks to the success of an EITA implantation project related to change management.

² <https://pt.primaverabss.com/en/>

8.1 Change Management

Change management in an EITA implantation project in SMEs consists of dealing with users to minimise risks and maximise benefits. In this type of projects, there will always be resistance to change; This is due to human nature (fear of the unknown, fear of uncertainty).

There are several models for the management of organisational change (and no model is better than the other). Some models lead the change, and other models respond to the change. The purpose of this section is to provide a brief explanation of these models.

There are several models to guide change management. The following are the most cited in the literature: Kotters eight steps of change (Kotter, 1995); Lewin 's change management model (Lewin, 1947); McKinsey 7S Model (Mind Tools, 2016); A Model of Organisational Performance and Change (Burke & Litwin, 1992); "AMIGO" Model (Peiró, 1999); and ADKAR Model (Prosci, 2018d).

In addition to models that aim to lead change, some models explain the transition or response of people in a situation of change. The Kübler – Ross model (Kübler-Ross, 1973) is such an example. From this model, others have been derived: Bridges' transition model (Bridge, 2018); and Scott and Jaffe Change Model (Scott & Jaffe, 1988).

In this chapter, we use the general process of change that emerged from the field study carried out (cf. section 7.4.4). This process addresses the change management in EITAs implantation projects, It was obtained through the interviews carried out in the field study. We decided to work with this model because the focus is an EITA implantation project in the SME. Also, it fits very well to the needs of MIP.

Managing change means considering the human side in the management of projects related to the implantation of EITAs. Figure 8-1 depicts a process to deal with the change management, highlighting five key areas: leadership, communication, prepare the enterprise, involve people, and prepare the person. We briefly describe each area below:

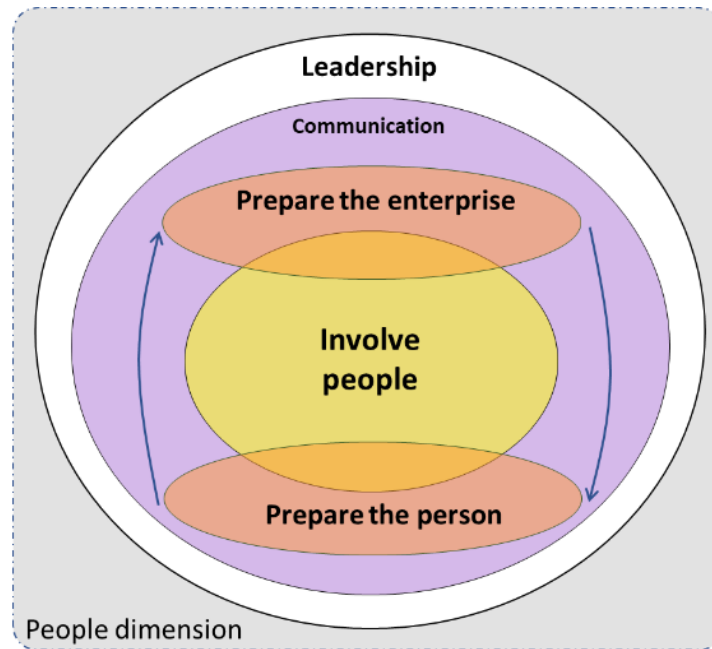


Figure 8-1: Change management process for the EITA implantation in SMEs

8.1.1 Leadership

Leadership in these projects is fundamental because, at certain times, difficult decisions must be made for the continuity of the project. Delegating this leadership without the power to decide complicates the process of implanting the EITA. On the other hand, these leaders must be aware of the benefits to obtain and preferably they must have specific knowledge of the processes to be automated.

A project of this nature, if possible, should be led by the general manager if the project involves the whole enterprise; by the area manager if the project includes a specific area.

Here are some leadership requirements that we identified and classify according to Action Centred Leadership (ACL) framework:

- **To accomplish the task**
 - Establish the scope and objectives of the project
 - Efficient resource management
 - Capability to make decisions

- **Build and maintain the team**
 - Firm leadership
 - Promote teamwork
 - Know the operation of the enterprise
 - Share the vision

- Establish enterprise policies
- Motivate the work team
- Comply and enforce the plans
- **Development of the individual or person**
 - Convinced of the change
 - Manage expectations
 - Transmit confidence and security
 - Transparent
 - Minimizes uncertainty
 - Be an agent of change

8.1.2 Communication

Adequate communication is the difference between success and failure of the project. It is for this reason that a project launch is an important moment. The launch of the project should involve the personnel; here it is explained what it is intended to do with the implantation of the EITA, how it will be done, and what the expected results are. This communication process must be regular during the project and involve all the staff. For this reason, the project leader should use several channels (work meetings, email, social networks groups, etc.).

Below we present a summary of the aspects to be considered in the communication issue, in an EITA implantation project in the SME.

- **Communication plan**
 - Vision
 - Reasons
 - Final Goal
 - Project stages
- **Policies and channels**
 - Define policies (internal and external)
 - Define channels (newsletters, memo, phone, e-mail, conference, internal social media, etc.)
 - Define cases to use briefings, presentations, and meetings.
- **Socialisation**
 - Communicate the purpose
 - Make the presentation and launch of the project
 - Internal promotion
 - Presentation of the implantation team
 - Integration workshops (consultants, enterprise staff)
 - Benefits

8.1.3 Prepare the enterprise

For the successful implantation of an EITA in an enterprise, it is first necessary to recognise what is needed, define the processes that will be automated, and define management policies at various levels (organisation, information, security, among others). The critical problem is the lack of formalised processes and policies. Preparing the enterprise for change involves high-level decisions such as defining the organisation's strategy (the reason for change) and, based on this strategy, determining the structure, processes, and policies of the company. It is also necessary to influence the culture and organisational climate positively.

Some of the aspects to consider in the preparation of the enterprise are the following:

- Define policies for enterprise management
- Define policies for information management
- Define policies for Information security
- Define the strategy,
- Define the structure
- Define the process
- Positively influence the culture and climate organisational

8.1.4 Involve people

A sensitive issue in the implantation of EITA are people. People have differences (generational, cultural, social, etc.) and, as such, the treatment must also be different. It should also be borne in mind that in this type of project there will initially be resistance to change, since it is characteristic of human nature and is due to circumstances such as fear (experimenting new ways of working, unknown, losing power) and insecurity (due to lack of knowledge, doubt of stability), among others.

In the process of change, it is essential to involve people. For this, we have classified some aspects to consider:

- **Users**
 - Identify users
 - Identify groups of interest
 - Identify change agents
 - Predict respond to change
- **Identify source of resistance:**
 - At the individual level
 - At the organisational level
 - To the process

- To software
- **Identify resistance behaviour:**
 - Users who accept the change
 - Indifferent users
 - Users with passive resistance
 - Users with active resistance
- **Identify response to user change:**
 - The user is in denial state
 - The user is in resistance state
 - The user is in exploration state
 - The user is in commitment state
- **Identify if users are awareness (people understand) of:**
 - The need to change
 - How the company will change
 - The impacts of the change
- **Identify users' wishes (people wish):**
 - For opportunities
 - For stability
 - For growth
- **Identify if the user knows (people know):**
 - The work management
 - Their business processes
 - About information technology
- **Identify user ability (people can do) in:**
 - Managing their work
 - The use of business processes
 - The use of information technology

8.1.5 Prepare the person

One of the most challenging activities for managing change is preparing the person. Developing a person involves working from two perspectives: emotional and rational. The emotional side touches awareness and desire. The rational side has to do with training and the development of skills. For this, the steering committee of the project should use different strategies for this purpose such as: coaching, training, interactions with colleagues, reference materials, online resources, super-user support, job aids, etc.

Here are some guidelines to prepare people:

- Define training and coaching needs
- Coaching for users

- Training for leadership
- Training for users or key users*
 - Management,
 - Processes
 - Technology,
 - Software (Application)
- Support
 - During implantation
 - After implantation

* Training for key users, Key users train their department

In Figure 8-2 , we present a view of the aspects to consider in the change management of an EITA implantation project in the SME.

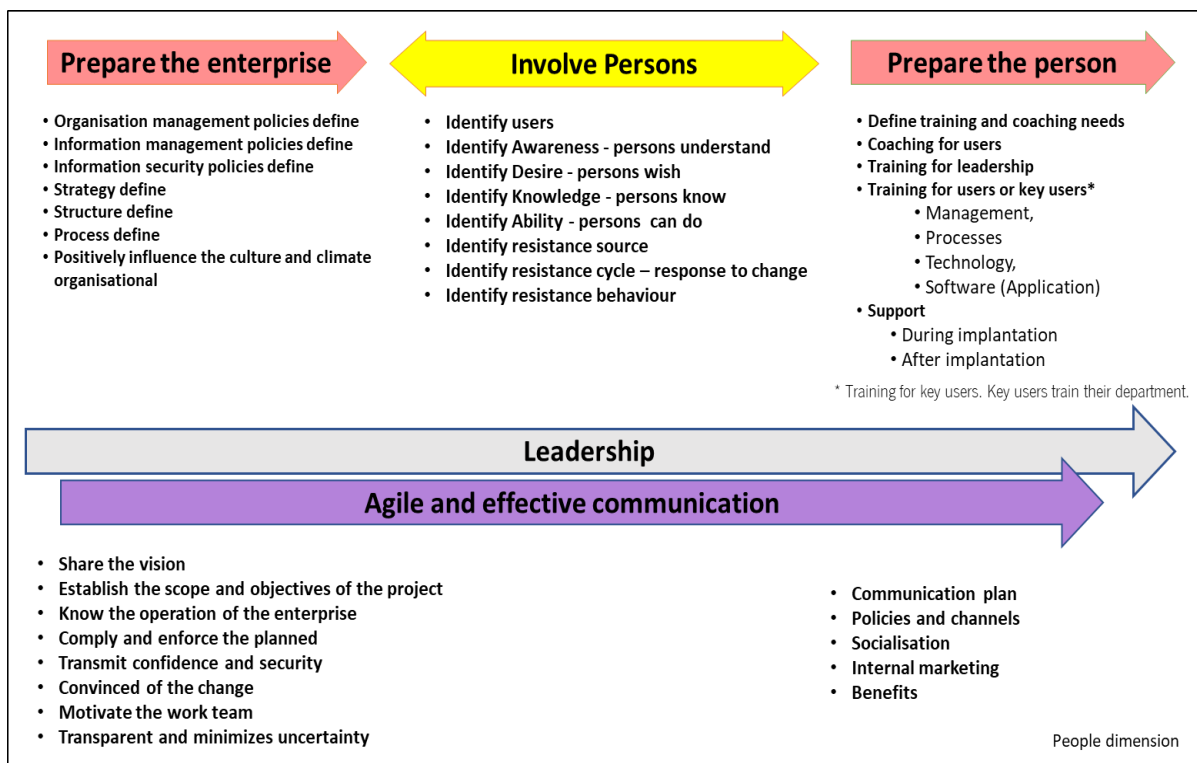


Figure 8-2: Change management for EITA implantation in SME - Aspects to consider

8.2 Primavera Implementation Methodology (MIP)

Note: The information in this section has been adapted from the official MIP documentation. (PBSS, 2017). Also, in this section, we use the term "implementation" as used in the methodology. Remember that we in this thesis have been using the word "implantation".

The Primavera Implementation Methodology (MIP) is a set of good practices for the implantation of de *Primavera* solutions. This methodology aggregates the best of breed techniques and methods for the implantation and integration of management software, together with the horizontal extensibility characteristics and ease of vertical integration of *Primavera* solutions. Also, MIP covers the entire life cycle of an application, from sales to maintenance, monitoring and continuous improvement processes. For this, MIP is made up of a set of stages, phases, and activities³.

The purpose of the MIP are: To provide an implantation model, standardise processes, support the implantation of vertical applications, increase focus on the customer and their business goals, improve control over project scope, reduce implantation risks, increase collaboration between stakeholders, and guarantee successful projects.

The expected benefits are agility and ability to adapt to the objectives of a project, effectiveness and efficiency in the various stages of the project, speed and assertiveness in carrying out the project activities and customer satisfaction.

8.2.1 MIP structure

The MIP is divided into five areas: Classes, implementation management, project management, change management and roles & responsibilities. Each area covers a specific dimension of the implementation process of enterprise applications, as shown in Figure 8-3. The figure depicts the structure of MIP documentation.

³ The MIP uses the sequence: Stage-> phase-> activity. This differs from the sequence used in this research: Phase-> stage-> activity.

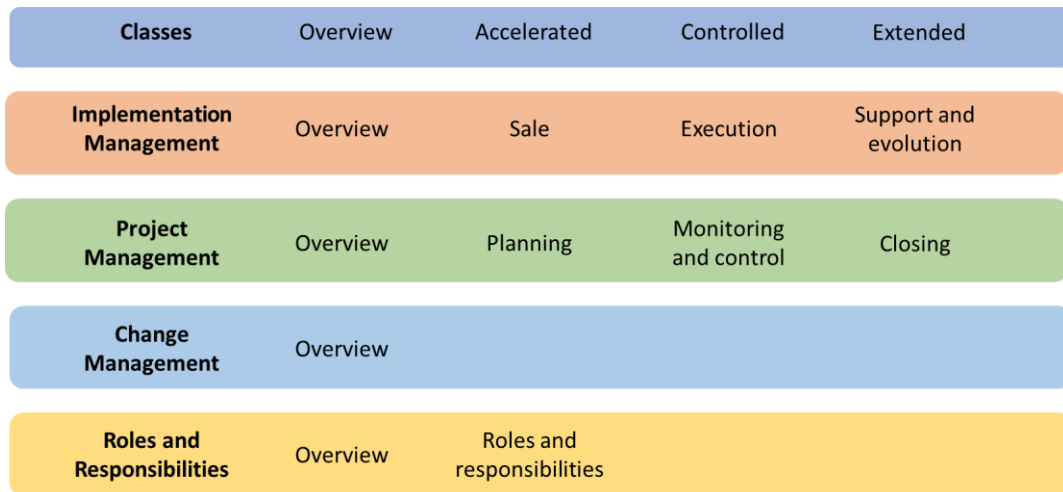


Figure 8-3: MIP structure (adapted from PBSS, 2017)

Classes

Considering that each company is unique (activity, business model, processes, clients, markets, structure, philosophy), MIP is structured on a hierarchical scale, presenting itself as a global model supporting implementation projects with different levels of needs, demands and complexity. In this way, the various classes are divided as follows: Accelerated (projects with standard scope and short deadlines), Controlled (projects that involve more control and monitoring) and Extended (projects that demand high customisation and deep solution adequacy).

The classes are determined by a set of criteria that are based on four major groups that should be focused: Client, project, requirements and processes.

Implementation Management

The MIP objective is to aid operationalization of the principles declared by the methodology, being constituted by a set of stages, phases, and activities. The MIP stages are sale, execution, and support & evolution.

The primary objective of *MIP implementation management* is to carry out the implementation of the solution intended by the client in the production environment. It consists of a set of predefined phases that aims to transform customer needs into the integration of a Primavera solution. Each phase encompasses activities that allow to achieve the objectives, as well as to give continuity to the implantation project. The stages are:

- **Sale.** It has four activities: Contact (meeting with the client), discovery (identification of functional and non-functional requirements), argumentation (presentation of the proposal), closure (award of the commercial proposal).
- **Execution.** It has five activities: Planning (scope and objectives of the project), analysis, realisation, final preparation, start-up and support
- **Support and evolution.** It has three activities: Support (continuity and proper operation), diagnosis & evolution and audit

Project Management

The Project Management area, related to the execution stage, is composed of three phases: Planning, Monitoring & Control and Closing. These phases cover the entire life cycle of a project, from initial preparation, through monitoring and production of management indicators, to closing, and are intended to cover requirements at project management level.

Project Management provides guidance project managers to successfully and adequately manage all types of implantation projects, helping to predict potential problems and hazards. This result is possible with the right combination of implantation methodology, social skills and available technology tools.

Change Management

During the execution stage, change management is a fundamental process for the success of the project. The change management aims to support client companies (and their collaborators) in completing the implantation of the "PRIMAVERA" solution, leading them to understand the changes that occur in their work processes.

The faster the end-users adopt the new work practices, less money and time is spent, allowing the company significant savings. Leaving change management aside means spending more and having late acceptance from end-users.

Roles and Responsibilities

The implementation process consists, in general lines, in the adequacy of the functional model of the solution, to the business model of the client organisation. This adaptation is made through a combination of efforts and expectations, both from the implementing company and the client organisation, which allows us to conclude that the main intervenient in an implantation project are human resources, people.

At a macro level, the main disaggregation that can be verified in the implantation project is the existence of two large groups of actors: Implementing Company Team and Client Organisation Team. From these teams, the Steering Committee Team is formed, whose main objective is to define and ensure the strategic alignment of the project.

8.2.2 Status of the change management dimension

The change management dimension is a weak point in the MIP (Methodology Implementation Primavera). As we can be seen in Figure 8-3, change management has little content. It is for this reason that from now on, we will focus on dealing with issues related to change management.

The MIP approach to change management is based on three key activities that aim to act on the actors directly or indirectly involved with the solution to be implemented. These activities are supported in three documents, which guide the process of change management, and these are: Change management plan, communication plan and organisational communication (template). Next, the content of each of these is detailed.

Change Management Plan.

At the beginning of the project, it should be identified how each person involved in the project will be affected. Developing the change management plan consists of defining the stakeholders, what are their participation, the means of communication that will be used during the implementation project, and the main points and activities of stakeholder participation. This plan may be separate or integrated with the project plan. For a simple plan, it will be enough to identify the intervention activities and the communication channel. For extended class projects, a specific plan for change management can be created. Next, the main items of this plan are:

- Context
- Scope

- Purpose of communications
- Training objectives
- Steps in accompaniment and adherence
- Change management
- Validation of the content of this document.

Communication Plan

The communication plan is intended to establish the correct perception of the project, as well as the motivation for its adoption. Communication between the project team (internal and external), as well as with other entities, is increasingly important. It should be promoted based on periodic meetings to accompany the project, sensitization sessions for end-users and their participation with contributions (suggestions and comments). The main items of this communication plan are:

- Audience (sponsors, teams, quality managers, end-users)
- Main messages and calendar (executives, supervisors, collaborators, clients - users, suppliers)
- Communication risks
- Budget
- Annexes

Organisational communication

The organisational communication template is a power-point document for the consultants of the enterprise Primavera to use to operationalise the communication plan.

8.3 Proposal for MIP

In this section, we present a proposal for improving MIP in what concerns change management. The development of this propose corresponds to a DSR process (Peffer et al., 2007) that includes the following activities: identify the problem, define solution objectives, design & development, demonstration, evaluation and communication. Using this process will allow us to suggest an improvement to the MIP change management area.

8.3.1 Problem identification and motivation.

MIP's change management component is commonly limited to little more than stating the importance of change management during the implantation of EITAs. However, it is fair to say that the importance of change management is normally underestimated by both the implantation teams and the SME. Furthermore, as a reinforcement of activities related to change management will increase the cost of implantation project, change management is tacitly left off the core of implantation projects.

The problem identified is the weak support that the Primavera implementation methodology (MIP) provides to the management of change in EITA implantation projects. Below, we list the weaknesses found:

- a. The reference documentation of the MIP Change Management area is not yet well structured, only contains the *overview* section. It lacks sections to identify users and their different desires, behaviours, capacities, among others.
- b. The *overview* is a little ambiguous. For example, when analysing this area, we found that there are two base documents: change management plan and communication plan; From these, a template (power-point) appears to make a change management proposal to the client company. However, when reviewing the overview, we come across with mixed concepts, sometimes referring to the change management plan and other times referring to the communication plan.
- c. The names used to refer to the stakeholders are inconsistent. For example, in the *overview*, it identifies them as *sponsors, teams, quality managers, end-users*, while in the *communication plan* it refers to these as *executives, middle management* and *supervisors, collaborators, customer-users*, and *suppliers*.
- d. Training activity is significant for change management and is not addressed/reinforced in the change management section, appears only in: *Implementation Management/ Execution/ Final Preparation/ Training*.
- e. Monitoring the adoption of the solution by end-users is mentioned in the *overview*, in which MIP proposes to create some problem-solving strategies (proactive and reactive). However, MIP does not suggest activities to monitor end-users and resolve problems in using the PRIMAVERA solution.

- f. The last section refers to the main factors of resistance to change; in this section, five motivators are mentioned. Stability may be threatened, negative financial impact, affected labour relations, changes made in levels of responsibility and learning curve (for a new function) very high. However, MIP does not propose what to do to mitigate them.
- g. MIP does not have instruments to characterise end-users, that is, instruments that allow:
 - Identify the degree of acceptance that a user may have to new technology,
 - Identify the interest that a user has in using the EITA-PRIMAVERA to be implemented,
 - Identify end-user resistance, and
 - Identify the degree of awareness, desire, knowledge and skills of the individual who will use the PRIMAVERA solution.

8.3.2 Objectives for a solution

Based on the weaknesses found in the MIP change management area, below, we list opportunities for improvement:

- a. Better define the structure of the MIP Change Management area
- b. Rewrite the overview to improve understanding
- c. Describe those involved consistently, both in the *MIP documentation*, as well as in the *overview*.
- d. In the *overview*, the training activity is mentioned; this activity must be complemented with coaching activities.
- e. Suggest activities to be carried out to monitor end-users in the use of the PRIMAVERA solution and problem-solving.
- f. Consider activities to reduce resistance to change by end-users.
- g. Include instruments to characterise end-users from various perspectives, such as:
 - The degree of adoption of innovations,
 - Identify the interest vs the power that a user has in the company,
 - Identify the degree of resistance that a user has before, during and after deployment,
 - Identify if the staff is aware of the change that is to be made, identify what users want, identify the knowledge that users possess, identify the skills they have.

Although there are several possible areas for improvement, in this proposal, we will only focus on problems *a* and *g*. Our proposal cares: definition of an adequate structure for MIP change

management; develop/prepare instruments to characterise users according to several perspectives relevant to change management. Knowing the end-user will allow the implantation team to take actions and corrections necessary for the successful implantation of the EITA.

The objective is to propose a flexible and light but effective change management component adequate to EITA implantation project in SME.

8.3.3 Design and development - proposal

The aimed solution can be described as a set of recommendations (artefacts) to be used to manage change during an EITA implantation project. The change management process that emerged from the field study (cf. section 7.4.4) was taken as the starting point for the solution to be.

The first task we did before the design and development of the "*change management*" area was to analyse the MIP methodology thoroughly. This analysis allowed us to understand its strengths, its weaknesses, its philosophy, the areas it possesses, the process it performs, the documentation it generates, among the main ones.

The next activity we carried out was to propose the structure of the MIP change management area. This proposal is made according to the current structure and philosophy of MIP. It is necessary to emphasize that due to the nature of MIP, this change management strategy should not be extensive because this methodology is oriented to SMEs. Besides, due to the nature of the enterprises where the MIP methodology could be used, the change management component is rarely applied. One of the leading causes is the reduction of costs that clients request in this type of projects.

Later, to meet the second objective, we turned to the academic literature for useful information to manage change. Specifically, we have searched for existing change management models. From these models, sophisticated diagnostic instruments have been taken that allows obtaining, characterising and classifying end users, as well as user groups.

Thus, we propose to use four diagnostic instruments to characterise users and groups: Individual Innovation, stakeholder map, change curve and ADKA. We review these instruments in more detail in section 8.4.

Change management propose for MIP

Using the components presented in Figure 8-1, we propose that MIP's change management considers the following elements: *overview*, *involve people*, *training & coaching*, and *communication* (see Figure 8-4).

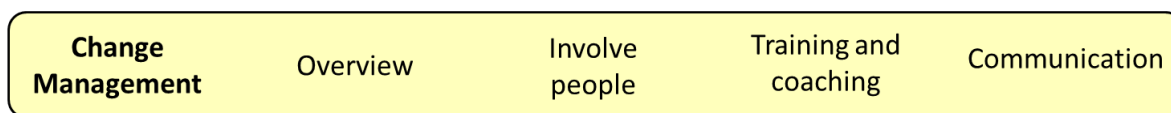


Figure 8-4: Change Management Proposal for MIP

Involve people (users)

Involving people in a project to implant EITA includes several activities, such as: Identify users, characterise users from different perspectives, identify sources of resistance and resistance behaviours, identify people's awareness, desire, knowledge, ability. This allows the project management committee to understand the users, predict behaviours and plan preventive actions according to the profile detected, which help to carry out the EITA implantation project in a healthy manner.

For this, we propose four diagnostic instruments, which allow to characterise the users. The instruments are individual innovativeness, stakeholder map, change curve and ADKA. These instruments are explained in more detail in section 8.4.

It is necessary to mention that because of practical reasons, our proposal to improve the component of change management of MIP will only address these four instruments. The *training & coaching* and *communication* sections are left for future improvements.

Training and coaching

Preparing the person for an EITA implantation project in the enterprise involves addressing two perspectives (emotional and rational).

To work on the emotional side (awareness and desire) of a person, a strong coaching component is needed. The development of the rational side (knowledge and skills) can be done through training, interactions with colleagues, reference materials, online resources, super-user support, job aids, etc.

Table 8-1 presents the differences between training and coaching.

Table 8-1: Comparing coaching and training (adapted from Maestro, 2019)

Training	Coaching
<ul style="list-style-type: none"> ● Transferring knowledge ● Often used in group setting ● Frequently off-site or at a special facility ● Often used for new hires ● Usually structured ● Formal ● Depends on telling ● Learning focused 	<ul style="list-style-type: none"> ● Enhancing knowledge or skills ● Usually one-on-one ● Usually on-the-job ● More often used with experienced employees ● Usually unstructured ● Informal, conversational ● Depends on asking ● Development focused

We must consider that knowledge does not mean skill (that it can do it). That said, the project manager must plan training actions (knowledge) and provide controlled testing environments to develop the skills required in an implantation project.

Communication

Without a doubt, communication is one of the essential tools to manage change, which is why we propose the following: define the audience, define policies and communication channels, carry out an organisational communication plan, and at the beginning of the implantation project make a socialisation plan.

8.3.4 Demonstration

A working meeting between the representatives of Primavera Business Software Solution and the research team was agreed to present the change management proposal for MIP. This meeting was held on February 26, 2019, and the following people participated: Representing Primavera - Vice President, Head of the MIP methodology, Lead Consultant for SMEs, Lead Consultant for public companies; Representing the research team - Master student, PhD student and Senior research.

At this meeting, the first draft of the MIP change management structure and four instruments are proposed to characterise the end-users of the solution to be implemented by Primavera Business software solution.

Each of the proposed instruments allows us to characterise the end-users from different perspectives; besides, they allow the EITA implantation team to make informed decisions regarding change management. Thus, each instrument allows for obtaining the following information from the end-users:

Individual innovativeness. This instrument consists of a questionnaire that can be applied at the beginning of the project. It allows identifying five types of individuals. This instrument allows to identify people who could act as leaders in the implantation project; It also allows users to be identified who may be resistant to change.

Stakeholder map. This instrument is applied at the beginning of the project. It is done based on a grid that is filled by the implantation team on the side of the SME and by the provider's implantation team. It allows identifying four categories of individuals. Based on this categorisation, communication strategies are proposed; this allows to focus resources on essential individuals.

Change curve. This instrument is applied at different times of the implantation project. It allows identifying in which state of the change curve a specific individual. The states can be Denial, Resistance, Exploration and Commitment.

ADKA. This instrument is applied at different times in the implantation project. Through a questionnaire, it is possible to identify those individuals who are aware of why the change is made; we can also identify what the individual's desires, we can also identify what the individuals know and what skills and individual has.

The purpose of these instruments is to provide information to the implantation team about de persons involved and affected by the project. The implantation team based on this information must take the necessary actions, according to the individual or groups and the state in which the project is located.

8.3.5 Evaluation

The evaluation of this proposal had to be outside the scope of this thesis, since its evaluation would take a long time. However, some activities were carried out.

From the presentation meeting of the change management proposal for MIP, the opportunity arose to apply these instruments in a *Primavera project*, which had recently started. Based on the criteria of the manager of this project, it was decided that two diagnostic instruments would be applied (Individual innovativeness and ADKA). The application of these instruments was carried out by the master's student (participant in this research and who at the same time began to carry out internships at the *Primavera company*) with the supervision of the project administrator.

Below we describe the activities carried out for the application of the instruments mentioned in a company in Portugal. These activities are documented in chapters V and VI of the master's thesis (Silva, 2019) of the student participating in this research.

- Translation from English to Portuguese of two proposed instruments (individual innovativeness profile and ADKA). Evaluation and preliminary test of translated instruments.
- The Primavera project manager planned a meeting with the client company. In this meeting, the diagnostic instruments and proposal for application to the company are presented. By joint decision of the executives of the client company and PRIMAVERA, it was decided that the ADKA questionnaire should be carried out at three different times. In the first moment, (beginning of the project) the questions referring to awareness and desire were considered; in the second moment, (after the training), questions regarding knowledge; and at the third moment (after the EITA was put into production), questions regarding ability.
- Besides, in this meeting, the feedback was obtained from the representatives of the client company. They showed interest and saw the possibility of detecting potential critical points. It was also decided that the two questionnaires will be applied anonymously only to officials who interact with the ERP Core.
- The pilot study was carried out in May 2019, obtaining thirty-eight responses from company collaborators. These responses received are equivalent to 60% of the invitations sent, and at the request of the client company, a presentation was made of the results obtained.
- Finally, it was concluded that these two instruments are viable and fulfil the purpose of diagnosing individuals in the face of a change.

Due to the extension of the research carried out and the lack of time, we have not been able to validate the two proposed instruments comprehensively. Also, the validation must be carried out in an SME that is implanting an EITA. Regarding the instrument *stakeholder map*, the MIP methodology has a document to collect information from the participants; to this document, we add two columns (interest, power). With these data, it is already possible to create the Stakeholder map and identify the position of those involved.

On the other hand, when consulting the Primavera SME project manager about the feasibility of the proposed methodology, he stated: “*The work you carried out was interesting. A good synthesis of the*

tools we can use. As I tried to convey, we are in an early phase of introducing change management into our implantation methodology. It is something that I have been defending, but sometimes clients are not interested in paying for this type of services. So, we intend to develop something light to be implemented, but that generates the maximum result. We are in an initial phase of introducing change management into our implantation methodology.”

8.4 Diagnostic instruments

From the existing literature, we have selected four instruments that we consider to be robust for the characterisation of those involved (individuals or groups) in the process of implanting an EITA in the SME (cf. Figure 8-5).

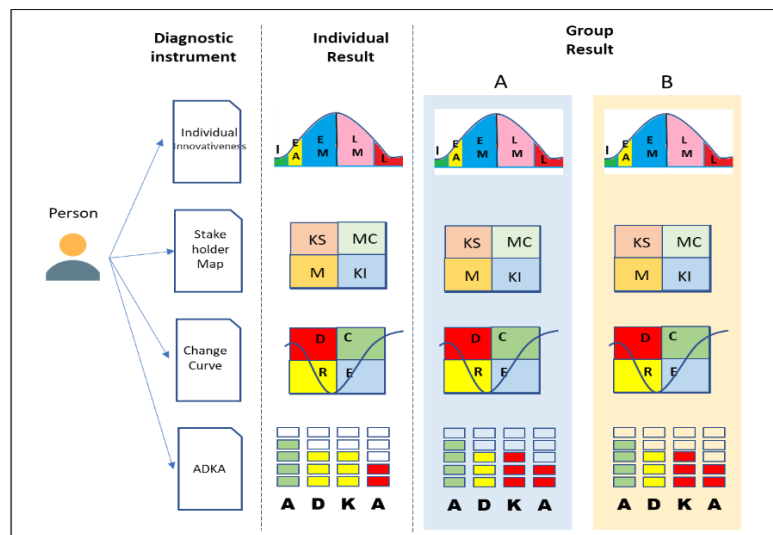


Figure 8-5: Characterisation of the person and groups involved in the organisational change

8.4.1 Individual innovativeness

The individual innovativeness scale was designed to measure individuals' orientations toward change, based on the Rogers' diffusion of innovations theory (1962). The Individual Innovativeness instrument has been found to be highly reliable, and predictive validity (Hurt et al., 1977).

This instrument of self-diagnosis of a person (Appendix F), will allow us to characterise the person involved according to their probable predisposition to accept the change (use of new EITA); Innovativeness has the following categories (cf. Figure 8-6). Members of each category possess certain distinguishing characteristics.

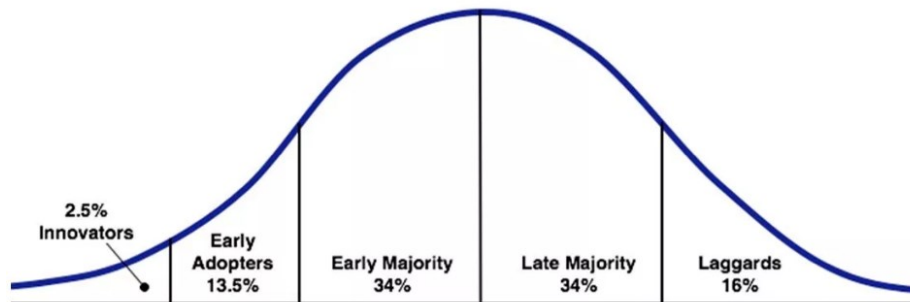


Figure 8-6: Adopter categorisation based on Innovativeness (adapted from Rogers, 1962)

- **Innovative (2.5%).** – Venturesome, it is a person who will accept the change very quickly; they are persons who want to be the first to try innovation, are entrepreneurs and interested in new ideas. They are willing to take risks and are often the first to develop new plans
- **Early adopter (13.5%).** – Social leaders, this individual can see the opportunities for change and quickly adopts the new EITA; they enjoy leadership roles and embrace change opportunities. They are aware of the need to change and so are very comfortable adopting new ideas.
- **Early Majority (34%).** - Pragmatic, these people are rarely leaders but supports leadership. They do adopt new ideas before the average person. They typically need to see evidence that the innovation works before they are willing to embrace it. Susceptible to change and persuade. Persuasion is made showing the benefits of the EITA.
- **Late majority (34%).** - Conservative and reluctant to adopt new ideas until the benefits are clearly established. They think like this: "*A change is, after all, a change. If I must do it, I could do it ... if the majority has already done it and implies for me, the minimum cost* "
- **Laggards (16%).** - Sceptical, they are the most traditional and resistant to change; are the hardest group to bring on board. Sometimes, they can never change.

Besides, if we analyse the use of this instrument positively, we can see that at the beginning of the project and without carrying out any change management activities, we probably have 50% of people predisposed to accept the change (Innovative, Early adopter, Early majority). The challenge of change management is to carry out actions with the other 50% of the people to increase the acceptance of the new EITA.

This instrument also allows identifying which people can be the agents of change (models to follow), that is, which will be the first to adopt the new EITA, which promotes it and encourages others to

embrace it. Using active change agents, how leading people, influential people, peers, can accelerate the adoption of the EITA.

On the other hand, this instrument can be used at the group level, placing all users in their respective category in a single diagram. This figure will allow us to observe the dominant type of a group and based on this result, plan future actions for the group.

8.4.2 Stakeholder map - Power vs interest grid

The stakeholder's map is based on the power vs interest matrix that proposed by (Bryson, 2004). It is used to assess how the interests of the parties (individuals - groups) should be addressed in the project to implant an EITA in the enterprise.

The stakeholder map starts with a categorised list of the members that are going to be involved in the project, which includes the following: Name, area, position (job) and expectation (what they expect from the project). Based on the position and expectation of the stakeholders, we can estimate their interest and power on a scale of 1 to 10 (cf. Appendix G). With the estimated values, stakeholders are positioned in a power vs. interest matrix.

Each member of the steering committee, according to their perception, built the Stakeholder map. Subsequently, with this information, the steering committee meets, and together they define the final stakeholder map. For this, each member of the steering committee presents his/her stakeholder map. With this base, coincidences are analysed, and differences are discussed. Finally, the management committee decides the location in which each stakeholder is located and their degree of acceptance of the project (sympathizers, neutrals, and critics-blockers).

Stakeholder map helps to identify stakeholders according to their interest and power. This is useful for the steering committee to plan actions according to the type of stakeholder (cf. Figure 8-7). The stakeholder map allows optimizing resources and focusing on those users who add value to the project of implanting an EITA in the SME.

The four options of the stakeholder map are:

- **People of high power and high interest.** - People with whom you must connect and with whom you must put the most considerable effort, to get them involved in the project
- **People of high power and low interest.** - These people have influence, contacts, convening power, etc., but they still show little interest in the project. The project leader should strive to ensure

that these people have a good perception of the EITA. We will have to satisfy your information needs about the project.

- **People of low power and high interest.** - They have consideration for what we do, they are sensitized and know about the project, but unfortunately, they lack enough power to offer us an impulse or acceleration. These people can provide us feedback that will enrich our business idea. We will have to keep you informed about the evolution of the project.
- **People of low power and low interest.** - We will have to monitor them, to capture all their movements and possible changes of attitude regarding the project.

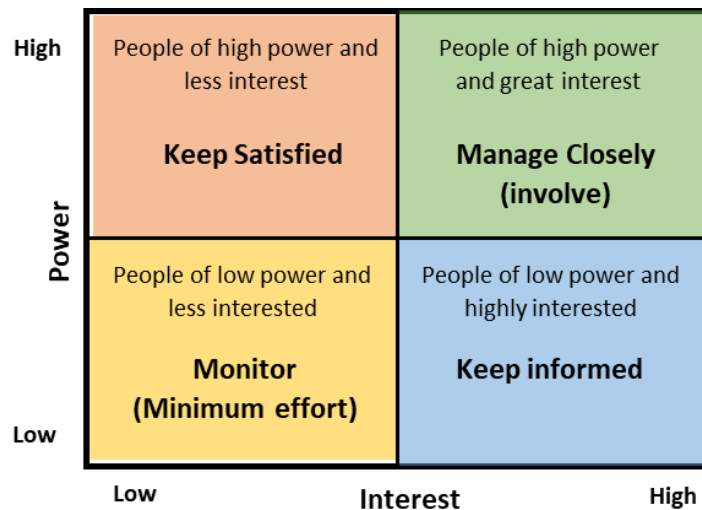


Figure 8-7: Power vs Interest grid (adapted from Bryson, 2004)

On the other hand, another variant of using a Stakeholder map is to do it by groups, always in order to optimize resources and focus on priority aspects of the process of implanting an EITA in the SME.

Note: The stakeholder map is a document with sensitive information, and as such, we recommend its use within the steering committee.

8.4.3 Change Curve – Response to change

The change curve proposed by (Jaffe & Scott, 2003), emerges as a model that responds to the different stages that an individual goes through when affected by any process of change at the organisational level.

The change curve allows the project leader to understand the different emotional facets that a person goes through. This understanding will help the project leader to make timely decisions to facilitate the transition and support people in the process of change. This model is used in the early stages when there is high resistance, or the impacted subjects do not desire the changes.

This instrument contains a set of 24 questions (Appendix H), which allow identifying in a two-by-two matrix (cf. Figure 8-8) the state of resistance to change in which an individual is concerning the EITA implantation project. The stages are the following:

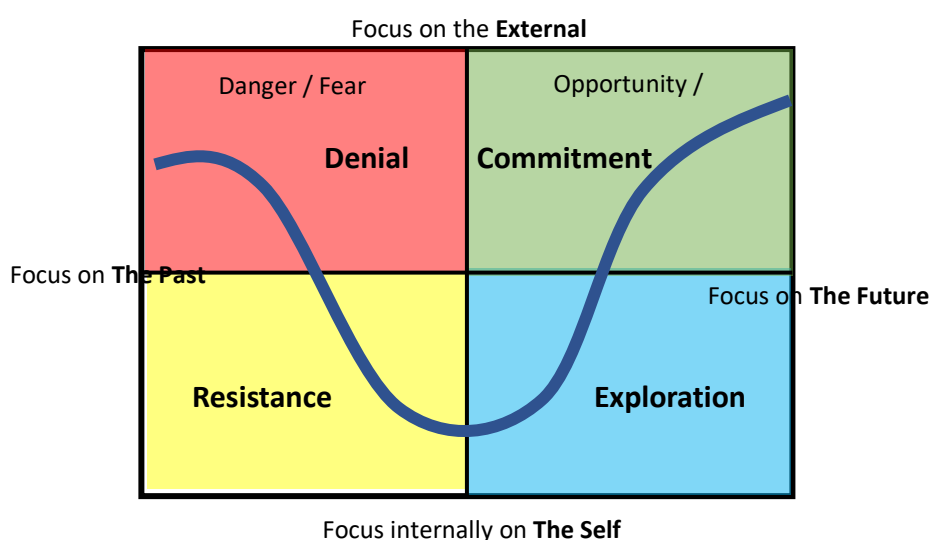


Figure 8-8: The change grid (adapted from Scott & Jaffe, 1988)

- **Denial.** - This stage begins when people knowledge through formal (communicated) or informal media (rumours) that there is a change in the enterprise. In response to this, they take a defensive attitude towards the change. A feeling of fear is hidden and is replaced by an apparent serenity and rationality. Also, internal confusion is masked, and the solution to current problems postponed. The first reaction of people when become aware that there is something new is to resist.

The deniers are the most difficult to transform. Those who promote change need significant investments in communication and search for subtle and differentiated ways to ensure that the new can be observed and finally adopted (Ordoñez, 2011).

Behaviours:

- They are not aware of the proposal
- They perceive the change as something foreign
- Avoid the subject as much as possible
- Wait quietly, without taking the initiative

- Act as if nothing happened
 - Do the usual, follow your routine
 - Blames others for the difficulties
 - Focuses on small details
- **Resistance.** - It is the most critical stage of the process of change. When people leave their comfort zone, they perceive change as a threat. This attitude of resistance can be shown actively (complaints and protests) or passively (indifference, rejection, and apathy). The resistance seeks to stop the change with arguments that oppose the new and reasons that revolve around excuses.

The attitude of resistance to change is easily recognizable, sometimes in a passive-aggressive manner. It must be clear that people do not resist change by itself, but they resist to what they can lose with the change.

- **Exploration.** - In this phase, people go from seeing change as a threat and begin to perceive it as an opportunity. They also recognise that change is necessary, accept their importance and have their initiatives to make adaptations, in addition to being with a right attitude. The explorers are hungry for information, concerned about the search for solutions and determined to learn new skills.

Behaviours:

- Mental attitude of learning
 - Personal contribution
 - convinced of the change
 - With energy to explore
 - Interested in implementing the changes
 - They see the changes as an opportunity
- **Commitment.** - In this phase the change is accepted; the person has already acquired the capacity to work efficiently in the new environment. Productivity increases, the full potential of human capital unfolds, and the benefits are perceived, in addition to not wanting to go back to the past and accepting new forms. At this stage, it is essential to celebrate the achievements, to thank the team that actively participated in making this change initiative a reality and to focus on continuous improvement.

8.4.4 ADKA (Awareness, Desire, Knowledge, Ability)

The Prosci ADKAR® Model is a goal-oriented change management model that guides individual and organisational change. Created by Prosci founder Jeff Hiatt, ADKAR is an acronym that represents the five tangible and concrete outcomes that people need to achieve for lasting change: awareness, desire, knowledge, ability, and reinforcement (Prosci, 2018d)

In this proposal, we use an instrument based on Prosci ADKAR, with the first four milestones of this model (Awareness, Desire, Knowledge, and Ability) to characterise the individual and from this to the organisation involved in a project to implant an EITA. We left out the reinforcement, since we are focused on the implantation phase.

The ADKAR model can be used to identify gaps within a change management process. By breaking down a change in the ADKAR blocks, the project manager implanting an EITA will be able to see where and why a change does not work well. The ADKAR model is useful for diagnosing employee resistance and helping them make the transition of change.

This model is sequential and cumulative, that is, it must be initiated by the first phase (awareness), and it is not passed to the next, while the first one is not realized (convinced of the change), and so on.

To apply this model, Prosci ADKAR proposes a questionnaire with questions for each phase of the model (Appendix I) and the necessary actions are initiated with the first phase that has the lowest evaluation.

Next, we describe each of the outcomes:

- **Awareness.** - Awareness represents a person's understanding of the nature of the change, why the change is being made and the risk of not changing. Awareness includes information about the internal and external drivers that created the need for change, as well as "what's in it for me?" This first goal is defined as "awareness of the need for change," not merely "awareness that a change is happening." This subtle nuance is an important distinction.

When it is readily visible to employees that an organisation is in trouble, building awareness will be relatively easy. In contrast, it is often more difficult to build awareness when an organisation is already succeeding. Change leaders will need to create a very compelling case and make the reasons for change blatantly evident.

Building awareness, as defined within ADKAR means sharing both the nature of the change and communicating why this change is necessary. It means clearly explaining the business drivers or opportunities that have resulted in the need for change. It also means addressing why a change is needed now and explaining the risk of not changing.

Many will assume that the act of sharing information is enough to produce awareness. This is not the case. The effectiveness of your communication depends on how the messages are received and internalized. When an employee says, “I understand the nature of the change and why this change is needed,” you have succeeded at building awareness.

Besides, the ADKAR Awareness document proposes several tactics for effectively building awareness, among which are: effective communications, sponsorship, coaching by managers and supervisors and access to business information.

Also, the ADKAR Awareness document contains information about the resistance factors that prevent the individual from becoming aware of the need for change, in some cases the resistance factors are so strong that even the best communication plan will not be enough. Below are some resistance factors: A personal view of the current state, how a person perceives problems, the credibility of the sender, circulation of rumours, reasons for change are unclear, subjective, or open to debate.

Note: Summary adapted from ADKAR Awareness document (Prosci, 2018b)

- **Desire.** - When awareness has been established, the next outcome for an individual is to make a personal decision to participate in the change. Desire is the willingness to support and engage in a change. Desire is ultimately about a personal choice that is influenced by the nature of the change and by personal circumstances.

Desire is often the most challenging ADKAR outcome to achieve. Awareness enables people to understand the impacts and value of the future state but creating more and more awareness will not result in desire.

Creating a desire to change, by definition, is not under a leader’s direct control. Change leaders can take definitive steps to influence desire, but each individual ultimately makes his or her own choice to support the change. Desire has been achieved when an individual genuinely says, “I will be part of this change.”

In a business context, influencing desire requires a change management strategy that matches the personal motivators of the impacted teams and leverages the influence of leaders in the organisation. Key business leaders act as sponsors of change. Managers and supervisors are coaches to employees during the change process. Incentives are aligned with new behaviours and employees are proactively engaged in the change process.

The factors that influence people to want change are:

- Understand the nature of the change and how it will benefit him. "What's in it for me?"
- The organisational context for change, each evaluates from their perception the history and culture of change in the organisation, if the past is positive, people may be more willing to change.
- An individual's situation impacts their desire to change. Personal context includes a wide variety of factors that can influence desire. Know an individual's status is beneficial in understanding their choice to support or resist a change.
- Personal motivators are inherent attributes that drive our choices and make us unique as individuals. The decision to engage with change is much easier when the future state aligns with an employee's personal motivators

Below, the ADKAR Desire document proposes are several tactics for effectively building desire: effectively sponsor the change with employees and peers, equip managers to be change leaders, assess risk and anticipate resistance, engage employees in the change process, and align incentive programs.

Note: Summary adapted from ADKAR Desire document (Prosci, 2018c)

- **Knowledge.** - Knowledge is the third outcome. Knowledge represents the information, training, and education necessary to know how to change. Knowledge includes the behaviours and skills; the processes, tools, and systems; the roles and responsibilities; that each impacted individual needs to implement a change.

Historically, training is the most used vehicle for building knowledge. However, training is not the only way to develop knowledge. Informal interactions with colleagues as well as other formal vehicles like reference materials, online resources, user support and job aids all play their part in ongoing knowledge-building.

From a change management perspective, there are two aspects of knowledge to consider when assessing training needs and designing training programs to build knowledge:

- Knowledge on how to change: What to do during the transition - this requires training and education on the skills and behaviours needed to support the change
- Knowledge on how to perform effectively in the future state: Detailed information on the new roles and responsibilities associated with the change, as well as training and education on how to use new processes, systems and tools

Both categories of knowledge must be addressed in an effective change management plan.

There are three factors that influence the development of knowledge: Current level of knowledge, ability to learn and resources available for education and training.

The changes your organisation is facing are unique. Each change usually requires its specific combination of different learning tactics. The following four tactics have emerged from Prosci experience: practical training and education programs, job aids, one-on-one coaching, and user groups and forums.

Note: Summary adapted from ADKAR Knowledge document (Prosci, 2018e)

- **Ability.** - Ability is turning knowledge into action. Ability means tangibly demonstrating the application of intellectual understanding in a real-world environment. Change leaders impact project success by intentionally providing time, resources, and coaching to help impacted employees develop new skills and behaviours.

Ability is not equivalent to knowledge. It is not the automatic result of training. There is a difference between knowing how to do something and being able to do it. In fact, the gap between knowledge and ability can often be quite large.

Building ability is an individualized process that requires hard work and practice. The time and steps involved will vary from person to person. Some individuals will adopt naturally into the new way of work, while others may not adjust with the same ease.

There is a variety of tactics that can be employed to help individuals to successfully develop the abilities they need to succeed and thrive in their changing environment. Examples include: direct involvement of managers (support, feedback, coaching, etc.); access to experts or experienced employees; practical exercises during training; and performance monitoring.

One of the crucial aspects is that employees also receive tools (testing environment) and time to develop their own skills.

Note: Summary adapted from ADKAR Ability document (Prosci, 2018a)

ADKAR also proposes to represent the results of the diagnostic questionnaire in a bar chart, one bar for each component of ADKAR divided into five parts (equal to the scale used). In addition, the model uses colours (green = 4 and 5, yellow = 3, red = 1 and 2). See Figure 8-9.

This diagram can be used individually or in groups. These diagrams help to quickly visualize how an individual or group is, and from this, allows the project leader to direct actions to overcome the problems that arise.

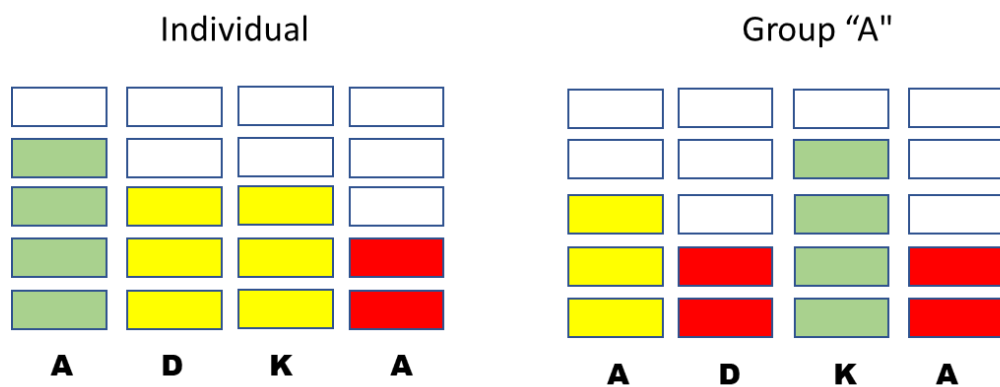


Figure 8-9: ADKA, representation of individuals and groups (adapted from Prosci, 2018a)

In summary, these four instruments intend to characterise people. That is, try to meet the people involved in the process of implanting the EITA in the SME. From this knowledge, change management is facilitated.

The instrument *individual innovativeness* helps to detect individuals and groups that can facilitate or delay the adoption of the EITA. It also supports the detection of compromised users and change-resistant users. The second instrument *-power vs interest grid-* helps to recognise the internal actors that will be involved in the implantation. The grid provides information to identify critical staff. The third instrument *-change curve-* allows to identify the emotional state that a person is going through. This instrument allows to detect in which phase of the change curve is the persons involved in the implantation project. The fourth instrument *-ADKA-* helps to recognise the degree of awareness, desire, knowledge and skill that individuals and groups of a company possess, in the process of implanting the EITA in the SME

8.5 Summary

In this chapter, we present an extension to the Change Management component of the Primavera's methodology (MIP).

The development of this extension was carried out according to the DSR model proposed by Peffers (Peffers et al., 2007). It contemplates the following activities: Identify the problem, define solution objectives, design and development, demonstration, evaluation, and communication.

To approach with change management, we used the model that emerged from the field study carried out earlier and described in Chapter VII. This model describes the change management in an EITA implantation project in SMEs. This model has a good fit with the structure of MIP.

The proposed extension for MIP focuses on the diagnosis of SMEs, emphasising the people involved and affected by an EITA implantation project. It is expected that the diagnosing instruments are flexible, effective, and easy to use.

A limitation of these phase of this thesis is that the validation could not be performed entirely due to time restrictions. However, the feedback obtained from the demonstration encourages the use of suggested instruments. Furthermore, the work carried out by Silva (Silva, 2019) going connection to this project provides evidence of the need for change management instruments and the value of better knowing the situation to be changed.

The proposed model that extends the change management component of MIP was as follows:

Change management for MIP

- Overview
- Involve people (Diagnostic instruments to characterise the person)
 - Individual innovation
 - Stakeholder map
 - Change curve
 - ADKA
- Training and coaching
- Communication.

PART 5

Chapter 9

9. Conclusions

In the development of this work, we confirmed that the implantation of EITAs in SME is not an easy process. There is a wide range of aspects to consider during the implantation process, such as the needs of SMEs, the size and structure of SMEs, their business processes of SMEs, their managers, the skills of the staff, the type of EITA, the EITA functionality, the experience the EITA provider, the methodology used, among others.

It became clear the need for reliable guidelines scientifically validated that can help SMEs to carry out EITA implantation processes, in all its phases. Moreover, to monitor EITA usage in order to identify problems and business opportunities.

9.1 Revisiting the research questions and the objectives

The literature review that led to this research aimed to understand the difficulties, challenges, and influence factors relevant to the EITA implantation process in SMEs. It allowed us to identify knowledge gaps and research opportunities related to the EITA implantation in SME.

In general terms, the problem we identified can be stated as a lack of methodological support to EITAs' implantation in SMEs. Therefore, the following research objective has been expressed: to develop methodological support for the implantation of EITA in SMEs. See section 4.2.

Addressing this problem involved two phases: 1) improve the current understanding of EITA implantation in SMEs; 2) build upon that understanding to contribute to the establishment of a body of research-grounded methodological guidelines capable of providing SMEs with the necessary support for EITA implantation processes.

9.1.1 Understanding the EITA implantation process in SMEs

The first research phase, aiming at understanding the process of implanting EITAs in SMEs, was structured along with four research questions:

1. *What are the main motivations for an SME to implant an EITA?*

2. *What are the main difficulties SMEs face when implanting EITAs?*
3. *What factors are facilitators in the process of implanting EITA in SMEs?*
4. *What are the main phases, stages, and activities of the process of implanting EITAs in SMEs?*

To answer these research questions, two studies were carried out: an exploratory case study and a field study based on interviews to key informants. The exploratory case study (chapter 5) was carried out in a medium-sized car distribution company, in northern Ecuador, that recently implanted an ERP. The field study (chapters 6 and 7) consisted of interviewing forty-eight key informants with different profiles (software developer, distributor, consultant, SME owner, etc.) and who have personal experience in implanting EITA in SMEs.

The exploratory case study enabled establishing a process model for the implantation of EITAs. It also enabled the identification of critical cross-cutting concerns along the process - leadership & communication, change management, and project management. The process encompasses three phases - pre-implantation, implantation, and post-implantation - that are further decomposed in stages, and activities.

The exploratory case study was followed by a field study where a wide range of key informants was interviewed. The criterion for searching and selecting the interviewees was their actual involvement in the implantation of EITAs in SME. The following informants were interviewed: managers of software development companies; EITAs distributors; business and IT consultants; professionals who provide technical support to SMEs; SME managers and owners considering the implantation of an EITA; SME man; scholars in the IS field.

The outcome of those two empirical studies has been presented in this thesis as a framework for successful implantation of EITA in SMEs - the SImplE framework. This framework encompasses the following three components: (i) actors that participate in an EITA implantation process (some are inescapable others are discretionary); (ii) a process model for the EITA implantation that, besides defining a set of phases and their subdivision in stages, identifies cross-cutting concerns and areas of focus; (iii) a set of factors that influence the success of the EITA implantation process. The process model included in the SImplE framework has both descriptive and prescriptive potential. Therefore, it constitutes a strong basis for a prescriptive model to be used in EITA implantation projects in SMEs.

The SImplE framework recognises the involvement of several possible actors and admits the existence of several perspectives onto the EITA implantation in SME. However, it emphasises the perspective of SMEs, highlighting the main aspects an SME should consider before, during and after the implantation of an EITA. Nevertheless, the SImplE framework can also be useful to the other actors it identifies - software (EITA) developers, EITA providers, business and IT consultants, and other support organisations.

We have detected that what motivates SMEs to implant an EITA in order of priority are: Improve the management and control of the enterprise, meet government requirements and finally the integration of systems. Regarding difficulties, the main ones are at the organisational level, such as management (projects, company, information, change). Furthermore, the lack of defined structures and processes hinder the implantation of the EITA, as well as the lack of strategic vision. Finally, another significant difficulty is the resistance of users to EITA and the lack of digital skills of their employees. And the factors that facilitate the implantation of the EITA are mainly organisational such as the adequate decision in the selection of the EITA and its provider, understanding well the needs of the SME, being open to change, involving people and defining well the business processes.

We can conclude from the previous paragraph that the focus for the implantation of EITA in SMEs must be in an organisational context, very different from the technological approach with which SMEs implant EITAs.

9.1.2 Development of methodological guidelines for the EITA implantation process

The second phase of the research aimed to produce (based on the results of the first phase) guidelines capable of providing SMEs with the necessary support for the EITA implantation processes.

One first component of such guidelines is the SImplE framework, especially its process model. This process model is viewed as general, in the sense that it fits most EITA implantation processes in SMEs. The elaboration of the SImplE framework started with a case study. However, the set of interviews carried out afterwards legitimated the acceptance of its generality. Although further research might be necessary to reinforce the confidence on its general nature, and to improve its applicability as a design theory, we dare to claim that the SImplE framework constitutes a contribution to bridge the gap related to the lack of methodological support to EITAs' implantation in SMEs.

Another aspect that has been tackled in this phase of the research addresses a specific problem felt by a consultancy company – Primavera BSS. The consultancy division of Primavera BSS developed a methodology for the implantation of Primavera's ERP product and other products that integrate Primavera's portfolio of EITAs. This methodology – MIP – is currently in its eighth edition. It has been created to provide support to Primavera's staff and Primavera partners when implanting EITAs.

Primavera is aware that MIP's change management guidelines are minimal and wants to improve them. Therefore, contributing to the improvement of MIP's change management guidelines became a research objective.

Such research endeavour fits the Design Science Research model as it combines solving an actual problem with producing novel scientific knowledge. The research outcome of DSR is generally referred to as an artefact, corresponding to a method, technique, tool (Peffer et al., 2007). In the present case, the expected artefact can be described as corresponding to a set of guidelines for dealing with the management of change in SME during the implantation of EITAs. Such artefact should embed scientific knowledge existing in the relevant body of knowledge. In this case, the artefact applies the research outcomes of phase 1 and combines it with another relevant scientific knowledge.

The artefact that has been developed is integrated into the MIP methodology. Therefore, MIP's philosophy, approach and structure had to be taken into consideration.

Other restrictions that are necessary to mention are related to the timing of the research. The time necessary to fully develop and validate a comprehensive set of guidelines for change management was not available. Both because of the duration of such project and of the duration of the doctoral project that frames this research. Therefore, in what concerns the development of guidelines for dealing with the management of change in SME during the implantation of EITAs, it was decided to focus on how to diagnose a situation - characterisation of people and groups that will be affected by the new EITA. For this, we work on the first four activities of the DSR proposed by Peffer (see section 8.3).

9.2 Contributions

Enterprise IT Application (EITA)

In this thesis, we use the term EITA (Enterprise IT Application) to refer to IT artefacts used for the execution of enterprise functions. Although the term “*IT application*” is widely used, the term “*information*

system - IS' is also a common designation. We avoid its use as the designations are also used to refer to a perspective on an enterprise that addresses information processing encompassing not only IT artefacts but also humans and social elements. The term "*EITA*" adds the reference to the context in which IT applications are to be studied.

EITA examples include products such as Point-of-Sales (POS), Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Supply Chain Management (SCM), Content Management (CM), Document Management (DM), among others.

ERP products are a case particularly compelling as they assure the essential functions of an enterprise. The ERP process business transactions support the general ledger of an enterprise, hold a great deal of the enterprise's business records, and execute a wide range of operational and managerial actions upon business information. Also, the main bibliographical references are mostly related to the ERPs, and at a great distance about CRMs, and after that, there are few documents about another type of EITA

Implantation vs implementation

In this thesis, we propose to use the term "*implantation*" instead of "*implementation*". Our motivation to make this proposal is based on the fact that the term "*implementation*" is ambiguous, it can refer to the fact of building software (EITA), or also to the activity of putting the EITA into operation within a company. We propose using the term "*implantation*" to refer to the activity of putting the EITA into operation in the SME, that is, integrating the EITA into the company.

To justify the use of this term "*implantation*", we propose the use of the term *implantation* in analogy to the same term used in the area of medicine. We consider that the process of implanting an EITA in the SME has similarities with the process of implanting an external device (prosthesis) to a person. This *implantation* needs to go through a process of definition of needs, search, evaluation, and selection of the artefact (device, EITA), *implantation* and monitoring of the patient. Besides, this process needs to be performed by specialists.

The adaptation of concepts from the medical practice to the IS practice can be beneficial to the latter as it can learn from the experience of a much longer established area.

Framework *SImpIE*

The biggest contribution of this research work was the *SImpIE* framework, which we obtained using different qualitative research strategies (literature review, exploratory case study, and field study). This framework describes a general strategy of how SMEs access an EITA. Encompasses three components:

- i. Actors that may be involved in an implantation project (software developer, provider -software & management consultant- and support organisations).
- ii. Process model and areas of concern (three phases - pre-implantation, implantation, post-implantation; cross-cutting areas of concern - leadership, communication, change management and project management; areas of focus - persons and process); finally,
- iii. Influence factors that stimulate the success of the EITA implantation process - technology, organisation, and environment.

The *SImpIE* framework provides an overview of central aspects that SME should consider before, during and after the implantation of the EITA. This framework attempts to describe in general the actors involved (external and internal); all the phases and stages through which an SME should go through the process of implanting an EITA; and the main factors that influence the successful implantation of an EITA in the SME.

Business processes are a key issue in EITA implantation in SMEs. However, as SMEs seldom formalize their business processes, there is a tendency for overlooking business processes. The *SImpIE* framework contributes to make the business processes visible and to lead the SME through the adjustment between the business process and the functionalities provided by the EITA.

Besides, the framework can also be useful for the companies that develop software, resellers, and consultants, as the model identify the phases and stages that an SME goes through before requesting their services.

The difference of this model with the commercial models (Microsoft, 2012; Oracle, 2016; PBSS, 2017; SAP, 2018b) is that this model covers the whole process from the perspective of the SME. Commercial models carry out this process from the perspective of the supplier and do not necessarily consider the first phase (pre-implementation). Also, if they consider it, they do it to maximize sales.

The difference with the academic models is that this model covers the whole process, from the search, evaluation, selection, hiring, implantation, go-live, operation and continuous maintenance of the

EITA. Academic models focus on solving specific problems, such as: frameworks for readiness (Ahmadi et al., 2013; Hidayanto et al., 2013), frameworks for decision support (Blackwell et al., 2006; Xie et al., 2014), frameworks for selection (Ganapathy & Raju, 2008; Hustad & Olsen, 2011), requirements (Jebreen et al., 2013). There are also theoretical or conceptual models that generally explain the main success factors based on the TOE framework (Awa & Ojiabo, 2016; Nofal & Yusof, 2016; Ramdani et al., 2013; Saedi, 2016; Saini et al., 2010; Shahawai & Idrus, 2010; Sophonthummapharn, 2009).

In addition to the models mentioned above, we also find more general models, which try to cover the entire implantation process. Next, we mention the main ones and the difference with the Simple framework (Table 9-1):

Table 9-1: Differences in general implantation models with the SIMPLE framework

Model	Contribution	Simple Framework contribution
A Methodology for Successful Implementation of ERP in Smaller Companies (Xia et al., 2010)	Roadmap for ERP Implementation divided into four stages: Readiness assessment, BPR, ERP selection, Implementation.	The Simple framework is divided into three components:
Development of a Generic Procedure Model for the Enterprise Resource Planning Implementation in Small and Medium Enterprises (Fu, 2010)	ERP implementation procedure models based in four components: ERP software, business process, business data and project. This model tries to cover the entire implementation process.	i. External actors that may be involved in an implantation project (software developer, software provider and support organisations).
ERP Implementation Challenges in Small and Medium Enterprise: a Framework and Case Study (Sahran et al., 2010)	Conceptual Framework. This is one of the most detailed that exists and covers the three major phases (Pre-implantation, implantation, and post-implantation). Its weakness is that it is based on a single case study; in addition, the article does not support enough empirical evidence of how this model was made.	ii. Process model and areas of concern (three phases - pre-implantation, implantation, post-implantation; cross-cutting areas of concern - leadership, communication, change management and project management; areas of focus - persons and process); finally,
Implementing Best Practices in ERP for Small & Medium Enterprises (Jha et al., 2008)	Systematic & Holistic Steps defined for Sustainable ERP Project (Selection) and Key Factors for SME's Strategic ERP Implementation. This model is more focused on the pre-implementation phase.	iii. Influence factors that stimulate the success of the EITA implantation process - motivations, difficulties, and facilitators.
Rescuing Small and Medium-sized Enterprises from Inefficient Information Systems - a Multi-disciplinary Method for ERP	Customer-centred ERP Implementation (C-CEI), this ERP implementation process is based on the combination of operational, contextual and risk analyses	This model tries to cover phases and stages that arise

Model	Contribution	Simple Framework contribution
System Requirements Engineering (Vilpola et al., 2007)		in the process of implanting the EITA in the SME.
SMEs implementing an industry-specific ERP model using a case study approach (Wu et al., 2006)	An IS implementation model was proposed after studying the four cases and conducting a literature review. This model includes the following key points: senior management's support and participation, recognition of ERP, professional ERP products, the establishment of a common understanding among all employees, process reengineering, and the system operation model.	We obtained the SIMPLE framework using different qualitative research strategies, such as literature review, exploratory case study and field study. We try to leave the framework open for the three types of SMEs (micro, small and medium), since we understand that this framework may have variants, depending on the size of the company and other contingency factors.
Soft Systems Methodology in IT Project Management: Implementing CRM in SMEs. (Lockett et al., 2006)	Soft systems methodology covers the implementation phase. It is divided into four project phases: Project planning & definition, system configuration, system testing and training, and go-live support & review. Also, these phases have ten project milestones and a cross-cutting stage (project management & communication).	

A weakness of framework Simple is that it does not provide specific solutions for certain stages. The concern was focused on determining the entire process for the implantation of an EITA (search, evaluation, selection, hiring, implantation, go-live, operation and continuous maintenance of the EITA).

A change management artefact for the MIP methodology.

Another significant factor to consider is to manage the change correctly, it must be considered that resistance to change is typical of human nature, but that well managed can significantly decrease. For this reason, we propose an artefact that addresses this problem, which must be aligned to the MIP methodology. This artefact consists of four components: Overview, Involve people, training & coaching, and communication.

The strength of this artefact lies in the characterisation of people and for which four diagnostic instruments are proposed that can be used at the individual or group level. The instruments are Individual innovations, stakeholder map (power vs interest grid), change curve (response to change) and ADKA (Awareness, Desire, Knowledge, Ability).

We have compiled these instruments from the existing literature regarding change management; they have been selected to characterise people before, during and after the EITA implantation project. The idea of using these instruments is that if we recognise the type of individual or group with whom we will work on the implantation project, we can make better decisions for change management.

A weakness of this change management proposal is that it does not provide the actions to be carried out with people or groups once they have been characterised.

9.3 Synthesis of results

Buy or rent is better than build

Due to the evolution of the software industry, it is common for SMEs to buy or rent a ready-to-use Enterprise IT application (EITA), than to try to develop a custom application. Several reasons may be presented to explain this preference. First, the cost, it is no surprise that the price of an EITA that addresses the essential needs of enterprises is lower than the cost of a tailor-made enterprise application. Furthermore, a ready-to-use EITA embraces good practices of the companies, thus providing to any enterprise up-to-date support to generic business functions. This might be true even for specific industrial areas, as long as enterprises do not look for competitive advantages in the information processing domain.

These assertions are in tune with (Daneshgar et al., 2013), who mentions that the acquisition of software packages is the most realistic option for SMEs. We must also consider that the software delivery model has evolved to Software as a Service (SaaS), in which the company pays to use the Software package. This model has low acquisition and operation costs at the start compared to traditional models (Zadeh et al., 2018) and gives the client more freedom to change the solution or provider if the service is not satisfactory.

We should also consider that the software producing companies are orienting their products to this segment (SMEs), mainly due to the saturation of the market in the sector of large companies. Also, we must note that the software and implantation methodologies produced for large companies are difficult to adapt to SMEs (Johansson et al., 2013; Leyh, 2014).

Business Process Management

One of the main drawbacks with SMEs is the lack of company structure, which causes their business processes to be rarely formalised. For this reason, before starting an EITA implantation project, it is advisable to raise, analyse and improve the internal processes of the institution. If possible, the most optimal is to re-engineer processes. Knowing the internal processes of the company will help to select the EITA since one of the fundamental issues for the successful implantation of the EITA is the alignment between the SME processes and the EITA processes. If this is not fulfilled, the implantation will be very complicated.

Also, we can mention that in SMEs, the formalisation of processes appears with the implantation of EITA. That is, the business application is the engine of change and therefore organises the enterprise based on the process models embedded in the software.

In this section, we must also mention that it is necessary to estimate the limits of the tool and have an idea of how the EITA will be integrated with the other existing applications in the SME.

Influence Factors

In this research work, we have detected that the factors that influence the successful implantation of the EITA in the SME are: The organisational structure should be modified before project initiation; CEO - CIO involvement; financial resources; proper evaluation and selection of EITA; educations and training to end-users; capability in the domain of information systems; change management program; and provider support quality.

Selection of EITA

One of the success factors in the implantation of the EITA consists of an adequate search, evaluation, selection and hiring of the EITA and its supplier. We have detected that in the micro and small business, the selection process is fast and is linked to the personal contacts of the SME owner. As the size of the company grows, the selection process is more complicated.

We must also mention that in this sector, they are unaware of the existence of methodologies for an adequate search or selection of the EITA that the SME needs.

Principal actors

It is important that, at least one of the actors involved in the EITA implantation process is knowledgeable about the EITA functionalities, features and demands. The role played by those actors will help to overcome several difficulties related with the adjustment between business process and EITA functionalities, and with IT infrastructure requirements. In implantations with higher complexity, the involvement of specialist in the business areas affected (accounting, logistics, marketing, production, etc.) is advisable.

Framework Simple

The SIMPLE framework is mainly obtained through a field study and describes how SMEs are currently facing the implantation of an EITA in SMEs. This framework can be applied in the three types of SMEs (micro, small and medium enterprises). It depends on the size of the company for the execution of the different stages (e.g. micro-enterprise does not need to perform all the stages of the pre-implantation phase). This framework can serve as a guide for SMEs and for EITA providers. Thus, these actors will be aware of the factors and subfactors involved in the process of implanting an EITA in the SME.

Most often, the motivations, difficulties, and facilitators in EITA implantation in SMEs are organisational, instead of technology as it is frequently assumed and treated. The implantation process is many times conducted by IT people (the IT department if it exists) with minor involvement from management.

Business processes are a key issue in EITA implantation in SMEs. However, as SMEs seldom formalize their business processes, there is a tendency for overlooking business processes. The Simple framework contributes to make the business processes visible and to lead the SME through the adjustment between business process and the functionalities provided by the EITA.

It is important that, at least one of the actors involved in the EITA implantation process is knowledgeable about the EITA functionalities, features and demands. The role played by those actors will help to overcome several difficulties related with the adjustment between business process and EITA functionalities, and with infrastructure requirements. In implantations with high complexity, the involvement of specialist in the business areas affected (accounting, logistics, marketing, production, etc.) is advisable.

Another interesting aspect that is obtained from the SImplE framework is the cross-cutting areas of concern (leadership, communication, project management and change management) and areas of focus (people and process). In this case, we can conclude that for successful implantation of the EITA in the SME, these cross-cutting areas and focus areas must be treated together and not in isolation.

Migration de historical data

Another common problem in the implantation of EITA in SMEs and underrated is the migration of historical data. Many implanters face data migration without proper planning and solve their problems as they appear. Some experienced experts suggest that historical data migration should be considered as a separate project.

Preparation and submission of proposals from the EITA provider

The elaboration of a proposal for SMEs should not be complicated for the supplier, but the difficulty is that implantation proposals should be made with little information on the activities, structure, and organisation of the SME. This is because the supplier cannot spend much time identifying the needs of the SME. After all, the business agreement is still uncertain.

Besides, in this type of companies, there are countless different SMEs in different sectors. This means that suppliers cannot provide solutions to all possible sectors. At this point, it should be considered that the suppliers that offer EITA solutions to SMEs are also SMEs.

9.4 Study limitations and future work

9.4.1 Study limitations

Below we detail the limitations of this work:

- a) Lack of worldwide coverage. One limitation is related to the data collection, to access professionals who have experience in the implantation of EITA in SMEs. The research was conducted with professionals from Ecuador, Portugal, Spain, Argentina, Mexico, and Cuba; Iberic-American countries, in which people's culture can be more relaxed compared to other cultures. This may somehow influence the model obtained.
- b) The SImplE framework is that it does not provide specific solutions for certain stages. The concern was focused on determining the entire process for the implantation of an EITA (search, evaluation, selection, hiring, deploy, and maintenance).

- c) Due to time constraints, we only performed the first four activities (problem identification & motivation, objectives of a solution, design & development and demonstration) of the DSR proposed by Peffers (Peffers et al., 2007).

9.4.2 Future Research

The SImple Framework is the outcome of the first phase of our research project. It constitutes the basis for the next phase: to develop and evaluate proposals of methodological support for the implantation of EITAs in SME. Such outcome corresponds to prescriptive knowledge. It should contemplate detailed descriptions of how to carry out the activities considered in the SImple Framework, together with contingency factors that take into consideration aspects such as the enterprise's size, industry sector, level of complexity. Special attention must be paid to the cross-cutting issues (leadership, communication, change management, and project management).

Translating the SImple framework into the key element of a method for the implantation of EITA in SMEs is the next step of our research. This will involve refining several of the aspects contemplated in the framework. For example, it will be necessary: define what activities to consider in each stage, taking into consideration the specificities of each project (e.g., size, business area); and how these activities should incorporate the cross-cutting concerns.

In this way, we identify future research that is necessary to complement the SImple framework, which we mention below:

- **Preparation of the enterprise for the implantation of an EITA.** The objective is to detail the main activities that an SME should carry out before the implantation of an EITA.
- **Identification of the needs of the enterprise.** Developing guidelines for the SME to identify their technological needs.
- **EITA selection for SMEs.** So that SMEs can evaluate and select the EITA that best suits their needs.
- **Negotiation between the buyer and the seller of the EITA.** Create a reference model so that the SME and the EITA provider can negotiate the contract of acquisition - rent, implantation, technical support, maintenance and updating of the EITA under equal conditions.
- **Loading and data migration.** Develop a process or method for the SME to migrate data (initial balances or historical data), from legacy systems to the new EITA.

- **Migrate the EITA to the cloud.** Develop a referential model to migrate the EITA from server resident in the SME to servers located in the cloud. The proposal should also consider mixed environments (on-premise and cloud)
- **Management of the EITA implantation project.** Develop a reference framework to manage the EITA implantation project in SMEs. This frame of reference should consider the differences in enterprises sizes, and based on that, determine routes of implantation. An interesting way of doing it, involves carrying out a few case studies, focusing on EITA implantation projects, where attention is payed to the documentation produced during the projects.
- **Validation of the change management proposal made for MIP.** Validate the change management proposal made for the MIP and based on this validation, propose a cycle of improvement.
- **Preparation and presentation of the proposal by the EITA provider.** Create a referential model so that the EITA provider can identify the needs of SMEs, and based on this, prepare, and present a marketing and implantation proposal for the EITA.

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PART 6

Appendix A1– Invitation Letter (In Portuguese)

Exmo(a) Senhor(a)

Minhas considerações:

Por este meio, peço-lhe muito educadamente ser autorizados a conduzir uma entrevista, sobre "Implantação de sistema de informação em pequenas e médias empresas"

Este estudo tem como objetivo compreender o processo de implantação de um sistema de informação (ERP, CRM, POS, CMS, etc.) em pequenas e médias empresas, e, numa fase posterior desenvolver um framework ou um conjunto de metodologias apropriadas para tais projetos.

Este estudo será conduzido por Irving Reascos Paredes, um professor na Universidade Técnica do Norte - Equador, será parte de seu trabalho o doctoramento em Tecnologias e Sistemas de Informação da Universidade do Minho - Portugal, sendo supervisionado pelo Professor doutor João Álvaro Carvalho no Departamento de Sistemas de Informação da Universidade do Minho.

Devemos enfatizar que todas as informações recolhidas são confidenciais e de uso exclusivo de pesquisadores, além de em troca, o fim do estudo, oferecemos entregar o "Framework desenvolvido para a implementação de sistemas de informação em pequenas e médias empresas".

No seguinte anexo, a informação é apresentada aos participantes, sobre a realização deste estudo.

Para a atenção que se digne ao presente, a partir e eu sou grato.

Atentamente.

A handwritten signature in black ink, appearing to read 'IRVING', enclosed within a circular scribble. Below the signature is a horizontal line.

Irving Reascos Paredes
Investigador UTN – Universidade do Minho

Appendix A2 – Invitation Letter (In Spanish)

Sr(a).

De mis consideraciones:

Por este medio, le solicito muy comedidamente me autorice realizarle una entrevista acerca de “Implantación de sistemas de información en las pequeñas y medias empresas”.

Este estudio tiene como objetivo comprender el proceso de implantación de un sistema de información (ERP, CRM, POS, CMS, etc.) en pequeñas y medias empresas, y en una fase posterior desarrollar un framework o un conjunto de metodologías apropiadas para tales proyectos.

Este estudio será realizado por Irving Reascos Paredes, profesor de la Universidad Técnica do Norte - Ecuador, será parte de su trabajo de doctoramiento en Tecnologías y Sistemas de Información de la Universidad de Minho - Portugal, siendo supervisado por el Profesor doctor João Álvaro Carvalho en el Departamento de Sistemas de Información de la Universidad do Minho.

Debemos enfatizar que todas las informaciones recogidas son confidenciales y de uso exclusivo de los investigadores. Al finalizar el estudio, ofrecemos entregar el "Framework desarrollado para la implantación de sistemas de información en pequeñas e medias empresas".

En el siguiente anexo, la información para participantes es presentada, sobre la realización de este estudio.

Por la atención que se digne dar a la presente, desde ya le estoy agradecido.

Atentamente.

A handwritten signature in black ink, appearing to read 'IRVING', with a horizontal line underneath.

Irving Reascos Paredes
Investigador UTN – Universidade do Minho

Appendix A3 – Invitation Letter for case study (In Spanish)

Sr.

Nombre persona

Puesto y nombre de la empresa

.

Presente.

De mis consideraciones:

Por medio del presente, solicito a Usted muy comedidamente se permita realizar un estudio de caso, acerca de la “IMPLANTACION DE UN SISTEMA DE INFORMACION – ERP” en su organización.

Este estudio tiene como objetivo comprender el proceso de implantación de un sistema de información ERP en pequeñas y medianas empresas, y en una etapa posterior desarrollar un framework o un conjunto de metodologías adecuadas para este tipo de proyectos.

Este estudio será realizado por Irving Reascos Paredes, docente de la Universidad Técnica del Norte, el mismo que será parte de un trabajo de doctoramiento en Tecnologías y Sistemas de Información en la Universidad de Minho – Portugal, siendo supervisado por el profesor PHD João Álvaro Carvalho perteneciente al Departamento de Sistemas de Información de la Universidad de Minho.

Cabe resaltar que toda la información recopilada será de carácter confidencial y para uso exclusivo de los investigadores.

Como contrapartida, al finalizar el estudio ofrecemos entregar el framework desarrollado para la implantación de Sistemas de Información en pequeñas y medianas empresas.

En el siguiente anexo se presentan la información a los participantes acerca de la realización de este Estudio de caso.

Por la atención que se digne dar a la presente, desde ya le estoy agradecido.

Atentamente,

A handwritten signature in black ink, appearing to read 'IRVING', is written over a horizontal line. The signature is enclosed within a faint, circular stamp or watermark.

Irving Reascos Paredes

Investigador UTN – Universidade do Minho

Appendix B1– Participants information (In Portuguese)

ENTREVISTA: Projecto “Desenvolvimento de un Framework para a implantação de Sistemas de Informação nas Pequenas e Médias Empresas”

Informações para os participantes

1. O que é este estudo?

Este estudo tem como objetivo compreender o processo de implantação de um sistema de informação (ERP, CRM, POS ...) em pequenas e médias empresas, e, numa fase posterior desenvolver um Framework ou um conjunto de metodologias apropriadas para tais projetos.

2. Quem são os pesquisadores?

Este estudo será conduzido por Irving Reascos Paredes, um professor na Universidade Técnica do Norte - Equador, será parte de seu trabalho o doctoramiento em Tecnologias e Sistemas de Informação da Universidade do Minho - Portugal, sendo supervisionado pelo Professor doutor João Álvaro Carvalho no Departamento de Sistemas de Informação da Universidade do Minho..

3. O que envolve a sua participação?

Sua participação neste estudo envolve uma entrevista relacionada com a questão da implantação de aplicações de software, como ferramentas base para a transformação digital de pequenas e médias empresas.

Nesta entrevista não lhe serão colocados perguntas sobre assuntos privados ou confidenciais.

A entrevista será idealmente áudio gravada por razões práticas. No entanto, poderá pausar a gravação a qualquer momento, e caso não deseje prosseguir, a gravação será desligada ou apagada.

4. Quanto tempo será necessário? Quando e onde será realizada?

A entrevista tem uma duração estimada de 45 minutos e será feita em horário e local de sua conveniência.

5. Se você decidir participar, você pode alterar a sua decisão no futuro?

Sua decisão de participar neste estudo é completamente voluntária, por isso não é obrigado a participar. Em caso de aceitação para participar deste projeto, você pode a qualquer momento alterar a sua decisão.

6. O que acontece com a informação recolhida?

Todas as informações fornecidas por você, são estritamente confidenciais e só será conhecido pelos pesquisadores envolvidos neste estudo. Poderá ser publicado um relatório sobre este estudo, mas os participantes e a organização não serão identificados neste relatório. A menos que você indique o contrário.

7. Que compensações resultantes da participação neste estudo?

Quando o estudo estiver concluído, a organização irá obter uma cópia do Framework ou Handbook desenvolvido para a implantação de sistemas de informação em pequenas e médias empresas.

8. ¿ Há algum risco neste estudo?

Não há riscos conhecidos sobre a participação neste estudo.

9. ¿ Pode haver problemas adicionais relativos à participação neste estudo?

Agradecemos a todas as perguntas que você pode realizar sobre este estudo, e vamos fazer o nosso melhor esforço para responder suas perguntas imediatamente. Suas perguntas devem, preferencialmente ser endereçadas ao e-mail: imreascos@utn.edu.ec o ireascos@gmail.com

Appendix B2 – Participants information (In Spanish)

ENTREVISTA: Proyecto “Desarrollo de un Framework para la implantación de Sistemas de Información en la micro, pequeña y media empresa”

Información para participantes

10. ¿Qué es este estudio?

Este estudio tiene como objetivo comprender el proceso de implantación de un sistema de información ERP en pequeñas y medianas empresas, y en una etapa posterior desarrollar un framework o un conjunto de metodologías adecuadas para este tipo de proyectos.

11. ¿Quiénes son los investigadores?

Este estudio será realizado por Irving Reascos Paredes, docente de la Universidad Técnica del Norte, el mismo que será parte de su trabajo de doctoramiento en Tecnologías y Sistemas de Información en la Universidad de Minho – Portugal, siendo supervisado por el profesor PHD João Álvaro Carvalho perteneciente al Departamento de Sistemas de Información de la Universidad de Minho.

12. ¿Qué involucra la participación de su organización?

La participación de su organización en este estudio involucra un conjunto de entrevistas a personal involucrado en la implantación del Sistema de Información, en las cuales se colocarán preguntas relacionadas a su participación en el mencionado proyecto. En esta entrevista NO le serán colocadas preguntas de carácter privado o sobre asuntos confidenciales.

La entrevista será, idealmente, grabada en audio por razones prácticas, sin embargo, podrá interrumpir la grabación en cualquier momento y, en caso de que el entrevistado lo desee, la grabación será apagada.

13. ¿Cuánto tiempo será necesario y cuándo y dónde será realizada?

Las entrevistas tienen una duración estimada de 40 minutos, y será realizada en horario y local de su conveniencia.

14. ¿Si Usted decide participar, puede alterar su decisión en el futuro?

Su decisión de participar en este estudio es completamente voluntaria, por lo que no es obligado a participar. En caso de su aceptación para participar en este proyecto, podrá en cualquier momento, alterar su decisión.

15. ¿Que acontece con la información recopilada?

Todas las informaciones brindadas por personal de su empresa son estrictamente confidenciales y apenas serán conocidas por los investigadores involucrados en este estudio. Podrá ser publicado un informe sobre este estudio, pero los participantes y la organización NO serán identificados en este informe.

16. ¿Qué contrapartidas resultan de la participación en este estudio?

Cuando todo el estudio concluya, la organización obtendrá una copia del Framework desarrollado para la implantación de Sistemas de Información en las pequeñas y medianas empresas.

17. ¿Existe algún riesgo de participar en este estudio?

No existen riesgos conocidos en relación a la participación en este estudio.

18. ¿Puede haber temas adicionales sobre la participación en este estudio?

Agradecemos todas las preguntas que nos pueda realizar sobre este estudio y haremos todo lo posible por responder de inmediato a sus dudas. Sus preguntas deben de preferencia direccionadas al e-mail: imreascos@utn.edu.ec o ireascos@gmail.com

Esta información es para su futura referencia

Appendix C1 – Statement for collaboration (In Portuguese)

FORMULÁRIO DE CONSENTIMIENTO INFORMADO

PROYECTO “DESENVOLVIMENTO DE UM FRAMEWORK PARA A IMPLANTAÇÃO DE APLICAÇÕES INFORMÁTICAS NAS PEQUENAS E MÉDIAS EMPRESAS”

Eu, _____,
com o endereço de e-mail _____,
declaro que tive conhecimento da informação para participantes do projecto
“Desenvolvimento de um Framework para a implantação de Aplicações Informáticas nas Pequenas e Médias Empresas”, e que decidi participar.

Assinatura do Participante

Data

Entreguei nesta data ao participante a carta “Informações para os participantes”, sobre o estudo e disponibilizei-me a esclarecer a suas questões, pelo que acredito que este possui informação suficiente para decidir de forma esclarecida.

Assinatura do Investigador

Data

Appendix C2 – Statement for collaboration (In Spanish)

FORMULARIO DE CONSENTIMIENTO INFORMADO

PROYECTO “DESARROLLO DE UN FRAMEWORK PARA LA IMPLANTACIÓN DE APLICACIONES INFORMÁTICAS EN LAS PEQUEÑAS Y MEDIANAS EMPRESAS”

Yo, _____, con dirección de email, _____, declaro que tuve conocimiento de la información para los participantes del proyecto “Desarrollo de un Framework para la implantación de Aplicaciones Informáticas en las Pequeñas y Medianas Empresas”, y en el cual decidí participar.

Firma del participante

Fecha

Entregue en esta fecha al participante la carta “Información para participantes” sobre el estudio solicitado, y me pongo a su disposición para esclarecer las preguntas que surjan, razón por lo cual se considera que él posee información suficiente para decidir de forma transparente.

Firma del investigador

Fecha

Appendix D1 – Interview Guide (In Portuguese)

GUIA DE ENTREVISTA

Esta entrevista enquadra-se num projeto de investigação que visa estudar o processo de implantação de aplicações informáticas em pequenas e médias empresas (PME).

Tenha em mente uma ou mais situações de implantação de aplicações informáticas em pequenas e médias empresas que tenha experienciado. Do seu ponto de vista:

- Quais as principais motivações das PME para a implantação (adoção) de aplicações informáticas?
- Quais são os principais problemas, dificuldades, desafios que as PME enfrentam na implantação de aplicações informáticas?
- Acha que as PME, ao implantar aplicações informáticas, aproveitam para mudar os seus processos organizacionais ou a maneira como trabalham? Ou a preocupação é sobretudo de automatizar alguns dos seus procedimentos e processos?
 - Qual acha que deveria ser a atitude das empresas (PME) face a esta questão?
- Como acha que deve ser o processo de implantação de aplicações informáticas em pequenas e médias empresas, para alcançar sua transformação digital?
 - Quais as principais etapas e que competências são essenciais para as conduzir?
- Como é que as PME selecionam as aplicações informáticas a implantar?
- Nas PME, quem é que tipicamente assume a condução da instalação, configuração e afinação das aplicações informáticas, a migração de dados e outras tarefas relacionadas com a disponibilização das aplicações informáticas?
- Como fornecedores de aplicações informáticas, que aspetos são mais difíceis de lidar nas pequenas e médias empresas (relacionados com a aquisição/fornecimento de aplicações informáticas)?
- Que recomendações deixaria para as pequenas e médias empresas para melhorar o processo de implantação de aplicações informáticas?
 - E recomendações para os vendedores de aplicações informáticas?
 - E recomendações para os que vão conduzir o processo de implantação?

Appendix D2 – Interview Guide (In Spanish)

GUIA DE ENTREVISTA

Esta entrevista se encuadra en un proyecto de investigación que pretende estudiar el proceso de implantación de aplicaciones informáticas en las pequeñas y medias empresa (Pymes).

Teniendo en mente la implantación de la aplicación informática en su empresa, por favor dé su punto de vista de las siguientes situaciones:

- ¿Cuáles fueron las principales motivaciones para la adopción de la aplicación informática?
- ¿Cuáles son los principales problemas, dificultades o desafíos que las pymes enfrentan en la implantación de una aplicación informática? paint
- ¿Previo a implantar la aplicación informática se realizó una reingeniería de procesos de la empresa?
- ¿Cómo fue el ajuste de la aplicación informática con la empresa, la aplicación se ajustó a la empresa o la empresa se ajustó a la aplicación?
- ¿Con la experiencia obtenida, Cómo cree que se debería enfrentar esta cuestión?
- ¿Cómo cree que debe ser el proceso de implantación de aplicaciones informáticas en las pymes?
- ¿Cuáles son las principales etapas y que competencias son esenciales para concluir satisfactoriamente la implantación de la aplicación informática?
- ¿Como seleccionaron la aplicación informática que implantaron?
- ¿En su empresa, quien asumió la conducción de la instalación configuración y afinación de la aplicación informática, la migración de datos y otras tareas relacionadas con la manipulación de la herramienta?
- ¿Como cliente de una aplicación informática, que aspectos son más difíciles de lidiar con el proveedor?
- ¿Qué recomendaciones dejaría para las **pymes** para mejorar el proceso de implantación de aplicaciones informáticas?
- ¿Qué recomendaciones dejaría para los **proveedores**, para mejorar el proceso de implantación de aplicaciones informáticas?
- ¿Cuál es el siguiente paso de su empresa respecto a la implantación de aplicaciones informáticas?

Appendix E – Interview Protocol (In Spanish)

PROTOCOLO DE ENTREVISTA

Este documento presenta el procedimiento general y guías para la conducción de entrevistas cara a cara con los participantes del estudio “Desarrollo de un framework para la implantación de Sistemas de Información en las pequeñas y medianas empresas”. La entrevista se desarrollará en tres momentos, los cuales se describe a continuación:

Primer momento – Información.

La interacción inicia con una introducción, con el fin de facilitar la compenetración con los participantes. Esta introducción cubre los siguientes aspectos:

- Presentación del investigador y del estudio, explicando el propósito general del estudio y de la entrevista,
- Preguntar al participante si tiene alguna pregunta respecto a la carta de “*Información para los participantes*”, que fue enviada con anticipación y si ésta dispuesto a dar su consentimiento informado.
- Asegurar a los participantes de la confidencialidad de los datos y su derecho a retirarse del estudio en cualquier momento.
- Agradecer al participante por su contribución y preguntar si tiene interés en recibir un reporte con las principales conclusiones del estudio.

Segundo momento – Entrevista

El segundo momento es la entrevista en sí, el investigador usará la guía de la entrevista y se enfocará en mantener una conversación fluida con el participante demostrado interés y comprensión de los temas tratados.

Además, el investigador debe considerar otras fuentes de información en el desarrollo de la entrevista, tales como por ejemplo énfasis en sus respuestas, posición corporal, entre otras.

Tercer momento – Cierre

El objetivo de este momento es lograr un buen cierre con los participantes y aliviar alguna tensión o ansiedad que la entrevista pudiera haber causado.

Los siguientes aspectos serán cubiertos en este momento:

- Preguntar al participante si quiere aportar algo más y si tiene alguna pregunta acerca del estudio o de la entrevista.
- Reiterar el agradecimiento por la contribución dada y mostrarse abierto a responder preguntas acerca de su participación.

- Solicitar permiso para realizar otra entrevista en caso se requiera alguna clarificación de los temas tratados en la entrevista.

Después de la entrevista

Después de la entrevista, un período de conversación informal sigue, si surge algún aspecto de interés durante esta interacción, el investigador solicitará permiso para tomar nota e incluir esto en su estudio.

Appendix F - Individual Innovativeness Instrument

**DIAGNOSTIC INSTRUMENT FOR CHANGE MANAGEMENT
PROJECT OF IMPLANTATION OF AN ENTERPRISE IT APPLICATION:**
Individual Innovativeness Instrument

Indications:

The questionnaire consists of 20 questions, please read carefully and rate each of them according to the degree of correspondence of the current situation. The score ranges from "strongly agree" to "strongly disagree". Given that the assessments are subjective, perhaps the degree of correspondence is not total with any of the scores, in that case it scores on the closest to your reality.

Scale: Strongly agree (SA); Agree (A); Neither agree nor disagree (N); Disagree (D); Strongly disagree (SD)

Nº	Question	SCALA				
		SA	A	N	D	SD
1	My peers often ask me for advice or information.					
2	I enjoy trying new ideas.					
3	I seek out new ways to do things.					
4	I am generally cautious about accepting new ideas.					
5	I frequently improvise methods for solving a problem when an answer is not apparent.					
6	I am suspicious of new inventions and new ways of thinking.					
7	I rarely trust new ideas until I can see whether the vast majority of people around me accept them.					
8	I feel that I am an influential member of my peer group.					
9	I consider myself to be creative and original in my thinking and behavior.					
10	I am aware that I am usually one of the last people in my group to accept something new.					
11	I am an inventive kind of person.					
12	I enjoy taking part in the leadership responsibilities of the group I belong to.					
13	I am reluctant about adopting new ways of doing things until I see them working for people around me.					
14	I find it stimulating to be original in my thinking and behaviour.					
15	I tend to feel that the old way of living and doing things is the best way.					
16	I am challenged by ambiguities and unsolved problems.					
17	I must see other people using new innovations before I will consider them.					
18	I am receptive to new ideas.					
19	I am challenged by unanswered questions.					
20	I often find myself sceptical of new ideas.					

An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (like an organisation). People and organisations vary a great deal in their "innovativeness." Innovativeness has to do with how early in the process of adoption of new ideas, practices, etc. that the individual or organisation is likely to accept a change.

The individual innovativeness scale was designed to measure individuals' orientations toward change. Research has indicated that this orientation is associated with several communication variables. The Individual Innovativeness instrument has been found to be highly reliable and the predictive validity is good.

Tool - Individual Innovativeness Scale (adapted from Hurt et al., 1977)

Appendix G – Template for stakeholder map

DIAGNOSTIC INSTRUMENT FOR CHANGE MANAGEMENT
PROJECT OF IMPLANTATION OF AN ENTERPRISE IT APPLICATION:
Template for Stakeholder map

This template can be used by the steering committee that leads the EITA implantation project in the SME. This committee is formed by the team of consultants of the supplier together with the team designated by the enterprise (where the EITA will be implanted).

We recommend that each person in the committee fill out this template and then in a meeting with the entire committee, a consensus be obtained from the stakeholders involved in the project.

The stakeholder interest and power assessment should be done from **1** to **10**, where **1** means very low and **10** very high.

Num.	Stakeholder	Area	Position (Job)	Expectation	Estimate	
					Interest	Power
Individual						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
Group						
1	Accounting					
2	Marketing					
3	Sales					
4						
5						

Base template for stakeholder map

Appendix H – Change curve – response to change

DIAGNOSTIC INSTRUMENT FOR CHANGE MANAGEMENT
PROJECT OF IMPLANTATION OF AN ENTERPRISE IT APPLICATION:

Mastering the Change Curve

Directions:

Below are 24 statements describing reactions to the change you identified. Please read each statement carefully. Using the Response Key, decide how true each statement is of your current reaction to the change.

Response Key:

ATT	Almost Totally True
MT	Mostly True
ST	Somewhat True
MU	Mostly Untrue
ATU	Almost Totally Untrue

N°	Question	SCALA				
		ATT	MT	ST	MU	ATU
1	This change doesn't really affect me.					
2	I prefer the way things were before.					
3	I'm excited about all the new possibilities the change allows.					
4	I've really come a long way with this change.					
5	The reality of the change hasn't set in yet.					
6	I don't know if I can do what is expected of me in this change.					
7	Everything is up in the air, but we're dealing with the real issues.					
8	I would not go back to the way things were before.					
9	I'm not wasting my time worrying about the change.					
10	I think this change is bad for the organisation.					
11	I keep thinking of new ways to do things.					
12	I have mastered what needs to be done to be effective with this change.					
13	I'm sure this whole thing will blow over soon.					
14	I feel angry about the change.					
15	Recently I've had a lot more energy to deal with the change.					
16	I am comfortable in the new work environment.					
17	I don't have any feelings about the change.					
18	I can't concentrate on my work.					
19	I'm amazed at how many new things I'm learning because of this change.					
20	I feel good about myself and what I have accomplished to meet the demands of the change.					
21	I just try to do what I have to do to get through the day.					
22	I'm upset about the way this whole thing has been carried out.					
23	I feel like the worst part of the change is over.					
24	I've learned things in this change that will help me deal with the next change.					

Tool – change curve (adapted from Jaffe & Scott, 2003)

Appendix I – ADKA instrument

DIAGNOSTIC INSTRUMENT FOR CHANGE MANAGEMENT
PROJECT OF IMPLANTATION OF AN ENTERPRISE IT APPLICATION:
Awareness, Desire, Knowledge, Ability for EITA implantation

Indications:

The questionnaire consists of 16 questions, please read carefully and rate each of them according to the degree of correspondence of the current situation. The score ranges from "strongly agree" to "strongly disagree". Given that the assessments are subjective, perhaps the degree of correspondence is not total with any of the scores, in that case it scores on the closest to your reality.

Brief description of the change

--

SCALE: Strongly agree (SA), Agree (A), Neither agree nor disagree (N), Disagree (D), Strongly disagree (SD)

Nº	Awareness of the need for change	SCALE				
		SA	A	N	D	SD
1	I understand the triggers (internal and external) for this change					
2	I understand the goal of this change					
3	I understand the intended results of implementing this change					
4	I could explain why this change is happening to a colleague					
Desire to make the change happen		SA	A	N	D	SD
5	I believe the organisational motivations for this change are true and accurate					
6	I know What's In It For Me (WIIFM)					
7	I have made the decision to participate in this change					
8	I believe that if we take on this change, there is a high likelihood that we will be successful					
Knowledge about how change		SA	A	N	D	SD
9	I clearly understand the impact this change will have on my behaviours, processes, tools, and workflow					
10	I have the knowledge I need to be successful while the change is being implemented					
11	I have received adequate training to feel prepared to be successful					
12	I have the capacity to learn the new things I need to be successful in this change					
Ability to change		SA	A	N	D	SD
13	I believe I can close the Knowledge - Ability gap					
14	I am capable of implementing the changes for my behaviours, processes, tools, and workflows					
15	I believe the training provided will give me what I need to be successful in this change					
16	I have capacity to implement the changes in how I do my job					

Tool - ADKA instrument (adapted from Prosci, 2018d)