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FACULTY OF MANAGEMENT

Management

Improving and Embedding Project Management Practice in Organisations

by

Aldora Gabriela Gomes Fernandes

Thesis for the degree of Doctor of Philosophy

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ABSTRACT

FACULTY OF MANAGEMENT

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Thesis for the degree of Doctor of Philosophy

IMPROVING AND EMBEDDING PROJECT MANAGEMENT PRACTICE IN ORGANISATIONS

by Aldora Gabriela Gomes Fernandes

This thesis describes a mixed methodological research approach for developing a framework to help organisations to improve and embed project management (PM) practice. While the literature on PM provides some advice, organisations need guidance on which PM improvement initiatives (PMIIs) they should concentrate their efforts. A related issue is how to facilitate the embedment of PMIIs in organisations. The research adopts an "innovation lens" perspective, using concepts of diffusion, dissemination, implementation and routinisation, from other disciplines to develop an understanding of the embedding process of PMIIs.

Exploratory research was undertaken, which aimed to identify key PMIIs and key embedding factors, based upon the circumstances encountered in different organisations. A first attempt at framework conceptualisation based on a literature review was used as a skeleton support for the exploratory study. A series of thirty semi-structured interviews with PM professionals sought to identify additional PMIIs and embedding factors and check the salience of the PMIIs and embedding factors identified from literature review. Analysis of the interviews data led to a modified set of pertinent PMIIs and embedding factors resulting in a 'revised framework'. In a subsequent phase of the research, an online questionnaire survey was undertaken to obtain a wider set of views and it was answered by 793 PM professionals from about 75 different countries. Analysis of the questionnaire responses largely confirmed the 'revised framework' for embedding useful PMIIs. Additionally, the questionnaire data was used to identify the inter-relationships between the themes to improve and embed PM practice, and the dependencies of the key PMIIs and key embedding factors on different organisational contexts, namely sector of activity, size, types of projects, and geographic location.

The main contribution to practice is the conceptual framework itself. The main contribution to theory of this research is that it builds knowledge in the area of embedding PM practice, for which there is limited understanding. Using a 'success factor' approach, the research identifies a key set of PMIIs and factors that can influence the embedding of PMIIs in organisations, based on empirical work. Additionally, the research i) adopts an "innovation lens" perspective, which is itself a relatively novel approach; ii) adds empirical evidence on the dependency of PMIIs and embedding factors on the organisational contexts; and iii) provides a foundation for future empirical research. The proposed framework has been validated by quantitative analysis of responses from the questionnaire, however further validation through the use of case studies in order to highlight contextual variables is warranted.

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DECLARATION OF AUTHORSHIP

I, Aldora Gabriela Gomes Fernandes declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

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I confirm that:

1. this work was done wholly while in candidature for a research degree at this University;
2. where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. where I have consulted the published work of others, this is always clearly attributed;
4. where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. parts of this work have been published as:
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   - Fernandes, G., Ward S. & Araújo, M. (2013), Improving and Embedding Project Management Practices in Organisations: A Mixed Methodology Approach. *Proceedings of IRNOP 2013 Conference*, 1-19.
   - Fernandes, G., Ward S. & Araújo, M. (2013), Improving and Embedding Project Management Practices in Organisations, *Proceedings of PMI Global Congress 2013 EMEA*, 1-14.

Signed: .....

Date:.....

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List of Abbreviations

A	-	Attitude Toward Behaviour
APM	-	Association for Project Management
BI	-	Behavioural Intention
BoK		Body of knowledge
CFA	-	Confirmatory Factor Analysis
EFA	-	Exploratory Factor Analysis
EVM	-	Earned Value Management
FA	-	Factor Analysis
IPMA	-	International Project Management Association
IQ	-	Interview Question
IT	-	Information and Technology
MSP	-	Managing Successful Programmes
OPM3	-	Organisational Project Management Maturity Model
OGC	-	Office of Government Commerce
PBC	-	Perceived Behavioural Control
PCA	-	Principle Component Analysis
PERT	-	Program Evaluation Review Technique
PM	-	Project Management
PMAJ	-	Project Management Association of Japan
PMPA	-	Project Management Performance Assessment

PMBoK – Project Management Body of Knowledge

PMCDF – Project Manager Competency Development

PMI – Project Management Institute

PMIIs – Project Management Improvement Initiatives

PMIS – Project Management Information System

PMO – Project Management Office

PMP – Project Management Professional

P2M – Project and Program Management

P3M3 – Portfolio, Programme, and Project Management Maturity Model

PRINCE2 – PRojects IN Controlled Environments

ROI – Return on Investment

RQ – Research Question

SEM – Structural Equation Modelling

SN – Subjective Norm

SPSS – Statistical Package for the Social Sciences

TAM – Technology Acceptance Model

TPB – Theory of Planned Behaviour

TRA – Theory of Reasoned Action

VAPM – Value Adding Path Map

1. Introduction

This study commenced in January 2010, and this thesis intends to provide a comprehensive account of the researcher's activities and results obtained. The following sections present: i) the problem that this research addresses and the relevance of this particular research, as well as, the main concepts and assumptions which play a central role in this thesis, ii) the research objectives and questions raised in this research project, and iii) the research methodology applied to obtain their answers. Finally, it summarises the thesis structure.

1.1 Problem Outline and Key Concepts

In the past thirty years project management (PM) has developed substantially as a discipline and significantly increased in visibility and importance (Thomas & Mengel, 2008; Kwak & Anbari, 2009; Zhai et al. 2009). In order to manage business objectives, organisations are increasingly utilising the discipline of PM (Kwak & Anbari, 2009; Demir & Kocabas 2010). Business is becoming increasingly 'projectised' or project oriented (Hobday, 2000; Sydow et al. 2004; Martinsuo et al. 2006), and 'management by projects' has become a powerful way to integrate organisational functions and motivate groups to achieve higher levels of performance and productivity (Morris, 1997). As Jugdev and Thomas (2002, p 4) have observed: *"Firms are turning to project management as part of their competitive advantage strategies. This is evident in the exponential increase of membership in PM associations such as the Project Management Institute (PMI)"*.

PM is a well developed and accepted organisational science (White & Fortune, 2002) that has been shown to deliver tangible and intangible benefits to organisations (Munns & Bjeirmi, 1996; Ibbs & Kwak, 2000; Martinsuo et al. 2006; Thomas & Mullaly, 2008; Mengel et al. 2009), and many methods, techniques and tools have been developed, covering all aspects of managing projects from their genesis to their completion (White & Fortune, 2002). Nevertheless, PM remains a highly problematical endeavour. Projects still fail to live up to the expectations of stakeholders as they continue to be disappointed by projects' results (Cooke-Davies, 2002; Dai & Wells, 2004; Whitty, 2005).

Introduction

The Standish Group International (2009) found that, in the year 2008, only 32% of all the projects surveyed succeeded (i.e. were delivered on time, on budget, with the required features and functions); 44% were challenged (late, over budget and/or with less than the required features and functions) and 24% of projects failed (cancelled prior to completion or delivered and never used).

These results highlight the importance of improving PM practice in organisations. Geraldi et al. (2008) raised the question *how to better develop and apply the knowledge of PM in projects?* Cooke-Davies in 2001 has studied a similar research question *"What can be done to improve PM practices, and thus project performance?"* As argued by Shi (2011) how to implement and improve PM in the "right way" is still a relevant topic to study. One important issue in all these questions is that PM is highly contingent on the organisational context[1], such as structure of business or industry sector, size, and its environment (Besner & Hobbs, 2008; Hobbs et al. 2008; Cooke-Davies et al. 2009; Besner & Hobbs, 2013). In a research study: "Researching the value of project management", sponsored by Project Management Institute, Thomas and Mullaly (2008) concluded that there is no unique way being adopted when PM practice is improved in organisations; there are several different PM initiatives for improving PM practice present in organisations. For example, different strategies are employed for training and employee development, namely through the implementation of a PM career path or a PM certification system. There are different approaches adopted in introducing project support groups (such as PM offices), and these support groups differ in focus, structure and influence (Hobbs et al. 2008). The implementation of PM methodologies varies considerably, from the very *ad hoc* and informal to methodologies that are formally defined and consistently adhered to.

However, for organisations it might be useful to have the indication of the "best" path to improve PM. For example, Shi (2011) presents an approach named Value Adding Path Map (VAPM) which can direct an organisation step by step to introduce and implement PM in a better way. Shi (2011) argues that it is the coordination of the 'hard' and 'soft' PM system implementations that

[1] The organisational context is mighty dependent on the strategic context; economic/ political/ cultural context and organisational attributes (e.g. organisational structures; project data; organisational culture and people who actually do the work in organisations (Thomas & Mullaly, 2008).

creates the largest value to an organisation with the least investment. The 'hard' PM system means the traditional ways of PM implementation, which includes the PM process, PM training and knowledge management and PM tools and techniques. The 'soft' PM system includes the general management system and the PM culture which means the organisation has recognised that PM contributes to the success of the organisation. Nevertheless, Shi's study presents an important limitation in that it makes a recommendation of the "best" path to implement PM. However, the idea that PM practice varies from one organisational context to another is widely accepted (Thomas & Mullaly, 2008; Cooke-Davies et al. 2009; Besner & Hobbs, 2013). Therefore, a general indication of the "best" path might be "presumptuous".

Organisations might use PM maturity models to understand the current capability to undertake PM, and help them to improve PM practice in a structured way (Sowden et al. 2010). But, unfortunately, no one model has achieved general acceptance and from a practical perspective, each of the instruments underlying these models runs on top of a large number of questions or items – most of which have never been tested for either their reliability or validity in scientific terms (Thomas & Mullaly, 2008). Additionally, as argued by (Shi, 2011) maturity models have a large number of indicators which makes it hard to direct an organisation to improve PM practice. Therefore, while the literature on PM provides some advice, through for example, the use of PM maturity models (Sowden et al. 2010; Project Management Institute, 2013b), organisations need guidance on which key project management improvement initiatives (PMIIs) they should concentrate their efforts (Thomas & Mullaly, 2008; Shi, 2011).

In this research, improving PM practice in organisations is assumed to be made through PMIIs, which include specific tools and techniques that practitioners use to "execute a process", such as Work Breakdown Structures or Earned Value Management, as well as, development of activities that would help to improve PM practice, such as the standardisation of PM processes, tools and techniques, or the designation of formal titles and roles for those in charge of projects, and their adequate training. Therefore, PMIIs are defined here as not just specific tools and techniques, or enhancements of tools and techniques,

but a set of behaviours, routines, and ways of working that are directed at improving project management performance[2].

According to Thomas & Mullaly (2007) improving PM can result in a number of business outcomes. For example, organisations that do projects for clients, may improve customer satisfaction and their organisations ability to attract new customers through reputation effects. Or organisations that do projects primarily for internal purposes, such as organisational change and information technology projects, can benefit from increased ability to achieve project goals.

A related issue is how to facilitate the embedment of these PMIIs in a sustained manner, for which there is limited understanding. Cranefield and Yoong (2009, p 259) argued that *"the nature of the knowledge embedding process is not well understood at either the organisational or the individual level. In the research literature there is neither clarity about how embedding occurs, nor a good understanding of how it can be facilitated".* The limited number of articles published in the literature on embedding PM illustrates the limited attention given to their embedment process. Organisations tend to focus their attention on what to improve, i.e. the selection of PMIIs, and give less attention to the process of embedding the PMIIs into the organisation. According to dictionary definitions, embedding means to place or set something firmly in something else (Learners' dictionary, n.d.).

The concept of embedding was found being discussed mainly in knowledge management literature. Argote et al. (2003a) argue that the process of embedding of knowledge is one of the most fundamental areas in knowledge management and organisational learning research. Knowledge is said to be embedded, when it is deeply transferred or integrated into people's interpretive frameworks, routines and work practices (Cranefield & Yoong, 2009). However, as argued by Argote et al. (2003b), more research is needed on how knowledge is embedded in an organisation's memory.

The embedding of knowledge could be seen as 'the whole point' of knowledge transfer. Unless new knowledge is embedded, it will be unevenly dispersed and/ or applied in limited ways, leading to isolated, temporary benefits

[2] Project management performance is focused on the triple constraints: control of time and cost and progress of the project (Jha & Iyer, 2007).

(Cranefield & Yoong, 2009). In particular, PM knowledge is a valuable resource (Davenport & Prusak, 2000) that can enable the embedment of PMIIs into organisations. However, as argued by Sanchez (2005), having knowledge implies actually knowing how to do something or how to cause something to happen, not just simply being aware of something, which means having data or information. As knowledge is created and captured, learning takes place and the knowledge is hopefully applied and embedded within individual and organisational processes (Liebowitz & Megbolugbe, 2003). Accordingly, to embed PMIIs into organisations it is first necessary to have embedded knowledge of the PMII in key individuals.

Different perspectives to address the problem of embedding PM practice were considered, such as knowledge management, organisational learning, and change management. However, typical concepts in these perspectives do not inform the "how" research question as much as was expected at the beginning of this research – they were found to provide insufficient practical guidance to PM professionals in embedding PMIIs (project management improvement initiatives). However, research reported on innovation literature offers potentially relevant insights. Therefore, to explore embedment of a PMII in organisations, the study conceptualises PMIIs as innovations. Nevertheless, organisational learning and knowledge management are incorporated as components of the framework, being an important 'theme' in the first attempt at framework conceptualisation from literature review.

The embedding of PMIIs is here studied as an innovation process and the researcher borrowed the concepts of diffusion, dissemination, implementation and routinisation from other disciplines such as information and technology and health care services (Greenhalgh et al. 2004; Venkatesh & Bala, 2008) to develop an understanding of the PMIIs embedding process into organisations. This research interprets several key concepts as follows:

- **Diffusion** is considered as the passive spread of innovations (i.e. a passive phenomenon of social influence).
- **Dissemination** involves active and planned efforts to convince target groups to adopt an innovation.
- **Implementation** of an innovation is here viewed as active and planned efforts to mainstream the innovation within an organisation.

- **Routinisation** is seen as the institutionalisation of an innovation and its standard use within an organisation (Greenhalgh et al. 2004).

Therefore, embedding PMIIs is studied as a process rather than an event, whereas the PMII embeddedness into the organisation is the result (i.e. adopted by all relevant individuals and incorporated into "business as usual").

Van de Ven et al. (1999) argue that at the organisational level, the move from considering an innovation to successfully routinizing it is generally a nonlinear process characterised by multiple shocks, setbacks, and unanticipated events. The various influences that help the innovation spread through the organisation can be thought of as lying on a continuum between pure diffusion (in which the communication of innovations is unplanned, informal, decentralised, and largely horizontal or mediated by peers) and active dissemination (in which the communication of innovation is planned, formal, often centralized, and likely to occur more through vertical hierarchies) (Greenhalgh et al. 2004). In this study the diffusion and dissemination of PMIIs is seen as the process of 'communication and influence' for the adoption decision of the PMII by the organisation. The characteristics of an innovation (PMII) and the individual adopters have particular influence in this process (Rogers, 2003). As argued by Greenhalgh et al. (2004, p 598) *"people are not passive recipients of innovations. Rather (and to a greater or lesser extent in different persons), they seek innovations, experiment with them, evaluate them, find (or fail to find) meaning in them, develop feelings (positive or negative) about them, challenge them, worry about them, complain about them, "work around" them, gain experience with them, modify them to fit particular tasks, and try to improve or redesign them—often through dialogue with other users".* Implementation is the efforts made to introduce the use of a PMII in the organisation. As argued by Meyers, Sivakumar and Nakata (1999, p 295) implementation is "*the early usage activities that often follow the adoption decision".* The PMII implementation and routinisation success is dependent of the organisation context (e.g. Cooke-Davies et al. 2009). Different organisations provide widely differing contexts for innovations, and some features of organisations (both structural and "cultural") have been shown to influence the likelihood that an innovation will be successfully embedded (Nystrom et al. 2002; Sharma & Rai, 2003), as well as,

organisational external influences (Abrahamson & Fairchild, 1999; Johnston & Linton, 2000).

Therefore during this Ph.D. project, the factors that might have influence in the different stages of the embedding process: diffusion, dissemination (regarded as communication and influence), implementation and routinisation will be researched, as well as, the characteristics of the inner and outer context of the organisation, the adopters and the innovations (PMIIs) attributes will be regarded as factors that could facilitate or inhibit the embedding process of PMIIs.

In the innovation literature the term 'adopting' is commonly used instead of the term 'embedding' used in this study. The use of the term 'embedding' is based on two reasons. First, most of the research on diffusion of innovation focused on product-based innovations, for which the unit of adoption is the individual (Rogers, 2003), whereas, the unit of adoption in this study is the organisation. Second, individuals in the organisation can adopt a PMII, but this does not mean that the PMII is embedded in the organisation. An individual can adopt, but it is only the routine use of the PMII and the strong contextualisation (customisation) and integration with other contextualised management practices in the organisation, and the sense of 'ownership' facilitated by the staff involvement at all levels, that results in the PMII embeddedness in the organisation (Greenhalgh et al. 2004). Rogers (2003) defines adoption (in relation to the individual) as the decision to make full use of the innovation as the best course of action available, and presents Individuals' adoption as having five stages: awareness, persuasion, decision, implementation, and confirmation. However, empirical work in the field of organisation and management clearly shows that successful individual adoption is only one component of the assimilation of complex innovations in organisations (Greenhalgh et al. 2004).

In PM literature, authors use to focus their research on PM implementation process (e.g. Liebowitz & Megbolugbe, 2003; Hölzle, 2010; McHugh & Hogan, 2011; Shi, 2011), assuming simply that there is always a successful implementation, which implies, the routinisation of its use. However, an organisation can make efforts towards improvements and not achieve the improvement embeddedness.

There are numerous potential barriers to achieve the successful embedment of PMIIs. A study by Loo (2002) based on a questionnaire survey of a random sample of 150 Canadian organisations, identified some potential barriers for achieving PM improvements. For example: not having a 'champion' or an influencer of PM principles in the organisation; inadequate investment in training; some managers and staff not prepared to change or not seeing a need to change; everyone is already busy and improvements require allocating even more time and energy into work.

In conclusion, this project research intends to address a problem, perceived by the researcher when working as a project manager, consultant and trainer in this area, and subsequently confirmed by a literature review. Two main considerations motivated the researcher to this study. On one hand, firms do not necessarily have a clear or consistent approach to improve and embed PM practice. On the other hand, improving PM is for many companies crucial to survive in a fast changing environment (Ebert & Man, 2008).

1.2 Research Conceptualisation

This study is conceptualised into two constructs: improving PM practice and embedding PMIIs, although the two concepts are linked as indicated in Figure 1.1, since an organisation engaged in embedding a PMII is consequently improving PM practice. However, in this research improving is seen as the identification and selection of useful PMIIs for embedding into the organisation. Therefore, with respect to the improving construct, the research work focused on identifying the most useful PMIIs, particularly the key activities that would help to improve PM practice, such as the standardisation of PM processes, tools and techniques. In respect of the embedding construct, the research was particularly focused on identifying factors contributing to the successful embeddedness of PMIIs. The assumption is that if an organisation is aware of these factors and addresses them during the stages of the embedment process of a PMII, then the embeddedness is more likely to be achieved.

A basic assumption of this research is that improving PM practice improves project and organisational performance, even if the actual value resulting from investments in PM has been hard to define and measure (Thomas & Mullaly,

2008) (see section 2.5). In order to maximise the value of PM, two things should be addressed. Firstly, the identification of appropriate PMIIs, both strategic and tactical (Thiry, 2002; Winter & Szczepanek, 2008; Shi, 2011).

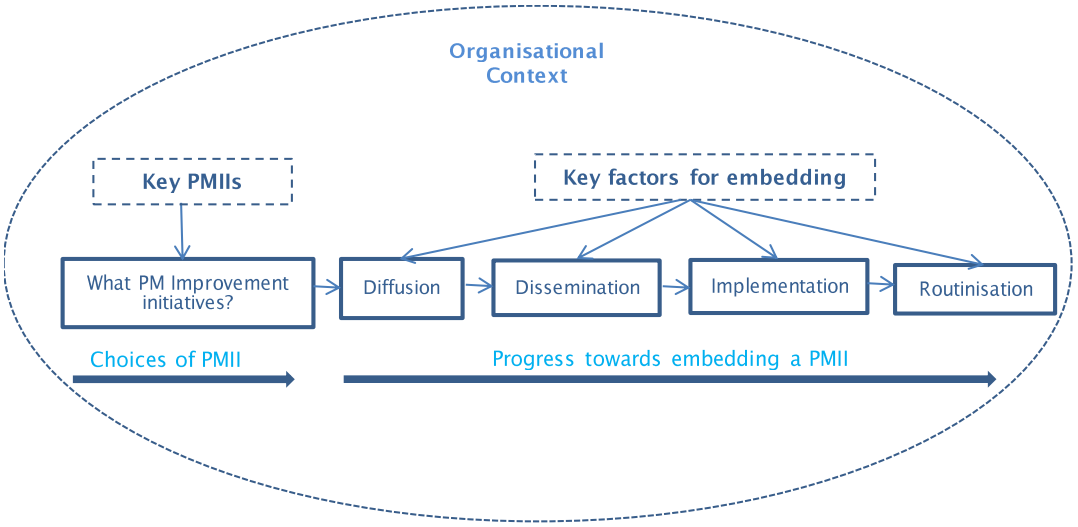

Figure 1.1: Research conceptualisation

Secondly, implementation processes should fit the organisational context (Thomas & Mullaly, 2008; Cooke-Davies et al. 2009; Zhai et al. 2009; Shi, 2011). As argued by Thomas and Mullaly (2008, p 3) *"The value of any organizational improvement must be judged in the context and situation from which it arises and how well the improvement itself fits within the context of the organization, industry and geography in which it is embedded."* The organisational context is created and renewed through tangible and concrete management actions. The context, in turn, influences the actions of all those within the company (Ghoshal & Bartlett, 1994).

1.3 Research Objectives and Questions

The main objective of this research study is – the development of a framework to assist in embedding PMIIs, pursuing a critical success factors approach. Therefore, the study attempts to identify those factors which have the greater influence on embedding useful PMIIs.

The concept of success factors is usually credited to Daniel (1961) who introduced it in relation to the 'management information crisis' (Fortune & White, 2006). This approach has many proponents. Also in the area of PM, several studies have used it (e.g. Balachandra & Friar, 1997; Clarke, 1999; Cooke-Davies, 2002; Fortune & White, 2006). However, there are two basic

criticisms of this success factor approach that emerged from the literature. The first is that inter-relationships between factors are at least as important as the individual factors, but the factor approach does not provide a mechanism for taking account of these inter-relationships. A second criticism as argued by Larsen and Myers (1999, p 398) is that *"the factor approach tends to view implementation as a static process instead of a dynamic phenomenon, and ignores the potential for a factor to have varying levels of importance at different stages of the implementation process"*.

In order to reduce part of these criticisms this research has the purpose of developing a framework showing not only the main PMIIs and key factors facilitating embedment, but also their main inter-relationships. Therefore, the study is operationalised through the attainment of the following objectives:

1. To identify the priorities of organisations when they chose to invest in PM practice improvements. This objective will be attained by the identification of the most useful PM practices for improving project management performance. These PM practices, regarded as tools and techniques, used to execute a "PM process" (which are aspects of practice that are observable and measurable), are closer to the day-to-day practice, closer to the things people do, closer to their tacit knowledge. Particularly, it will be pursued by the identification of key activities (PMIIs) that would help to improve PM practice, preventing organisations to waste money on inadequate PMIIs, and instead creating and preserving value and effectiveness. Identifying a set of key PMIIs is an important part of defining the frontiers of the discipline. Moreover, it is only possible to embed something if the organisation knows well what should be embedded.
2. The identification of key factors that influence the achievement of PMIIs embeddedness into organisations, in order for organisations to be aware of what could influence the extent of embeddedness of PMIIs.
3. The identification of inter-relationships between the key PMIIs and key factors to facilitate the embedment of PMIIs.
4. Finally, it is intended to find if respondents from different organisational contexts and demographics in the study identify different relevance levels of the key PMIIs and the key factors to facilitate the embedment of PMIIs. The purpose is to understand which of the key PMIIs and key embedding factors identified are most relevant and appropriate in a given context.

Accordingly, the research study seeks to answer the following five research questions (RQ):

- RQ1: What are the most useful PM practices?
- RQ2: What PMIIs have the higher impact on the improvement of PM practice?
- RQ3: How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance?
- RQ4: How are the identified key PMIIs and key factors to facilitate embedment related?
- RQ5: How does the set of key PMIIs and the key factors to facilitate PMIIs embedment vary in different organisational contexts (industry, size, geographic location and project type) and in demographics (primary role, PM experience, level of education, gender and age)?

1.4 Research Methodology

The research study comprised three phases. Firstly, semi-structured interviews were carried out in seven different organisations (different industries, sizes, project types) with directors, portfolio, programme and project managers and team members. Qualitative data analysis was conducted in order to: (a) identify new key PMIIs and key factors for embedding PMIIs not identified in literature review, (b) get confirmation for the key PMIIs and key embedding factors identified from literature, and (c) reduce the number of PMIIs and factors identified, and build a framework with a 'manageable' number of key items, as wide range will disperse the attention of organisations from what they should concentrate their awareness. This first phase resulted in a 'revised framework' of the 'initial framework', which consolidated a conceptualisation attempt from the literature review. The second phase involved a worldwide questionnaire survey to PM professionals with the objective of getting insights from more people and confirming, or not, the findings from the interviews. The questionnaire was also used to identify inter-relationships between types of PMII and key factors to facilitate the embedment of PMIIs, and find if the key PMIIs and the key embedding factors are dependent on the organisational contexts. The third phase of the study comprised the consolidation of the research findings and construction of a final 'proposed framework'.

In the development of the framework, it was necessary to make some judgments about how far to distinguish different embedding factors and the range of PMIIs. This 'decomposition problem' arises in most areas of management analysis. For example, in the analysis of sources of project uncertainty and risk, Chapman and Ward (2011, p 32) argue that *"…even the most decomposed structures which are viable still involve low level composites. Further decomposition to clarify a source may be possible, but in practice the limits to decomposition will be defined by what is useful. Further, the most effective and efficient decomposition structure is a matter of choice which is necessarily dependent upon the process objectives."*

In this initial study reasonably high abstraction level descriptions were adopted. For example the PMII 'standardisation of PM processes', was employed rather than distinguishing different kinds of PM processes.

1.5 The Structure of the Thesis

This thesis is structured as follows.

Chapter 1 is the introduction chapter, which is where the author sets out the study, including its motivation, objectives and approach used to attain its objectives.

Chapter 2 has as main purpose to define the scope of PM, since it is only possible to embed something if organisations know well what it is.

Chapter 3 has two main purposes: 1) to summarise the published work on commonly advocated PM practices in order to give the first step to answer the first research question: *What are the most useful PM practices? and 2) to* present the range of useful PMIIs, deriving from the literature review, in order to initiate to answer the second research question: W*hat PMIIs have the higher impact on the improvement of PM practice?* Four main PMIIs themes were identified and reviewed: process, tools and techniques; people and organisation learning; general management system and PM culture (Shi, 2011).

In the following chapter, chapter 4, the key embedding factors/ themes for embedding PM practice that also emerged from the literature are presented, in order to start to answer the third research question: *How can we increase the*

embeddedness of PMIIs into organisations in order to improve PM performance? The research adopted an "innovation lens" perspective and studied the embedment of PMIIs as innovations, therefore diffusion theories are reviewed. Most diffusion theories have the individual as the unit of analysis, however the unit of analysis of this research is the organisation, therefore an organisation perspective is also presented. Six main embedding themes are identified and reviewed: PMII (innovation) attributes; adopter and adoption; communication and influence; inner context; outer context of the organisation; and implementation (Greenhalgh et al. 2004). The change management literature is also addressed, but, the theories under change management were not helpful.

As a result of the literature reviewed in chapters 3 and 4, an 'initial framework' for the key PMIIs to improve PM practice and the key factors to embed them, is presented, as the conclusion of chapter 4. This is the necessary link to pave the way to address the research design presented in chapter 5.

In chapter 5, the research methodology used in the empirical work is explained, and the results of this fieldwork are presented and discussed in chapter 6 – interviews research phase and chapter 7 – questionnaire survey research phase. Finally, chapter 8 presents the main conclusions attained in this research and highlights its distinctive contributions as well as its limitations and future work recommended.

In summary, this thesis presents the research process towards the development of a framework to help organisations in improving and embedding PM practice. With this framework it is expected to produce a significant theoretical and practical contribution to PM discipline.

2. The Nature of Project Management

2.1 Introduction

It is only possible to improve something if organisations know well what it is. Therefore, before trying to define from the literature the nature of useful PMIIs, this Chapter has the main purpose to define the scope of PM. Additionally, the Chapter discusses the value of PM. The research study assumes that improving PM practice improves project and organisational performance, and for that reason, organisations embrace in embedding perceived useful PMIIs into their organisational structures.

In a broader context, PM includes the management of projects, programmes and portfolios, in alignment with the organisation's strategic business goals (Project Management Institute, 2013b). PM should be aligned to strategy, organisational strategies and priorities should be linked and have relationships between portfolios and programmes, and between programmes and individual projects (Morris & Jamieson, 2005; Srivannaboon, 2006; Srivannaboon & Milosevic, 2006). Therefore, firstly this chapter gives light on the worldview of PM, discussing the concepts of project, programme and portfolio management (section 2.2). To better understand what PM is, the research looks for how the professional bodies of knowledge (BoKs) organise the knowledge of PM, as much of the theory associated with PM explicitly reflects taxonomic BoKs (Snider & Nissen, 2003) (section 2.3). However, some authors (e.g. Cicmil et al. 2006; Winter et al. 2006b) are questioning the founding of PM. There is work about rethinking PM identifying the higher importance of 'people' role under PM practice (Crawford et al. 2006b); or the search for more agile PM methodologies (section 2.4). Finally, the value of PM is discussed, since this is an important premise of this research study (section 2.5).

2.2 The 'Worldview' of Project Management

Traditionally, PM has been concerned with the management of an 'individual project' (Andersen & Jessen, 2003). Gaddis (1959, p 89) defines project as "*an organisation unit dedicated to the attainment of a goal – generally the*

successful completion of a development product on time, within budget, and in conformance with predetermined performance specifications". PM promises a system which can deliver the goals of the project (Morris, 1997), through the planning and control of variables including resources, cost, productivity, schedule, risk and quality (Hodgson, 2002). Practitioners and academics have been showing an increasing interest in the use of PM for strategic purposes (Shenhar et al. 2001). This new approach of PM requires the use of programme and portfolio approaches. A programme can be defined as *"a framework for grouping existing projects or defining new projects, and for focusing all the activities required to achieve a set of major benefits"* (Pellegrinelli, 1997 p 142). A portfolio of projects is a group of projects and/ or operational activities which share common resources. The programme has common outputs and the portfolio common inputs.

2.2.1 Project Management

There is no universal agreement on a single definition of a project. However, its classical definitions usually include: i) the characteristics of established quantitative and qualitative objective(s); ii) a set of activities that are complex enough to need managing (uniqueness); and iii) a defined start and finish time (temporarily) (Cooke-Davies, 2001). These characteristics have implications for rethinking the definition of what constitutes a project (Maylor et al. 2006). In practice, the concept of project has been broadened from an initial focus on management of largely unitary, standalone projects with well defined and agreed goals and end products, to include multiple projects and programmes that are multidisciplinary, and which are not pre-defined but permeable, contested and open to renegotiation throughout (Atkinson et al. 2006).

In this study, it was adopted the traditional view, defining a project as a temporary endeavour in which human, material and financial resources are organised in a novel way to create a unique product, service or result (Project Management Institute, 2013a). A project is comprised by a set of defined deliverables, the scope to fulfil the project objectives (International Project Management Association, 2006), constrained by time, cost and predetermined performance specifications (Gaddis, 1959; Turner, 1993).

Companies initiate and sponsor projects to improve their innovative capacity, to carry out system-wide change efforts, and to enhance their adaptive

capability (Wikström et al. 2010). These projects focus on the future vision for the company and may include technology, product or process development, product/ service launch, business process reengineering or new capacity development (Chin, 2004; Shenhar & Dvir, 2007), named in this research as internal projects. On the other hand, organisations initiate projects to accommodate complex business activities (Hobday, 1998), named as external projects. Such activities have been common in the construction industry for several decades, and have also become significant on a range of other industries and sectors, as technology-based and service providing organisations, that increasingly organise their operational activities in different kinds of projects and costumer delivery projects (Hobday, 2000).

PM is a subfield of management and organisation studies (Söderlund, 2010). There are several definitions of PM, most of them from PM professional organisations, however they all specify the same concept. For example, the Association for Project Management (2006, p 2) defines PM as *"a process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realized"*. In this study, PM is seen as a disciplined method of achieving well-defined goals through deployment of tried-and-tested tools and techniques for planning, organising, control and evaluation of work.

PM is finding dramatically expanding application. More and more organisations are embracing PM practice (Kwak & Anbari, 2009; Zhai et al. 2009). PM is now the dominant model in many organisations for new product development, strategy implementation, business transformations, and continuous improvement (Winter et al. 2006a). PM importance is also growing as a strategic discipline within organisations (Winter & Szczepanek, 2008). Johnson (2004), reports that 66% of corporate strategy is never implemented. As argued by Meskendahl (2010) while strategy implementation (frequently considered as the graveyard of strategy) was neglected, the main emphasis in research strategy has been on the formulation side of strategies (Grundy, 1998; Morris & Jamieson, 2005). Nevertheless, organisations could use the discipline of portfolio, programme and project management to implement strategy.

The factors that have led to an increase in utilisation of PM include: competitive pressures (external pressures), increasing projects, greater project complexity, or compliance with international standards or regulatory

requirements (Martinsuo et al. 2006) and, importantly, managerial fads and fashions (Abrahamson, 1991; Abrahamson & Fairchild, 1999).

Project-based management brings several benefits to organisations, from a survey questionnaire to 111 Australian companies representing a variety of industries, Martinsuo et al. (2006) conclude that it brings: greater entrepreneurship, more knowledge management and know-how transfer, more client satisfaction, more effective communication, better multi-project coordination, improved project control, greater project transparency, and better project performance.

Although all the endeavours to develop the PM discipline and the interest growth from organisations, a large proportion of projects exceeds their budgets, suffer delays and fail in their objectives disappointing their stakeholders (Cooke-Davies, 2002; White & Fortune, 2002). This raises a question: the existent PM discipline addresses all the organisations' needs?

Koskela and Howell (2002) argued that the underlying theory of PM is obsolete. A unified theory of the management of projects does not exist (Shenhar, 2001; Smyth & Morris, 2007). Projects are context-specific and located in open-systems. Different types of projects should be managed differently to assure their success (Shenhar & Dvir, 1996; Shenhar, 2001; Mullaly & Thomas, 2009). While this is now widely acknowledged, research methodologies often continue to overlook it. Positivism has been the philosophy dominant historically in research on projects (Smyth & Morris, 2007). It underpins the PMBoK® Guide, which pursue generalisations, summarising the processes, inputs, outputs, tools and techniques that are considered good practices on most projects most of the time (Project Management Institute, 2013a).

Winter et al. (2006a) argue that the current conceptual foundations of PM need to reflect better developing conditions in practice. For example, the authors argued that the instrumental lifecycle image of projects as a linear sequence of tasks to be performed does not fit the needs of practitioners. However, BoKs like PMBoK®, are based on a narrow conceptualisation that projects start from a well-defined objective 'given' at the start. As referred by Cooke-Davies et al. (2009) innovation-driven organisations (such as those involved in pharmaceutical drug development) need to constantly innovate new products

or services, therefore they need to manage highly uncertain process and where standards as PMBoK® are not entirely helpful.

In the general field of management research a single theory cannot explain the behaviours in a complex organisational environment. Management researchers, such as Turner (2006a, 2006b, 2006c, 2006d), create and test theories that respond to specific issues and leave integration of these theories until later (Sauer & Reich, 2007). In fact, an increase in theory diversity can be taken as a healthy sign for the field of PM discipline, a sign of maturation of the discipline (Pollack, 2007). However, practitioners would no doubt prefer to have a single theoretical story emerging from research, but the reality is that they cope with the plurality of theories by adopting whichever appear useful, taking a pragmatic approach (Sauer & Reich, 2007). As argued by Morris (2002) while we can certainly identify good PM practices, there will never be an overall theory of PM, since much of the knowledge about how to manage projects is tacit, meaning, private and non-scientific. Therefore, there are limits to how much we can explicitly formalise the knowledge to manage projects effectively.

2.2.2 Programme Management

The use of projects has brought with it a perceived need to coordinate and balance their diverse interests and priorities, to deploy resources effectively, and to develop new capabilities and infrastructure incrementally towards the achievement of strategic goals and aspirations. Programmes and programme management in their many guises have emerged to fill this need (Pellegrinelli, 2010). Programmes facilitate managerial sensemaking and control in complex organisations where projects are the principal units of work (Maylor et al. 2006). Programme management is now a widely used approach for bringing about planned change (Pellegrinelli et al. 2007).

Shehu and Akintoye (2010) argue that there are many definitions of programme management, and this plurality and diversity of definitions can be associated with its origins and lack of understanding. Most definitions are from organisations that are heavily into PM like Project Management Institute, Association for Project Management or Office of Government Commerce. All these definitions have things in common and differences. In programme

definition, the main common points are that programmes usually cover a group of related projects; that their management must be coordinated, and that create a synergy, which will generate greater benefits than projects could do individually (Pellegrinelli, 1997; Thiry, 2002; Project Management Association of Japan, 2005; Office of Government Commerce, 2009; Association for Project Management, 2012; Project Management Institute, 2013c). The main difference is that some programme definitions, beyond related projects also cover linked ongoing operations, and other programme definitions just cover related projects, such as the definitions of the Project Management Association of Japan (2005) and Project Management Institute (2013c). Thiry (2002, p 221) tried to integrate the definitions and defined programme as *"…a collection of change actions (projects and operational activities) purposefully grouped together to realise strategic and/or tactical benefits"*. The concept of purposefulness is related to the objectives, which need to be defined. The word 'actions', refers to on-going projects, as well as operations. The benefits can be either strategic or tactical, but are always measured at organisational level and the benefits and objectives may change overtime (Office of Government Commerce, 2009). The definition of the projects is generally outside the programme's sphere of influence (Association for Project Management, 2012; Project Management Institute, 2013c), but the planning and execution of the project work is coordinated via programme structures (Pellegrinelli, 1997).

Pellegrinelli (2010) pointed that sceptics have questioned the uniqueness features attributed to programme management, arguing that it reflects a narrow conception of PM, disconnected from the lived experiences of competent practitioners. However, there exists detailed research showing the similarities and differences of project and programme management in theoretical foundation. For example, Artto et al. (2009) conclude that there are eleven distinctive characteristics with programmes and projects. One key distinction is that compared to projects, the outcomes of programmes are broader, more indirect and more far-reaching with long-term implications in the future. Outcomes from projects are concrete business results, which contribute in a foreseeable manner to business success. Artto et al's results largely confirm Lycett et al. (2004) conclusions, stating that programmes cannot and should not be treated as scale-ups of projects. However, the dominant perspective of programme management is essentially project-based,

tending to view programme management as an extension of PM. Complexity and uncertainty are both attributes of programmes (Thiry, 2002). Programmes have complexity arising from interfaces between projects as well as combination and overlapping of project life cycles (Artto et al. 2009). Programmes required a way of thinking more tolerant of uncertainty, more embracing of change and more aware of wider business influences, since periods until completion are usually longer than with ordinary projects (Pellegrinelli, 2002).

Unlike projects, programmes do not necessarily have a single, clearly defined deliverable, or a finite time horizon (Pellegrinelli, 1997). These factors mean that a programme may not have a pre-defined, linear life cycle comparable to a project life cycle (Pellegrinelli et al. 2007). Programme management is more strategic than PM, however to deny the discipline of PM a strategic, holistic role is dangerous, for example, this could limit the project manager roles to the more junior practitioner level leaving senior practitioners without a professional home (Morris et al. 2006b).

The most comprehensive and widely used programme management methodology in the UK is Managing Successful Programmes (MSP), published and used by the Office of Government Commerce (Office of Government Commerce, 2007). MSP is intended to provide pragmatic guidance in the form of key principles and techniques (Pellegrinelli et al. 2007). Other works in this area are the Standard for Program Management, from Project Management Institute, that describes the main generic phases of the programme management life cycle (Project Management Institute, 2013c) and the P2M a Guidebook for Project and Program Management for Enterprise Innovation issued by the Project Management Association of Japan.

In general, programme management standards approaches can be traced back into two erroneous assumptions: programme management is in effect a scaled-up version of PM; and that a single standard approach is applicable to all circumstances (Lycett et al. 2004). However, as Pellegrinelli (1997) argues, different rationales for programmes should lead to different programme management configurations of programme activities and organisation.

2.2.3 Portfolio Management

Portfolios are groups of projects and/ or programmes which are relatively independent of one another but share and compete for scarce resources (Archer & Ghasemzadeh, 1999). These resources can be money, people or technology, and the performance of projects can be improved through its coordination (Turner, 2009). The portfolio can also include 'other activities' or 'other work' (Association for Project Management, 2012; Project Management Institute, 2013d).

The traditional approach to PM considers projects as being independent of each other (Laslo, 2010). However, the vast majority of projects take place as one of a group of projects, either a programme or a portfolio of projects. Turner (2009) defends that only ten per cent of all projects activity are managed in an isolated way, the majority of projects being part of a portfolio or programme, in which:

- they deliver objectives which attain the full benefit only when several projects have been completed;
- they are dependent on other projects or operations for elements essential to their completion, such as data, new technologies, or raw materials;
- they borrow resources from a central pool and the resources remain within the control of the resource managers, the manager must negotiate release of the resources to the project and may lose them at little or no notice as the organisation's overall priorities change.

Portfolio management is the centralised management of one or more portfolios, which includes identifying, prioritising, authorising, managing, and controlling projects, programs and other related work, to achieve specific strategic business objectives (Project Management Institute, 2013a). One important activity of portfolio management is project prioritisation, since usually strategically there are more projects available for selection than can be undertaken within the physical and financial constraints of a firm, so choices must be made in making up a suitable project portfolio (Archer & Ghasemzadeh, 1999).

The selection of the "right" project is crucial to the project success (Munns & Bjeirmi, 1996; Naaranoja et al. 2007), although most practitioners pursuing

project success focused only on the management of the constraints: time; cost, scope, quality, resources and risks. Therefore, the project portfolio management process should be looked carefully by the organisation, in order to avoid wasteful investments (Laslo, 2010).

The main goals of portfolio management are the maximisation of the financial value of the portfolio, linking the portfolio to the organisation's strategy, and balancing the projects within the portfolio, taking into account the organisation's capacities (Meskendahl, 2010). Several authors argue that portfolio management is an important step in aligning projects with the business strategy (e.g. Shenhar et al. 2001; Crawford et al. 2006c; Srivannaboon & Milosevic, 2006, Turner, 2007). The importance of aligning PM and business strategy leads to the development of different theoretical frameworks highlighting the impact of business strategy on PM, and vice versa, as well as the mechanisms used to strengthen this alignment, namely the works from Milosevic and Srivannaboon (2006) and Meskendahl (2010).

2.2.4 Emphasising Project Management

During the conceptualisation of this research study a decision was made: to concentrate the research on the study of PM practices (tools and techniques) and, as well as, the development of activities that would help to improve PM practice related to the management of 'individual projects'. This was a difficult decision, because the researcher would like ideally to embrace the 'worldview' of PM (i.e. project, programme and portfolio management).

However, on the one hand, the theory under programme and portfolio management is fuzzy as discussed in the above sections. As argued by Pellegrinelli et al. (2007) programme management theory is far from uniform and 'mature' when compared to PM or other disciplines. For example, the relevance and robustness of the methodology Managing Successful Programmes (MSP), from the Office of Government Commerce (OGC), which comprises a set of principles and processes to guide programme management practice, is called into question by researchers. While MSP states that the principles, techniques and organisational arrangement contained therein need to be adapted to specific circumstances, it does purport to be, and is actively

promoted as, a guide to managing and evaluating programmes. As argued by Pellegrinelli et al. (2007) the mechanistic application of MSP tends to support a tactical, controlling agenda rather than a strategic empowering agenda.

On the other hand, this research was intended to produce a useful 'framework to improve and embed PM practice' to organisations and practitioners, and most organisations still have a low PM maturity level[3] and focus their attention on management of 'individual projects' (Thomas & Mullaly, 2008). Therefore, the focus of this research and the following sections is on management of 'individual projects'.

2.3 Project Management Bodies of Knowledge and Standards

The 'PM body of knowledge' is the sum of knowledge within the profession of PM. The complete PM body of knowledge (BoK) includes proven traditional practices that are widely applied, as well as innovative practices that are emerging in the profession, including published and unpublished material (Peng et al. 2007). PM BoKs have been published by the professional PM associations in late 1990's. PM BoKs are clearly important for both practitioners and academics. They are used by practitioners as 'best practice' guides to what the discipline comprises, but they also provide 'standards', against which the associations' certification programmes run (Morris et al. 2006b; Smyth & Morris, 2007). They are also of interest to academics, since any such attempt to define the 'discrete BoK and related skills' raises questions about the validity of the knowledge base in the subject being discussed or taught, both in epistemological terms and in what is deemed to be covered by the subject area. In fact, research has an important role to play in re-positioning the BoKs (Morris et al. 2006b).

There has been an emergence of multiple BoKs/ standards such as, PMBoK® (Project Management Institute, 2013a), APM BOK (Association for Project

[3] PM maturity is defined as the level of sophistication of an organisation's current PM practices (Ibbs & Kwak, 2000). PM maturity reflects, to some degree, the status of the implementation of PM in an organisation (Shi, 2011).

Management, 2012), ICB3.0 (Caupin et al. 2006), and P2M (Project Management Association of Japan, 2005). The attempts by the BoKs to systematise the knowledge required to manage projects are largely based on the underlying assumption that there are identifiable patterns and generalisations, from which rules, controls and guidelines for 'best practice' can be established that are replicable, even if not on absolutely every circumstance. The PMBoK® from Project Management Institute (PMI), APM BOK from Association for Project Management (APM) and P2M from Project Management Association of Japan (PMAJ) are of the most influential publications on what constitutes the knowledge base of the profession (Morris et al. 2006a). The three are not inconsistent, however the APM BOK and P2M, are much broader in conceptual breath and scope than the PMI PMBoK® (Morris et al. 2006b).

The PMI was founded in 1969, has more than half million members now and is the strongest and largest PM association (Milosevic, 2003; Morris et al. 2006b). PMI was founded on the premise that there were many management practices that were common to projects, in areas as diverse as construction and pharmaceutics (Duncan, 1995). This is the approach that the Association for Project Management, based in the United Kingdom, refutes. APM argues that there are a wide range of applications of PM, therefore it is not credible to produce a universal guidebook that in a step-by-step, phase-by-phase mechanical manner will drive towards successes in an assured fashion (Association for Project Management, 2012).

PMI released the first edition of PMBoK® Guide in August of 1996. Updated editions followed in 2000, 2004, 2008, 2013 (fifth edition). PMBoK® is limited to the management of an 'individual project'. The management of programs is addressed in *The Standard for Program Management*, already in its third edition, and the management of portfolios is addressed in *The Standard for Portfolio Management, also* in its third edition.

PMBoK® is a well-known body of knowledge. However, there is no formal programme of research underlying the formation of the PMBoK®. Its structure has remained essentially unchanged, in spite of the huge volume of research published since the structure was initially fixed. In fact, Morris et al. (2006b) argue that the PMBoK® generally does not, adequately reflect the research literature, either in scope of topics covered or in substantive details rendered.

For example, in areas as strategy, project definition, management of external factors and human behaviours (Morris, 2005).

Over time, other associations have launched their own bodies of knowledge. In 1986, the Association for Project Management (APM) developed the APM Body of Knowledge (APM BOK). The first release was in 1992, currently in its 6th edition, released in 2012, with multiple adjustments, upgrades and contributions developed over the last years. The APM BOK has been more directly informed by research. However, APM does not have the international reach of PMI, it is more locally influential (Morris et al. 2006b).

The International Project Management Association (IPMA) is the oldest PM institution of the world, founded in 1965. IPMA's members are primarily national PM associations (about fifty members, for example, APM is the UK member and APOGEP (Associação Portuguesa de Gestão de Projetos) is the Portugal member). These national associations serve the specific needs of PM professionals in their own countries, in their own language. IPMA serves those needs at an international level. The International Competency Baseline first version (ICB1.0) was released by IPMA in 1996, which was firstly used in Sweden, Germany and other European countries (Peng et al. 2007). Then, ICB2.0 was released in 1999 and the last version ICB 3.0 released in 2006 (Caupin et al. 2006).

In 1996, PRINCE2 standard (**PR**ojects **IN C**ontrolled **E**nvironments) was published by the CCTA (Central Computer and Telecommunications Agency, now Office of Government Commerce) assured by a virtual committee spread among 150 European organisations. In 2002 and 2005 PRINCE2 was updated in consultation with the international user community. In 2009, a major revision was made, making the standard simpler and more easily customisable, which was a common request from users (Murray et al. 2009). PRINCE2 has become a standard widely used by the British government and widely recognised by the private sector, and is definitely the most used PM standard in the UK (Murray et al. 2009). The Office of Government Commerce has also published a standard to manage programmes, which comprises a set of principles and processes, named as Managing Successful Programmes (MSP™).

In 2001, an initiative between academics, industry and the Japanese government, under the leadership of Professor Ohara of Chiba University,

following a year-long study funded by MITI (Ministry of International Trade and Industry) resulted in the production of a new standard known as P2M – "Guidebook for Project and Program Management for Enterprise Innovation" (Ohara, 2005). This study included a comprehensive review of existing standards and knowledge guides. The P2M was issued by the Project Management Professionals Certification Center of Japan, now renamed as Project Management Association of Japan. It was revised in 2002, 2004 and 2005. This publication is remarkable for rigorous analysis and practices redesign, processes and essential competencies to the achievement of strategies and innovative projects (Siang & Yih, 2012). P2M is the first guideline which compiles project and programme management and enlarges former PM scope. An outstanding trait of P2M is its emphasis in project and programme management in the view of enterprise, focusing on enterprise innovation, system innovation and application innovation (Peng et al. 2007).

Recently, in 2012, a new global PM standard, the ISO 21500 was published by the International Organisation for Standardisation ISO. This standard was the result of work involving representatives from over 30 countries during almost six years (Grau, 2013). Many large professional organisations for PM were involved either indirectly through participation in the NSB (National Standard Bodies) or directly as Liaison Partners such as IPMA. The standard ISO 21500 purpose is to be a general, overarching standard to give guidance. As referred by Grau (2013, p14) *"it will be the basis for developing a series of new national and international standards for project, program and portfolio management. That's why it is so general that it should be applicable for a wide variety of styles, sizes and levels of complexity of projects".*

Although with different structures, the PM BoKs are all value-driven (Smyth & Morris, 2007) and set out a broadly similar framework, requiring knowledge of techniques (such as project life cycling, budgeting, scheduling, etc.) and management skills (such as control and co-ordination, leadership, etc.) (Hodgson, 2002). However, as argued by Smyth and Morris, (2007) they reflect different epistemological approaches – primarily positivist and empiricist, with some interpretativist aspects, as well as differing paradigmatic perspectives. The PMBoK® is the most simplistic body of knowledge, with the primary focus upon task execution, and it fails to refer to the management of front-end issues, such as strategy or human factors (Morris, 2005). PMBoK® is

epistemologically closely associated with positivism, seeking general explanations and solutions for practice, tending to disregard context. The IPMA Competency Baseline (ICB) and APM BOK reflect a functionalist approach, and they include the strategic, front-end management of project. The P2M does not reflect any of these paradigms, it 'tastes' from a broad and diverse range of sources (Smyth & Morris, 2007). However, as argued by Morris et al. (2006b), epistemologically, the more tightly defined scope of the PMBoK® might seem more accessible for practitioners than the wider range of the APM BOK or P2M.

The several PM BoKs/ standards claim that they are 'best practices', since they are developed by committees of experts' practitioners and academics in the field, from different sectors of activity. However, they tend to reflect common practice. The committees are disposed to agree just on what is common. Additionally, PM BoKs/ standards do not give the practical guidance on how to develop competence. The BoKs are just successful in recognising the relevant professional area of competence (Morris et al. 2006b). As argued by Besner and Hobbs (2013) PM BoKs lack empirical foundation, are inventories of practices but provide little indication of the relative importance of the diverse practices or the structure that might underlie them, and indicate that practice must be adapted to the context but do not provide indications of what this adaptation might be.

Although the drawbacks mentioned, organisations have several benefits using an internationally-recognised BoK/ standard to guide them in the development of the organisation's PM methodology. These include: 1) the assurance that the organisation is using what is considered to be 'best practice'; 2) demand from external customers that a recognised methodology is used; 3) assistance with external recruitment; and the availability of suppliers of the methodology for training and support (McHugh & Hogan, 2011); and 4) removes to some extent the barriers to design/development of PM methodologies as BoKs are recognised as 'best practices' (Haji-Kazemi & Bakhshehsi, 2009).

The main results organisations can expect to reach applying a PM BoK/ standard are: 1) to achieve strategic goals; 2) to have continuous improvement; and 3) to reach a common language (Haji-Kazemi & Bakhshehsi, 2009). However, it is important to keep in mind that standards are not objectives and norms but they are tools for achieving project goals. As argued by Haji-Kazemi

and Bakhshehsi (2009) the success of projects, programmes and portfolios depend on the power of the user in interpreting the contents of a standard in different and specific situations.

2.4 Rethinking Project Management

The PM profession development has been strongly influenced by the professional associations and BoKs (Thomas & Buckle-Henning, 2007). However, both researchers and practitioners are rethinking what it means *to manage projects* (Cicmil et al. 2006; Winter et al. 2006a 2006b), looking for a more practical understanding of the actual project work. In many respects, *managing projects* is coming to be recognised as more complex than allowed for, in standards and guidelines that are designed to be generalizable across most projects (Thomas & Buckle-Henning, 2007; Besner & Hobbs, 2008).

Examination of the literature reveals that PM developed as an essentially purposeful, functionalist activity, aligning with the 'hard' paradigm. The 'hard' paradigm is commonly associated with the positivist epistemology, deductive reasoning and quantitative or reductionist techniques, attributes which are often associated with rigour and objectivity: practice based on the 'hard' paradigm tends to emphasise efficient, expert-led delivery, control against predetermined goals and an interest in underlying structure. However, rethinking the PM area led to a move towards a more 'soft' paradigm, which is commonly associated with an interpretative epistemology, inductive reasoning, and exploratory, qualitative techniques, which emphasise contextual relevance rather than objectivity. Practice based on the 'soft' paradigm emphasise learning, participation, the facilitated exploration of projects, and typically demonstrates an interest in underlying social process (Pollack, 2007).

Over the years, PM has been increasingly questioned in terms of its underlying theories and principles and its breath and nature of application (Betts & Lansley, 1995). As argued by Geraldi et al. (2008, p 587), *"the traditional discipline of PM as we know it today is unable to cope with all issues involved in the undertaking of projects"*.

There is immense interest in PM rethinking and on some real challenges for both academics and practitioners, which current approaches appear ill-equipped to deal with. As argued by Maylor (2006) rethinking gives the opportunity to academics and practitioners to challenge the 'common objects' to 'rouse the necessary questions' and consider 'unfamiliar possibilities'.

An important two year (2004-2006) research study of the PM profession was sponsored by the UK' Engineering and Physical Sciences Research Council – Rethinking PM. The concept of 'rethinking' has been to research how published knowledge in PM – mainstream theory – should be enriched and extended with new concepts and approaches to support practitioners working on 21st century projects (Winter & Smith, 2006). The aim of the study was to define a research agenda aimed at enriching and extending the subject of PM beyond its conceptual foundations (Winter et al. 2006b).

This two year research provides the first documented cases in PM of the co-production of knowledge with academics, practitioners and consultants working together (Maylor, 2006). The International Journal of Project Management published, in 2006, a special issue as a result of this research. The main findings of this study was that the current conceptual foundations of PM need to evolve in relation to the development of PM practice and presents five directions for the future: project complexity, social process, value creation, project conceptualisation and practitioner development, described in detail below (Winter et al. 2006a).

1. **Project complexity: The lifecycle model of projects and PM ➡ Theories of the complexity of projects and PM**

The simple lifecycle based models of projects, as the dominant model of projects and PM needs to evolve into the development of new models and theories which recognise and illuminate the complexity of projects and PM, at all levels. It is needed to develop new theories for practice – new images, concepts, frameworks and approaches – to help practitioners actually deal with the complexity in practice. Today, the rapid technological, social, economic, and global change push increased project complexity (Saynisch, 2010).

2. Social process: Projects as instrumental processes ➡ Projects as social processes

The instrumental lifecycle image of projects, as a linear sequence of tasks to be performed on an objectivity entity 'out there', using codified knowledge, procedures and techniques, and based on an image of projects as temporary apolitical production processes, needs to change into concepts and images which focus on social interaction among people, illuminating: the flux of events and human action and the framing of projects (and the profession) within a social agenda, practices, stakeholder relations, politics and power. As argued by Geraldi et al. (2008) the PM 'discipline' lacks consideration of social skills and contextualisation.

3. Value creation: Product creation as the prime focus ➡Value creation as the prime focus

The concepts and methodologies which focus on product creation – the temporary production, development, or improvement of a physical product, system or facility etc. – and monitored and controlled against specification (quality), cost and time, needs to develop into concepts and methodologies which focus on value creation as the prime focus of projects, programmes and portfolios.

4. Project conceptualisation: Narrow conceptualisation of projects ➡ broader conceptualisation of projects

The concepts and methodologies which are based on the narrow conceptualisation that projects start from a well-defined objective 'given' at the start, and are named and framed around single disciplines, e.g. IT projects, construction projects, HR projects etc., need to evolve into concepts and approaches which facilitate a broader and on-going conceptualisation of projects as being multidisciplinary, having multiple purposes, not always pre-defined, but permeable, contestable and open to renegotiation throughout. This is a call for more 'agile' PM approaches.

5. Practitioner development: Practitioners as trained technicians to ➡ Practitioners as reflective practitioners

The training and development which produces: practitioners who can follow detailed procedures and techniques, prescribed by PM methods and tools is essential to progress to learning and development which facilitates: the development of reflective practitioners who can learn, operate and adapt

effectively in complex project environments, through experience, intuition and the pragmatic application of theory in practice.

Sauer and Reich (2009), for example, used these five directions to develop a new 'mindset' for IT project managers. The 'mindset' was used to denote a set of principles and personal qualities that shape new style thinking of project managers.

The researchers involved in the Rethinking PM study argued that the current approaches to PM are deficient in both recognising the social nature of projects and the existence of many 'soft' projects; and recognising and managing fundamental uncertainties (Maylor, 2006). But, why does PM to date seems to be lacking in addressing uncertainty? One explanation is that conventional PM is too focused on operational planning and control (Atkinson et al. 2006). Sources of uncertainty are not confined to potential events and include lack of information, ambiguity, characteristics of project parties, trade-offs between trust and control mechanism. More sophisticated efforts to recognise and manage important sources of uncertainty are needed. This requires some attention to organisational culture, capabilities, and the development of appropriate infrastructure (Ward, 2005). Unfortunately, today, the wish to avoid inefficiency, and to dominate uncertainty and risks, bureaucratises the project work and changes the function of project managers of creativity, change and risk to a manager of paper and forms (Hodgson, 2004; Styhre, 2006). Consequently, the traditional PM discipline may be harmful for projects if followed blindly (Geraldi et al. 2008). As argued by Cicmil et al. (2006) conventional methods (i.e. according to the conventional PM BoK) can be inappropriate and potentially disadvantageous for projects that are structurally complex, uncertain and heavily time-limited.

There are some attempts to provide more agile or extreme approaches to PM, originating in IT projects (more necessity for balancing the needs of the PM process and the creativity of the technical team), as Scrum[4] or XP[5] (Geraldi et al.

[4] **Scrum** is a software development methodology proposed in 1995 by Ken Schwaber, a software developer. The Central idea of Scrum is that many of the processes during software development cannot be predicted. Therefore, it cannot be planned, estimated and completed successfully using the classical PM standards as PMBoK. Software development needs to be addressed in a flexible way (Vlaanderen et al. 2011).

2008). These methodologies have origin in the "Agile Manifesto" published by a group of software practitioners, which outlines the principles of agile system development. In short, these methodologies emphasised four principles: 1) the importance of individuals and their interactions; 2) continuous customer collaboration 3) early and continuous delivery of software; and 4) the capability to respond to volatile requirements (Chan & Thong, 2009). In these methodologies the project emerges rather than being entirely pre-planned. The management style is much more co-operative, recognising that the plan prepared pre-project is fallible and incomplete, and there is acceptance that the plan cannot be fully prepared because of the influence of the external environment (Cicmil et al. 2006). Agile PM provides some new concepts and techniques that have been seen to be effective in dynamic environments (Chin, 2004). Agile PM is a highly iterative and incremental process, where developers and project stakeholders actively work together to understand the domain, identify what needs to be built, and prioritise functionality (Hass, 2007).

Whilst it is tempting at first glance to treat agile PM methods as 'undisciplined', these methods require much higher levels of discipline from people working in those environments than is otherwise expected (Geraldi et al. 2008). In the agile environment, emphasis is moved from planning to execution. It is during project execution that crucial decisions are made that determine success or failure of the project. This does not mean that the area of planning will be ignored, just that the focus will shift to supporting decision during project execution rather than making them all up-front (Chin, 2004).

Agile PM provides some core PM methods, but it also looks at how organisations should use PM to become more effective and successful businesses. However, agile PM concepts are not adequate for every project. Chin (2004) argues that the agile PM is most applicable in the technology platforms development project environment. There is a misconception of many practitioners that PMI's PMBoK Guide only supports a non-agile, 'waterfall' approach to managing projects. However, it is perfectly possible to use an agile methodology and still be keeping with the recommendations in, for

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[5] **XP** named also as Extreme Programming is an agile software development methodology. Simplicity, communication, feedback and courage are the founding values of XP and all the XP best practices are coherent with these values (Angioni et al. 2006).

example, the PMBoK® Guide (Sliger, 2008). Evidence of this is that PMI, the strongest and largest PM association (Milosevic, 2003; Morris et al. 2006b) has available in their certifications program an certification to PMI Agile Certified Practitioner (PMI-ACP)®.

2.5 The Value of Project Management

PM value is often discussed and even proclaimed in consulting and practitioner literature, although the actual value resulting from investments in PM has been hard to define and measure (Thomas & Mullaly, 2008). One of the difficulties is to isolate the return from PM and return from other management concepts (Shi, 2011). As a result, PM joins the long line of initiatives (i.e., TQM, information systems, training and human resources) struggling to prove their worth to organisations (Thomas & Mullaly, 2007).

The value of PM is a function of what is implemented and how well it fits the organisational context. Cooke-Davies et al. (2009) argue that PM value is created or destroyed depending on the extent of 'fit' or 'misfit' between the organisation's strategic drivers and the characteristics of its PM system. They criticise the unconditional use of PM standards, and a 'misfit' between specific project characteristics and the chosen management approach is seen as a major source for project failure.

Some authors as Ibbs and Reginato (2002) and Dooley, Subra and Anderson (2001) found that on average, higher levels of PM maturity are associated with better cost and schedule results. However, Thomas and Mullaly (2008) found that in most organisations, expenditures on PM do not have direct impacts on revenue or profits. Most PM improvements do not yield tangible revenue and costs impacts but are more usually associated with improving less tangible aspects of the project, often related to meeting stakeholder expectations around cost, timing, quality and process. Tangible value is most typically evidenced in organisations that conduct work for customers, although very few can actually quantify the value realised (e.g. ROI).

Nevertheless, Thomas and Mullaly (2008) also found that in the early stages of improving PM practice, the cost of doing so is less than the cost to the

organisation of continuing to manage projects poorly. However, at some point, continuing to invest in PM has diminishing return on the gains from reducing losses due to poor PM, and in fact can destroy value. Investing beyond this point is only rational and logical where some other benefits exist that warrants the additional investment.

2.6 Conclusions

This chapter indicates the broad context of PM, which includes project, programme and portfolio management. However, the focus of this research is confined to the management of 'individual projects', because programme and portfolio management theory are far from uniform and 'mature' when compared to PM or other disciplines (Pellegrinelli et al. 2007), and this research was intended to produce a useful 'framework to improve and embed PM practice' to organisations and practitioners, and most organisations still have a low PM maturity level and focus their attention on management of 'individual projects'.

The scope of PM has been, in the last twenty years, defined by an emergence of multiple BoKs/ standards, such as: PMBoK® (Project Management Institute, 2013a); APM BOK (Association for Project Management, 2012); ICB3.0 (Caupin et al. 2006); and P2M (Project Management Association of Japan, 2005). These attempts to systematise the knowledge required to manage projects are largely based on the underlying assumption that identifiable patterns and generalisations are possible and useful. However, projects are context specific, therefore different types of projects should be managed differently (Mullaly & Thomas, 2009). Rethinking the conceptual foundations on the PM theories has included consideration of , the necessity for more agile PM approaches to manage project that operate in a rapidly changing environment and with requirements and scope that are difficult to define in advance. This 'Rethinking' work sheds some new light on how some PMIIs should be conducted in organisations. For example:

1) the implementation of the PM methodology(ies) in the organisation should focus on value creation as the prime focus of projects, instead of simple product creation, monitored and controlled against specification, cost and

time; the methodology should focus on the social interaction among people and not be seen as a simple sequence of task

2) PM is about 'People'; it is much more than the simple use of tools and techniques;

3) the PM training should focus in developing reflective practitioners who are able to effectively adapt the theory to practice.

Finally, although the actual value resulting from investments in PM has been hard to define and measure (Thomas & Mullaly, 2008), this research study assumes that improving PM practice improves project and organisational performance and for that reason organisations embrace in embedding perceived useful PMIIs into their organisational structures. Therefore, the value of PM is discussed in this introduction chapter to literature review.

3. Identifying Useful PM Improvement Initiatives

3.1 Introduction

The chapter has two main purposes: 1) to summarise the published work on commonly advocated PM practices in order to begin to answer the first research question: *what are the most useful PM practices?*, and 2) to give a first step to answer the second research question: *What PMIIs have the higher impact on the improvement of PM practice?* And give some guidance on how these PMIIs can be conducted in organisations.

In this research, PM practices are simply seen as those tools and techniques that practitioners use to "execute a PM process", such as work breakdown structure or a project charter. Tools and techniques are closer to the day-to-day practice, closer to the things people do, closer to their tacit knowledge (Besner & Hobbs, 2008). PMIIs include specific PM practices, such as work breakdown structures or earned value management, as well as, and particularly, the development of activities that would help to improve PM practices, including the standardisation of PM processes, tools, and techniques, or the designation of formal titles and roles for those in charge of projects, and their adequate training. Therefore, PMIIs are defined as not just specific tools and techniques, but a set of behaviors, routines, and ways of working that are directed at improving project management performance.

In order to identify the most useful PM practices (the first research question) some studies about specific PM tools and techniques are presented in section 3.2. In order to identify the key PMIIs, particularly the activities that would help to improve PM practices (the second research question) section 3.3 presents some models/ frameworks that could be adapted and used to provide guidance to improve PM practice in organisations, namely the model Value Adding Path Map (VAPM) from Shi (2011), which identifies several PMIIs and inclusively gives the indication of step by step to introduce them in the organisation in a better way.

Based mainly on the work of Shi (2011), four main themes for improving PM practice in organisations were identified from literature review:

Identifying useful PMIIs

1. Processes, Tools and Techniques
2. People and Organisational Learning
3. General Management System
4. PM Culture

Several PMIIs related to these four themes are identified from several sources of the literature and discussed in detail through the sections 3.4 to 3.7. Section 3.4 discusses the importance of the standardisation of PM processes, tools and techniques, which secures a common approach to project work and makes project progress less dependent on specific individuals (Andersen & Vaagaasar 2009). However, it is fast becoming accepted wisdom that it is people who deliver projects, not processes and systems (Cooke-Davies, 2002). Additionally, there is an evident necessity for developing systems and processes for promoting the organisational learning (section 3.5). Learning is profoundly linked to people and to their actions (Billet, 2000). Moreover, section 3.6 debates that the general management system should build a basic foundation for the PM system. Finally, section 3.7 discusses the importance of developing PM culture. A very critical point which should be addressed, is that all the people, especially the top managers, should recognise that PM plays an important role for the success of the organisation.

3.2 Most Useful PM Practices

PM practices in this study are seen as PM tools and techniques, which are the mechanisms by which PM processes within the organisation are delivered and supported. This includes, besides PM techniques (e.g. work breakdown structure or earned value management), the various guidelines in which the processes of the organisation are defined, including the use of procedure documents, checklists, job aids, and templates, as well as, the use of software packages and various databases. Within this definition there are numerous PM practices, therefore, this section attempts to identify from literature what are the most relevant, i.e. the ones that have high level of benefit to project management performance.

Projects are generally perceived to be unique, therefore it cannot be expected that the same set of methods, tools and techniques will foster the success of

each and every project. Instead, project managers need to determine which methods, tools and techniques are appropriate in specific situations (Ahlemann et al. 2009). A major study by Besner & Hobbs (2006) (discussed below) presents empirical evidence that the use of tools varies in different types of projects and different organisations. It also shows that the current set of well-known PM tools and techniques is more highly valued in the context of large projects for external customers and less highly valued for smaller projects for internal customer.

The proper use of PM tools and techniques should make it easier to implement PM principles (Kwak & Anbari, 2009). For example, a project management information system (PMIS) identified in the study by White and Fortune (2002), as the most used tool and technique, is a tool that supports and facilitates the delivery of any project, particularly those which are complex, subject to uncertainty, and under market, time and money pressures, or other difficult to manage restrictions (Raymond & Bergeron, 2008). As argued by Stewart and Mohamed (2003 p. 416) *"Without an effective use of information technology to facilitate the process of information management amongst project participants, it is unlikely that major improvements to the communication process will eventuate by continuing to use traditional paper-based process"*. Regarding PM software tools the market is populated with a wide range of them (Stang & Hanford, 2009).

Several inputs can be used to guide an organisation in selecting the most appropriate tools and techniques in a given context, including various BoKs/ standards, referred in section 2.3, and specific empirical studies that have been conducted which identified the most used tools, such as the work from White and Fortune (2002) and Besner and Hobbs (2006).

White and Fortune (2002) conducted a survey that was designed to determine the extent to which those involved in the management of projects actually make use of the methods and techniques that are available and how effective the methods and techniques used are felt to be. The authors listed 44 methods, tools and techniques and asked the respondents to indicate which had been used in the project being considered to participate in the survey. The options chosen to be included in the list were those found in a selection of standard text books of PM (e.g. Kerzner, 1998). From an analysis of 236 completed responses to their survey White and Fortune found that although

28% of respondents did not use any method or methodology, over 95% of respondents used at least one PM tool. 54% used their own 'in house' PM method or methodology. The mode number of tools used was 3. The most commonly used tools identified were: 'off the shelf' software (77% of the respondents); Gantt charts (64%); cost benefit analysis (37%); work breakdown structure (32%) and critical path method (30%).

A more recent questionnaire survey undertaken in 2004 by Besner and Hobbs (2006) surveyed views of 70 tools and techniques, with 753 respondents. Besner and Hobbs found that tools and techniques usage levels varied considerably, from 1.4 to 4.1, based on a scale ranging from 1 (not used) to 5 (very extensive use). Table 3.1 lists the 70 tools and techniques included in Besner and Hobbs survey, in decreasing order by the level of usage, from top to bottom and left to right.

Besner and Hobbs' findings are consistent with the results from White and Fortune (2002). Although, Besner and Hobbs selected a larger number of tools and techniques, the 3 most used tools identified from White and Fortune are also in the top list of Besner and Hobbs ('bold' highlight in Table 3.1).

Beyond the perceptions of the most used tools and techniques, Besner and Hobbs (2006) also studied an interesting variable – the perceived 'intrinsic value of tools', which is the combination of the extent of use of the tools and techniques and the perceived potential contributions to project performance Table 3.2 lists from Besner and Hobbs (2006) the twenty tools and techniques with the highest 'intrinsic value', in decreasing order from top to bottom. The tools and techniques with the lowest intrinsic value, were considered to be "discredited" by Besner and Hobbs (2006) as respondents indicated that these tools were rarely used and were perceived as having very little potential.

Ideally, we would like to see the complete list of the 70 tools and techniques in decreasing order by the 'intrinsic value', however Table 3.2 is the only information that Besner and Hobbs (2006) presented in their paper.

Table 3.1: The 70 tools identified by Besner and Hobbs (2006) in decreasing order of level of usage

1. Progress Report	**27. Critical path method analysis**	50. Database for cost estimating
2. Kick-off meeting	28. Bottom-up estimating	51. Database for lessons learned
3. PM Software to task Scheduling	29. Team member performance appraisal	52. Product breakdown structure
4. Gantt chart	30. Team building event	53. Bidders conferences
5. Scope Statement	31. Work authorisation	54. Learning Curve
6. Milestone Planning	32. Self directed work teams	55. Parametric Estimating
7. Change Request	33. Ranking of risks	56. Graphic presentation of risk information
8. Requirements analysis	34. Financial measurement tools	57. Life cycle cost (LCC)
9. WBS	35. Quality plan	58. Database of contractual commitment data
10. Statement of Work	36. Bid documents	59. Probabilistic duration estimate (PERT)
11. Activity list	37. Feasibility study	60. Quality function deployment
12. PM software to monitoring schedule	38. Configuration review	61. Value analysis
13. Lessons Learned/ Post-mortem	39. Stakeholder analysis	62. Database of risks
14. Baseline plan	40. PM software for resources levelling	63. Trend chart or S-curve
15. Client acceptance form	41. PM software to monitoring of cost	64. Control charts
16. Quality inspection	42. Network diagram	65. Decision tree
17. PM software for resources scheduling	43. Project communication room (war room)	66. Cause-and-effect diagram
18. Project charter	44. Project Web site	67. Critical chain method and analysis
19. Responsibility assignment matrix	45. Bid/ seller evaluation	68. Pareto Diagram
20. Customer satisfaction surveys	46. Database of historical data	69. PM software for simulation
21. Communication plan	47. PM software multiproject scheduling/levelling	70. Monte-Carlo analysis
22. Top-down estimating	48. Earned value	
23. Risk management documents	49. PM software Cost estimating	
24. Contingent plans		
25. Re-baselining		
26. **Cost/ benefit analysis**		

Table 3.2: Tools with the highest and lowest 'intrinsic value' identified by Besner and Hobbs (2006)

Highest 'intrinsic value'	Lowest 'intrinsic value'
1. PM software for task scheduling	1. Life cycle cost
2. Progress report	2. Graphic of risk information
3. Scope statement	3. Parametric estimating
4. Requirements analysis	4. Learning curve
5. Kick-off meeting	5. Quality function Deployment
6. Gantt chart	6. Value analysis
7. Lesson learned / post-mortem	7. Trend chart or S-curve
8. Change request	8. Critical chain method and analysis
9. PM software monitoring schedule	9. Control charts
10. Work breakdown structure	10. PERT analysis
11. Milestone planning	11. Cause-and-effect diagram
12. Statement of work	12. PM software for simulation
13. PM software resources scheduling	13. Pareto diagram
14. Risk management documents	14. Decision tree
15. Activity list	15. Monte Carlo analysis
16. Quality inspection	
17. Baseline plan	
18. Contingency plans	
19. Ranking of risks	
20. Client acceptance form	

Besner and Hobbs (2008), based on the same survey, of the 70 tools and techniques, throughout the use of the statistical t-tests identified dissimilarities in use across subgroups of responses. They found that there are many aspects of PM practice that are common to most projects in most contexts, while the use of others varies significantly among projects in different contexts. The most often and the least often used tools are almost invariably the same regardless of project characteristics and contexts, suggesting that PM practices have a strong generic context. However, Besner and Hobbs (2008) also found that the 70 tools and techniques surveyed are more clearly oriented toward large, well-defined projects with external clients.

Based on continuing their process of data collection from 2004, the data was collected in three phases, in 2004, 2007, and 2009, respectively. In 2012, Besner and Hobbs (2012) undertook a further study whose two main objectives were to: demonstrate that practitioners use PM tools and techniques in groups or "toolsets"; and compare the use of these "toolsets" across project types. This study showed that practice varies with the management of four different

types of projects: engineering and construction; business and financial services; information and technology and telecommunications; and software development projects. Besner and Hobbs (2012) results are based on a larger number of tools and techniques surveyed (108) compared with their 2004 survey. Most of the tools included in Besner and Hobbs' 108 tools list and not in their 70 tools list, are applicable to portfolio management (e.g. graphic presentation of portfolio; project portfolio analysis; project priority ranking; multi criteria project selection or PM software for project portfolio analysis), which is beyond the scope of this research project. Additionally, this later study did not study the attribute 'intrinsic value' of a tool and technique. Therefore, if any researcher or practitioner is looking for the most useful PM practices to manage an 'individual project', it would be better to look for results of the article Besner and Hobbs (2006).

3.3 Directions for Improving PM Practice

Previous sections looked for useful PM practices. This section looks for directions on models/ frameworks for improving PM practices, particularly the identification of key PMIIs (RQ3).

PM maturity models could be used to understand organisations current capability to undertake PM, and helping organisations to plan PM practice improvement in a structured way (Sowden et al. 2010).

There is a growing interest in organisational maturity models in that, directly or indirectly, help to assess and improve PM organisational maturity (Cooke-Davies, 2004). Some of these examples that organisations can use are:

- The standard Portfolio, Programme, and Project Management Maturity Model (OPM3) (Project Management Institute, 2013b), which describes how to plan for organisational improvements through the systematic achievement of 'best practices' in the management of portfolios, programs, and projects. It is comprised of three general elements: knowledge (presenting the contents of the standard), assessment (providing a method for comparison with the standard), and improvement (setting the stage for possible organisational changes).

- the Portfolio, Programme, and Project Management Maturity Model (P3M3) from the Office of Government Commerce (Sowden et al. 2010).

- The Berkeley project management maturity model, which uses the five maturity levels (Level 1: Initial (ad hoc); Level 2: Repeatable (abbreviated, planned); Level 3: Refined (organised, managed); Level 4: Managed (integrated); Level 5: Optimised (adaptive, sustained)), to demonstrate sequential steps that map an organisation's incremental approach to improve its PM process (Kwak & Ibbs, 2000; Ibbs & Reginato, 2002).

However, as discussed in Chapter 1 the maturity models have some limitations on improving PM practice.

There are other works in literature that could be adapted and used to provide guidance to develop and improve PM practice in organisations. For example, the Ward's six dimensional framework (the six Ws: What, When, Why, Whichway, Who and Wherewithal) from risk management development (Ward, 2005), which this research adapted to PM development. For easy reference these dimensions are given the labels:

- 'What' – The focus of attention (project management; project and programme management; project, programme and portfolio management).
- 'When' – Application contexts – the projects to which PM is applied (projects to clients; projects in one specific department (e.g. I&D); projects in one specific unit; all projects across the organisation).
- 'Why' – The objectives adopted for PM (project control; client requirement proactive control; strategy implementation).
- 'Whichway' – The nature and quality of PM processes employed in terms of: degree of formality; scope of the process; tools and techniques employed; nature of the issues addressed.
- 'Who'– The parties involved and the allocation of responsibilities for PM.
- 'Wherewithal' – The resources applied to PM. Concerns to the extent of resources formally invested in developing and maintaining PM.

The development of PM, as it happens in risk management, requires recognition of where PM processes already occur in the organisation and then decisions about where further attempts to develop PM should be made, and who should be involved (Ward, 2005). Such decisions might adopt a 'logical

incrementalist' approach (Quinn, 1989), first targeting areas of the organisation where the benefits from PM will be greatest, and then using this experience as a learning process before attempting more widespread deployment.

Improving practice towards 'integrated' PM does not need to proceed evenly across all the six dimensions (the six Ws: What, When, Why, Whichway, Who and Wherewithal) simultaneously, and at any given time practices in each dimension may not correspond closely to the same nominal level. In other words, the dimensions are separable in the sense that choice of approach in one dimension need not dictate choice of approach in other dimensions. In Table 3.3, adapted from Ward (2005), suggests the six dimensions in which PM might be developed. The columns entries represent levels of development and entries in each row illustrate the nature of possible progression in each dimension. The key idea is that for each dimension there is a spectrum of possible choices, moving from left to right with choices on the extreme right presenting the highest level of development, and choices to the left, the lowest.

Shi (2011) put forward an approach named Value Adding Path Map[6] (VAPM) which could also be used to direct an organisation on the selection of which PMIIs to embed into the organisation. The VAPM approach includes two dimensions, the 'soft' system configuration and the 'hard' system configuration.

The VAPM was based on the research findings of Thomas and Mullaly (2008), "Researching the value of project management", a three-year study, involving a multi-disciplinary research team, with over 45 academics and 65 organisations world-wide from very different contexts. Additionally Shi (2011) has interviewed 30 PM professionals (12 project managers, 9 top managers and 9 project team members) from a variety of industrial sectors in the Chinese context, and concluded that, the main configuration of the 'soft' system includes the following items:

[6] The VAPM approach could also be used to trace the history of the implementation of PM in one organisation (Shi, 2011).

Table 3.3: Six dimensions of PM development (adapted from Ward, 2005)

Dimension label	Nature of dimension	Range of choices			
		Level 1	**Level 2**	**Level 3**	**Level 4**
What	The focus of attention.	Project management	Project and program management	Project, program and portfolio management	
When	Application contexts – the projects to which PM is applied.	Projects to clients	Projects in one specific department (e.g. I&D)	Projects in one specific Unit	All projects across the organisation
Why	Objectives adopted for PM.	Project control	Client requirement	Proactive control	Strategy implementation
Whichway	The nature and quality of PM processes employed in terms of: degree of formality; scope of the process; tools and techniques employed; nature of the issues addressed.	Ad hoc informal processes, little documentation.	Some specific formal processes. Project plan documented.	Generic, formal processes. Project plan up-to-date and project progression documented.	Flexible, cost effective use of generic processes. Use of best practice techniques. Continuous improvement.
Who	Parties involved and the allocation of responsibilities for PM.	Scattered, ad hoc, left to individuals.	Specific functions with limited roles.	All functions, all levels, effective PM facilitation.	Effective corporate wide involvement extended to customers, suppliers.
Wherewithal	Resources applied to PM.	Implicit, ad hoc allocation of resources.	Formal, but ad hoc allocation of resources.	Widespread, explicit, formal allocation of resources. Planned investment of resources to develop and maintain PM.	Explicit, formal, flexible allocation, more if cost effective.

S1. The general management system

- S1.1 The PM system is aligned with the business strategy and the structure of general management system is highly project oriented;
- S1.2 The general management system includes a basic foundation for the implementation of PM;
- S1.3 The general management system is very well coordinated with the PM system including the involvement of support functions in the organisation;
- S1.4 The strategic planning of the organisation and the project identification are tightly coupled;
- S1.5 The project management office (PMO) has been set up;
- S1.6 Project manager has a clear goal and authority in the process of managing projects.

S2. The PM culture

- S2.1 The organisation has highly recognised that PM contributes to the success of the organisation;
- S2.2 The PM professionals have a clear career path in the organisation;
- S2.3 The project managers are highly respected;
- S2.4 The PMO is regarded as an important department of the organisation;
- S2.5 The resources allocation system is highly project oriented.

The main configuration of the 'hard' system includes the following items:

H1. PM process

- H1.1 The organisation has a clear definition of regular portfolio management process (note: out of scope of this research study, see section 2.2.4);
- H1.2 The organisation has a clear definition of regular programme management process (note: out of scope of this research study, see section 2.2.4);
- H1.3 The organisation has a clear definition of regular PM process including integration management; scope management; cost management; time management; quality management; procurement management; communication management as well as risk management across the initialization, planning, executing and terminating stages of a project.

H2. PM training and knowledge management

H2.1 The organisation has a training budget for PM which is aligned with the personal development plans of PM professionals in the organisation;

H2.2 The organisation has a regular training system for top managers;

H2.3 The organisation has a regular training system for project managers;

H2.4 The organisation has a regular training system for project team members;

H2.5 The organisation has a sound knowledge management system of PM including the learning system to improve the effectiveness of the PM professionals which goes beyond training.

H3. PM methodologies, techniques and tools

H3.1 The organisation has used cost management software;

H3.2 The organisation has used schedule management software;

H3.3 The organisation has used quality management software;

H3.4 The organisation has used risk management software;

H3.5 The organisation has used other PM software with the function of project resource allocation, communication management, etc.;

H3.6 The organisation has used systematic PM methodologies and techniques including procedures and templates in the implementation of PM.

The foundation for Shi (2011) to develop the approach of VAPM is that only by enhancing the 'soft' and 'hard' system synchronously, organisations can increase the value of PM. According to this rule, Figure 3.1 shows that the 'best path' for introducing PM to an organisation is $P_{11} - P_{22} - P_{33} - P_{44} - P_{55}$. For example, the value of P_{31} equals to the value of P_{11}.

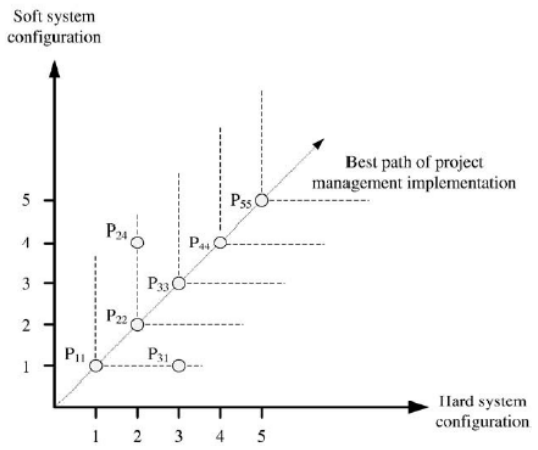


Figure 3.1: The Value Adding Path Map (VAPM) from Shi (2011)

Based on a case study Shi (2011) recommends five steps to introduce and improve PM:

- Step 1: S1.1 + S1.2 + S1.3 + S1.4 + S2.1 + S2.5 + H2.1 + H2.2
- Step 2: S1.5 + H1.1 + H1.2 + H1.3
- Step 3: S2.3 + S2.4 + H2.3
- Step 4: S1.6 + H2.4
- Step 5: S2.2 + H2.5 + H3.1 + H3.2 + H3.3 + H3.4 + H3.5 + H3.6

However, the above steps are not the only way that an organisation can follow when improving PM practice. Companies in a different background will face to different problems. Therefore, the 'best path' to introduce and improve PM in different organisational contexts can be, to some degree, different from one another. As discussed in the introduction chapter, PM is highly contingent on organisational traits and environment (Besner & Hobbs, 2013; Besner & Hobbs, 2008; Hobbs et al. 2008; Thomas & Mullaly, 2008). For example, Cooke-Davies et al. (2009) argued that the implementation of PM processes should be different depending on the strategy of the organisation. Therefore, a general indication of the "best" path might be "presumptuous". Even Shi recognises this limitation and calls for more detailed research to examine the differences to introduce and improve PM in different industries.

The VAPM framework was the piece of work found in literature that had the most similar objectives to this research study. Shi's VAPM framework identifies several main initiatives to introduce and improve PM, and showed through the use of a case study, in the Chinese context, that this approach is simple and easy to be used to describe the reasonable path to improve PM practice.

Based mainly on the work of Shi (2011), the key PMIIs to improve PM practice were explored into four themes (Table 3.4), discussed in more detail in the following sections.

Table 3.4: Links between the key themes for improving PM practice and the themes on the VAPM framework

Themes for improving PM practice	Main configuration systems in the Shi's VAPM framework
(1) Process, Tools & Techniques	H1. PM process H3. PM methodologies, techniques and tools
(2) People & Organisation Learning	H2. PM training and knowledge management
(3) General Management System	S1. The general management system
(4) PM Culture	S2. The PM culture

3.4 PMIIs Relating to PM Processes Techniques and Tools

Under the theme 'process, techniques & tools' two key PMIIs from literature were identified by the researcher: standardisation of PM processes and standardisation of PM techniques and tools. As argued by Dai and Wells (2004) organisations that standardise their PM practices are more likely to have stronger project performance. Generally, when an organisation makes efforts toward the corporate standardisation of PM processes, it also gives steps in the standardisation of tools and techniques, since tools and techniques are the mechanisms to implement PM processes (Besner & Hobbs, 2006). As argued by Milosevic and Patanakul (2005) PM tools and techniques ideally should be integrated with the standardised PM process, each process deliverable is supported by specific standardised PM tools.

3.4.1 Standardisation of PM Processes

Loo (2002), Milosevic and Patanakul (2005), Thomas and Mullaly (2008), Andersen and Vaagaasar (2009), and Shi (2011) had identified the standardisation of PM processes as one of the most important improvements that had the greatest impact on project performance.

However, Thomas and Mullaly (2008) had also identified the uniformisation or standardisation of PM procedures, processes and systems as an improvement that has been mentioned rather frequently as the one with the least impact. This might happen in cases where the standardised PM processes were not

sufficiently flexible, which clearly encourages and states how to adjust the standardised process to account for specificities of projects with significantly different size and complexity.

The efficiency and effectiveness of processes depend on the nature and quality of the process employed (Ward, 2004). Consequently, much of PM literature focuses on the nature and content of the generic PM process. There are numerous PM BoKs/ standards (see section 2.3), which may give guidance to organisations to develop their standardised PM processes. As argued by Ahlemann et al. (2009) PM BoKs are generally accepted and are regarded as an appropriate instrument to improve PM practice in general. Although, there are some limitations on these BoKs that should be taken into account when using them (see section 2.4 Rethinking PM).

Nevertheless, the organisation should put in question *"Which standard is the best for us now and which standard will be the best in long term?"* (Grau, 2013, p 10). From the researcher's professional experience one of the reasons organisations appear "disoriented and confused" about what PM processes, tools and techniques to use to improve PM practice, is the existence of several BoKs. What is the most appropriate guide to my organisation? Is it the PMBoK from Project Management Institute, the APM BOK from Association for Project Management, the P2M from Project Management Association of Japan, the ISO 21500, or other? (Grau, 2013) It is even particularly reasonable for organisations to investigate industry-specific or project type-specific standards that are frequently more easily applicable and contain more specific 'best practices'. It is also good practice to analyse which parts of the Bok /standard are useful to the organisation. For example, a complex resource management, including resource management assignment processes, resource leveling, and time recording will not be appropriate in every circumstance (Ahlemann et al. 2009).

Unfortunately, there is no consensus among researches and practitioners on a single PM BoK. As argued by Morris et al. (2000, p 156) "*If the professional project management societies cannot agree the elements of a project management body of knowledge, how credible is the idea of professionalism in project management?*"

Perhaps these unification problems are related to the scientific immaturity of the discipline, which requires more efforts on rigorous and publishable research in order to become possible the development of a single PM BoK. Or they may be related to the existence of many PM associations and consulting firms which have developed their own methodologies, so they can differentiate their product/ service in the market. However, as argued by Morris et al. (2006b), as a result of the rethinking PM project, seeking a unitary BoK, before PM community develop a better understanding of the boundaries and requirements of the profession would be premature.

3.4.2 Standardisation of PM Tools and Techniques

Milosevic and Patanakul (2005), from an exploratory multiple case study research using quantitative and qualitative methods, identified the standardisation of PM tools and techniques as also one of the most important improvements that had the greatest impact on project performance. Shi (2011) argues that organisations should use systematic PM techniques including procedures, templates and software in PM.

Today there is reasonable agreement on most of the formal techniques and tools used for managing projects (Morris, 2002). However as argued by White and Fortune (2002), there are some limitations, namely the PM software which was reported by the authors as the tool with the most limitations (e.g. inadequate for complex projects and difficult to model 'real world'). Thomas and Mullaly (2008) found that PM software was one of the improvements that had the least impact on project performance. The development of software packages, related to scheduling and control were identified as having the least impact, mostly because of the packages' inflexibility to be scaled down and adapted to the needs of a specific project.

Controversially, Raymond and Bergeron (2008), from a survey to project managers and project management consultants, by the analysis of 39 valid questionnaires, concluded, the significant contribution of PM information systems, usually acquired by organisations as software packages, as a tool that supports and facilitates the delivery of any project, particularly those which are complex. Anantatmula (2008) also argues that PM software can play a major

role in supporting project managers in managing projects effectively and efficiently.

Beyond the PM BoKs and standards number of studies have identified the most used PM tools and techniques (see section 3.2), which organisations could use as guidance on what probably, are the most useful tools and techniques for the organisation. In the selection of what tools and techniques to standardise is important the mutually compatibility of tools that work in synchrony, and balance simple and advanced tools (Milosevic & Patanakul, 2005).

There are many reasons why an organisation would aim to standardise According to Clarke (1999):

- it sets out what the organisation regards as 'best practice';
- it can improve communication, ensuring that everyone is talking the 'same language' in PM;
- it also minimises duplication of effort and waste, for example, by having common resources, documentation and training.

Additionally, PM standardisation in organisations secures a common approach to project work, makes it easier to control progress, and makes progress less dependent on specific individuals (Andersen & Vaagaasar, 2009).

Eskerod and Riis (2009) based on five case studies[7] studied the values that PM methodology (processes, tools and techniques) standardisation brings to organisations, and concluded that:

- almost half of the value statements (46%) were categorised as efficiency (cost reductions, better utilisation of resources, easier task solving, and avoidance of beginner's mistakes; better exchange of knowledge between the project managers; and easier communication, internally and externally);
- as stakeholder satisfaction (24%);
- as legitimacy (17%); and
- as power and control (13%).

[7] The case studies are part of the international research project aimed at determining the value of PM. All five companies applied a customised PM methodology. A minimum of seven interviews were conducted by each case company. The participants included senior management, project sponsors, PM support staff, project managers and human resources representatives.

Nevertheless, PM standardisation has also negative effects. PM standardisation in the organisation can often end up with several checklists, guidelines and mandatory reports (Hodgson, 2002), not allowing a certain level of flexibility, which is important for project managers not to feel as 'slaves' of the PM methodology as argued by Milosevic and Patanakul (2005). On the other hand, there are multi-national or multi-cultural organisations, where local or cultural variations should be taken into account. Therefore, it is also important to customise PM processes, tools and techniques to the specific context of the organisation. A PM methodology may not 'fit' all projects, some organisations may find necessary to maintain more than one methodology (Kerzner, 2009), for example, a methodology for information systems projects and a second methodology for new product development projects.

3.5 PMIIs Relating to People and Organisational Learning

It is fast becoming accepted wisdom that it is people who deliver projects, not processes and systems, as argued by Cooke-Davies (2002, p 89) ''*when it comes to project management, it's the people that count".* Ward (2004) argues relating to a particular area of PM, the effectiveness of risk management is clearly dependent to a substantial degree on the capability and experience of the people undertaking risk management.

Based on the literature review (detailed below through this section) the researcher, judging their relevance and practical application, identified under the theme 'people & organisational learning' three key PMIIs: manage PM competences, develop PM career path, and develop a culture of learning.

These three initiatives are strongly related. An organisation that has a PM career path established motivates their PM staff to develop their PM competences in order to ascend in the career path. An organisation that has a culture of learning facilitates the development of the staff's PM competences.

3.5.1 Manage PM Competences

Human resource competences development is a critical discipline in the PM world (Kwak & Anbari, 2009). As argued by Suikki et al. (2006, p 724) *"competence development is becoming more and more critical in today's*

turbulent business environment". Winter and Smith (2006) argue that is important to recognise and nurture the diversity of professional capabilities required in project work. Therefore, and based on the premise that competences have a direct effect on PM performance, it is important for organisations to manage their staff PM competences. For example, through the development of a system to identify the *core* PM competencies for the organisation's projects and assess these competencies on the organisation's PM staff.

However, there is no agreement among educators and training program directors of many leading institutions on what competencies are required to make a good project manager (Barber, 2004). Although, some efforts have been made, for example, the Standard Project Manager Competency Development Framework (PMCDF) from the Project Management Institute (Project Management Institute, 2007) or the IPMA Competency Baseline (ICB3.0) (Caupin et al. 2006).

The PMCDF provides a framework for the definition, assessment and development of project manager competence. It was developed to apply to all project managers, in general, regardless of nature, type, size, or complexity of projects they may be engaged in (Project Management Institute, 2007).

The PMCDF framework (Project Management Institute, 2007) divides the competences in three dimensions: knowledge, performance and personal – which are demonstrated in different ways, for example:

1. Project manager knowledge competence can be demonstrated by passing an appropriately credentialed assessment, such as PMP® examination, or any equivalent international project manager accreditation.
2. Project manager performance competence can be demonstrated by assessing the project-related actions and outcomes to be considered competent.
3. Project manager personal competence can be demonstrated by assessing the project manager's behaviour.

In organisations, developing PM competences can always be made by enhancing the competences of the existent resources or by the recruitment of new skilled resources (Bergström, 2007). Training is always an option to improve competences (McCreery, 2003; Alam et al. 2008), but it is not a

panacea, in fact; training can be deficient or outdated in important respects (Ward, 2004).

Loo (2002) had identified the need for PM training and education, particularly, training in planning tools, one of the most important areas for improving PM practice. Thomas and Mullaly (2008) have identified PM training as one of the most important improvements that had the greatest impact on project performance. Andersen and Vaagaasar (2009), based on just three case studies, conducted in Norway, as part of the research project "Researching the value of project management", have identified the creation of internal PM schools as one of the two more important efforts to improve PM practice. Shi (2011) argues that organisations should make training budget of PM aligned with the needs of PM development competences and that the training plan should involve people from top management to team members.

Crawford et al. (2006b) argue that much work is still needed on how to develop PM competences. Nevertheless, some attempts have been made, for example, Berggren & Söderlund (2008) discuss six learning modes of how to rejuvenate, stretch and improve PM education and give examples (see Figure 3.2), based on:

- the importance of articulation and reflection on one hand, and social validation and organisation action on the other hand (reflection/action) and;
- the necessity of the knowledge produced to be operationalised in both individual and collective settings with the relevant organisation (individual/ group/organisation).

Organisations can also explore the use of distance based education. As Thomas and Mengel (2008) argued distance education (i.e. Web based education) provides an ideal approach for many practicing projects managers.

Crawford et al. (2006b, p 731), as a result of the PM Rethinking study, argue that *"PM education must be able to teach project managers how to be reflective practitioners in touch with the best and newest theory and research and their day to day practice of managing."* This requires not a traditional classroom training, but, for example, a coaching approach over a longer term aimed at developing, in the workplace, managers capable of thinking critically about

	Individual	Group	Organisation
Reflection	**Individual Reflection,** writing and reading, articulation of experience. *Example: Reflection Report.*	**Experience Sharing,** class discussion, literature reviews. *Example: Round-table examination.*	**Organisational dialogue,** public presentation, articulation of lessons learned and implications. *Example: Knowledge theater.*
Action	**Individual action,** formulation of action plans, presentation of measures for improvements. *Example: Learning contract.*	**Teamwork,** joint problem-solving, case assignments, project work. *Example: Live case.*	**Organisational action,** sponsored projects, top management assignments. *Example: Thesis work.*

Figure 3.2: Modes of learning in PM education from Berggren and Söderlund (2008)

their own PM practice and anything presented to them as 'best practices', or knowledge sharing groups, through the creation of PM communities of practice, where project managers can meet, exchange ideas, and form self-supporting networks. Moreover, the educational programs should be more effective, for example, the force educators should be turn into sites for knowledge coproduction and combined theory and practice, in other words, closer links and tighter relationships between industry and academia are needed (Berggren & Söderlund, 2008). Students should be exposed to 'real' project situations in which they can use, develop, and reflect on their skills as well as learn from each other (Córdoba & Piki, 2011). Ojiako et al. (2011) even argue that educators need to facilitate students studying PM to become creators of knowledge rather than simple knowledge recipients.

The use of the method action learning[8] might be also a viable way to enhance PM competences (Mengel, 2008). However, there are a number of elements that influences the success of the action learning set, e.g. a proper and respected set member selection process, proper training of facilitators, sufficient time spent on each action learning session, and sufficient follow-up (Eskerod, 2010).

Lastly, beyond training, independently of its form (e.g. traditional classroom, action learning), organisations might take other initiatives, for example, the

[8] Action learning is an educational approach to enhance and nurture workplace learning (Pedler & Abbott, 2008) as it is a way to involve participants in working on their own problems and taking appropriate action.

use of PM certification programmes, which might motivate people to improve their PM competences (Eskerod & Riis, 2009), or the development of a categorisation system for projects and PM roles to allow training to be appropriately targeted and delivered to relevant audiences (Crawford et al. 2006b).

3.5.2 Establish PM Career Path

Many project managers do not feel adequately respected and compensated for their work. They often see their role as a temporary one and focus more on their advancement in traditional leadership career paths (Hölzle, 2010). Organisations should establish a clear career path in the organisation to PM professionals (Shi, 2011). As argued by Turner et al. (2008, p 577) "*providing employees with PM career development opportunities is as important for the individual as it is for the organization*." From the researcher's professional experience as a consultant, in some organisations professionals did not want to become project managers because they had not a clear path in the organisation. They did not see how they could progress in the career. As mentioned in previous section, if there is in place a PM career path, PM staff would be more motivated to develop their PM competences and increase project management performance, in order to ascend in the career (Hölzle, 2010). The development of a PM career path is also an important issue for an organisation to ensure that it has enough people with the right level of expertise to deliver the project work (Cooke-Davies et al. 2009).

Hölzle (2010) from a qualitative study with 20 companies that have already implemented a project managers' career path, identified key success factors for the design and development of a project managers' career path. Later, Bredin and Söderlund (2013) conducted a multiple case study involving ten firms, and identified a number of factors that seem to be critical for the design of career models for project managers, including the number of levels, the complexity of assignments, and the degree of formal requirements that organisations can use as guidance to implement their PM career paths.

3.5.3 Develop a Culture of Learning

Irwin and Klenow (1994), from a study conducted in the Semiconductor Industry, using quarterly data on seven generations of dynamic random access memory semiconductors over 1974–92, demonstrate that organisations learn three times as much from their own experience as from experience at another organisation. Therefore, the authors suggest that organisational units are more likely to benefit from internal than external knowledge.

Organisational learning describes attempts by organisations to become learning organisations by promoting learning in a conscious, systematic and synergistic fashion which involves everyone in the organisation (West & Burnes, 2000). How organisations create, retain, and transfer knowledge, is a subject of increasing interest for both academics and practitioners (Argote et al. 2003a; Burnes et al. 2003). The concepts of learning organisations stem from the works of leading strategic management authors like Weick (1995), Porter (1998), Mintzberg et al. (2003), or Senge (2003).

Burnes et al. (2003) suggest that there are two factors which seem to have moved organisational learning from being a subject of interest just for academics to also practitioners: the pace of change and the competitive threat posed by globalisation. The arguments put forward by proponents of organisational learning are: change is now so fast and so prevalent that if organisations fail to keep pace with it they will not survive; and the speed and prevalence of change is such that it cannot be managed in the traditional manner by a few senior managers, but must become the responsibility of everyone in the organisation.

Organisational learning can be said to occur when there is a change in the content, conditionality, or degree of belief of the beliefs shared by individuals who jointly act on those beliefs within an organisation (Sanchez, 2005). Gareis (2010, p 319) argues that "*Organisation learning should happen continuously. It has to be integrated in defined processes, responsibilities for organisational learning should be clearly defined*."

Loo (2002) had identified the need for organisational learning, one of the most important areas for improving PM practice. Learning and knowledge management contributes to PM in different ways, for example by the

availability of repositories of data from past projects which are crucial to the quality of estimates (Atkinson et al. 2006).

Organisations might develop a culture of learning, for example through the development of a knowledge management system including a learning system to improve the effectiveness of the PM professionals (Shi, 2011).

Organisational learning requires a different organisational culture than exists in most traditional organisations, for example, it is required a proactive leadership directed toward sharing knowledge or a cross-functional communication and cooperation (Burnes et al. 2003). However, there are difficulties and risks inherent in trying to change cultures which some organisations do not want to take. Therefore, it is doubtful that organisational learning is applicable to all organisations and all situations. For example, in fast-moving industries such as IT, the need for a high level of learning is crucial. But, there are still a wide range of organisations, industries and sectors where change remains relatively slow and, indeed where one might not want to encourage staff to experiment and pursue improvement (Burnes et al. 2003).

Sense (2007) argues that activities directed towards enabling and promoting learning activity within project oriented organisations are essential, and certainly not considered 'optional' or simply as something 'nice to'. In fact, projects can create barriers to organisational learning, by privileging short-term task performance over long-term knowledge accumulation (Bresnen et al. 2004). Sense (2007) suggests five sociological elements within a project setting that can either constrain or assist situated learning activity, which organisations can use as guidance to develop a culture of learning:

1. Cognitive styles. This involves a participant's predisposition towards, or preferred way to gather, process, and interpret information.

2. Learning relationships. It concerns the relationships that exist between participants and how those affect the creation and sharing of knowledge within a project setting.

3. Pyramid of authority. This involves a participant's exercise of power or authority to support or constrain situated learning activity within a project setting and also emphasises the importance of managing politics for learning in projects.

4. Knowledge management. It is concerned with the way a project team actually goes about handling the flow of project knowledge in and around a project setting.

5. Situational context. This is concerned with how a project setting is organised to help establish and facilitate a project learning environment and it involves two intimately connected workplace domains i.e. the workplace of a project team and the organisational workplace immediately surrounding a project team.

3.6 PMIIs Relating to General Management System

3.6.1 Integration of the PM System with the General Management System

Based on the researcher's judgment of their relevance in literature and in practice under the theme 'general management system' seven key PMIIs were identified:

- Integration of the PM system with the general management system;
- develop supported infrastructure;
- develop a project sympathetic organisation structure;
- empowerment of project managers;
- develop project categorisation;
- benchmarking to assessment and continuous improvement;
- assessment of project management performance.

All these initiatives are related in same way. For example, if an organisation develops supported infrastructure (e.g. a PM office) or guarantees the empowerment of project managers is consequently developing a project sympathetic structure in the organisation. Most probably, if the organisation implements a PM office, perhaps one of its priorities would be to focus on the integration of the PM system with the general management system.

PM system is the group defining general structures, standards, regulations, processes, policies, methods and supporting tools, which an organisation establishes as a norm, on the attempt to ensure satisfactory governance and accomplish projects successfully (Cooke-Davies et al. 2009).

Based on the study "Researching the Value of Project Management" Cooke-Davies et al. (2009) identified the basic attributes to describe the configurations of a PM system, and classified these under four categories:

1. **PM policy**. This category describes senior management perception of the strategic role of PM for the organisation, which includes: strategic importance of PM; organisational commitment to PM; overall organisational maturity.

2. **People-related**. This category describes PM personnel related issues, particularly how the organisation ensures that it has enough people with the right level of expertise to deliver the organisation's projects, which includes: PM industry experience; PM experience; PM training; PM career path; PM certification.

3. **Structure**. This category describes the organisational structures that link the temporary organisation (project) to the permanent organisation, which includes: project organisation; use of steering committees; extent, function and purposes of PMO; resource allocation (e.g. project-oriented, functional).

4. **Process:** This category describes the processes that are followed within the organisation's projects, which includes: PM methodology; % projects following formal methodology.

Unfortunately, in many organisations, the PM system is regarded as a corporate reporting tool rather than a useful system that the various parts of the organisation can use to help themselves (Clarke, 1999). The solution might pass to improve information flows throughout the organisation, for example through the integration of the PM system with the general management system. As argued by Milosevic and Patanakul (2005), an organisation when standardise their PM processes should build an integrated PM process whose elements are linked with upstream and downstream processes to provide the integration of the overall business process across the organisation. Therefore, the integration of the PM system with the general management system means that the PM system is aligned with the whole structure of the organisation, since the business strategy to the support functions. For example, the organisation should make sure that the strategic planning of the organisation should be tightly coupled with the project identification and prioritisation; and

the general management system builds a basic foundation for and is well coordinated with the PM system (Shi, 2011). When organisations link their projects to their business strategy, they are better able to accomplish their project and organisational goals (Milosevic & Srivannaboon, 2006; Srivannaboon, 2006; Srivannaboon & Milosevic, 2006; Alsudiri et al. 2013).

Cooke-Davies et al. (2009) argue that the PM system should be adapted to the specific strategic positioning of each organisation in order to deliver maximum value of PM. There are some authors that had developed conceptual frameworks to align PM with business strategy, such as Milosevic and Srivannaboon (2006) and Meskendahl (2010), where organisations can find some guidance.

3.6.2 Develop a Supported Infrastructure (PMO)

The development of a supported infrastructure to manage projects, such as a project management office[9] (PMO) or a similar structure, improves PM practices (Shi, 2011). As argued by Dai and Wells (2004) the development of a PMO is one important candidate for PM practice improvement.

The Project Management Institute (2013a, p 10) provides the following definition for PMO: *"is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of one or more projects."* There are several researchers that have studied the structures of PMO's. For example, Hobbs and Aubry (2008) conclude that PMOs vary significantly with regards to their structure, their assumed roles and their perceived value. Aubry et al. (2007) and Hobbs et al. (2008) argue that there are many questions and choices regarding organisational position and the tasks of the office that are not clearly addressed by the current theoretical studies on PMOs. The empirical study of Dai and Wells (2004) analyse the use of PMOs and its inherent

[9] PMOs started to become more widespread in the mid 1990's and their numbers have grown significantly since. Their proponents have typically been practitioners and consultants (Pellegrinelli & Garagna, 2009)

benefits. In their study on PMOs as change agents, Pellegrinelli and Garagna (2009), talk about the value of PMOs through some of the tasks they perform. People in PMOs become increasingly valuable as skilled change agents (Englund & Bucero, 2006).

Artto et al. (2011), based on the PMO literature, grouped the tasks of a PMO into five distinctive categories: (1) managing practices, (2) providing administrative support, (3) monitoring and controlling projects, (4) training and consulting, and (5) evaluating, analysing and choosing projects. 'Managing practices' focuses on developing standard procedures, information systems, and tools to help with PM within the organisation. When 'providing administrative support', the PMO takes responsibility for some of the project managers' tasks in order to benefit from the accumulated expertise and economies of scale in the PMO or to reduce the workload of individual project managers. 'Monitoring and controlling projects' involves collecting reports, auditing projects, conducting post-project reviews and allocating resources among others. 'Training and consulting' deals with developing the organisational culture with regards to PM, and consulting, mentoring and training employees who deal with PM in the organisation. Finally, 'evaluating, analysing and choosing projects' refers to all methods of portfolio management, including championing ideas and project seeds. A PMO can provide tasks in all these five categories, or in just one or two categories, as referred PMOs vary significantly.

3.6.3 Develop a Project Sympathetic Organisation

One important initiative in the 'soft' system identified by Shi (2011) is that organisations should develop a project sympathetic organisation, such as a project-oriented organisation, to PM development effectiveness.

The ideal project-oriented company is often described as a flat organisation with a strong PM culture; Huemann et al. (2007, p 316) argue that "*In essence, what defines a company as project-oriented is that these companies perceive themselves as being project-oriented and shape their policies and practices for working, for organizational culture and for strategy towards the challenge presented by managing projects.*"

Project-oriented firms are found in a wide range of industries such as consulting and professional services (e.g. accounting, advertising, law) cultural industries (e.g. fashion, film-making, publishing), high technology (e.g. software, computer hardware, multimedia) and complex products and systems (e.g. construction, transportation, telecommunications, infrastructure) (Sydow et al. 2004).

Martinsuo et al. (2006) used institutional and innovation diffusion theories to explore the adoption of project-based management as an organisational innovation[10]. Their survey-based research identified as drivers for introducing project-based management:

- external pressure (e.g. market/ competitive pressure, client demands, image of modernity and internationalisation/ globalisation), and
- internal complexity (e.g. increasing project complexity and number of projects and time pressure for projects).

Cicmil and Hodgson (2006) argue that the motives for defining work as projects are for example, to gain funding and senior management control and accountability.

Martinsuo et al. (2006) suggested that benefits from introducing project-based management include both:

- improvement in project culture (e.g. greater entrepreneurship, more knowledge management, know-how transfer, more client satisfaction and more effective communication) and
- efficiency improvement (e.g. better multiproject coordination, improved project control, greater project transparency and better project performance).

However, it is not a universally beneficial process, it is required a critical view to be taken of the process and the outcomes. Maylor et al. (2006) discuss several features of projectification that organisations can take as guidance if decided to embrace this PMII (Maylor et al. 2006, p 666):

- increasing use of project structures;

[10] Organisational innovation can be considered an idea or behaviour new to the adopting organisation (Damanpour & Evan, 1984).

- move of power away from line managers to project managers;
- projects granted official status and legitimacy by the organisation, there is an erosion of functional demarcation and project managers have direct authority over resources;
- communication in project team will shift from vertical to horizontal, between people at lower levels in the organisation;
- reduce level of bureaucracy and functional controls, and manage through process controls;
- increase importance of project methodologies, often codified in BoKs and represented in artefacts (e.g. project manuals, standardised processes);
- move from little learning due to disperse knowledge, (e.g. development of a process of learning);
- development of a PMO, which will give legitimacy to project managers by professionalising their role and implementing a PM career path;
- increase the relative proportion of organisational resources affected to projects;
- development of competencies required in planning, resourcing and executing projects, and;
- intensification of supply networks and buyer–supplier relationships; which imply to move from cheapest supplier to best partner in the project.

Some of these implications of 'projectification' by Maylor et al. (2006) are identified by the researcher, based on the researcher's judgment of their relevance in literature and in practice as key PMIIs for improving PM practice, for example: the development of a supported infrastructure, such as a PMO, and the development of a PM career path (discussed in previous sections); and the empowerment of project managers (discussed in the following section).

3.6.4 Empowerment of Project Managers

Empowerment is about power and enhancing it (Forrester, 2000). Empowerment is often defined as the act of giving people the opportunity to make workplace decisions by expanding their autonomy in decision making (Nauman et al. 2010). Shi (2011) argues that organisations should ensure that project managers have authority when managing projects and that project

managers are highly respected in the organisation. Other authors highlighted the importance of the empowerment of project managers, such as Maylor et al. (2006) by arguing that if an organisation intends to organise its work by projects, it is important to move power away from line managers to project managers, since project managers should have direct authority over the project team. Thomas and Mullaly (2008) identified the designation of formal title and role for those in charge of projects as one of the PM improvements that had the greatest impact on PM performance. Loo (2002) identified the need for empowerment teams, not just the project manager, one of the most important areas for improving PM practice.

3.6.5 Develop Project Categorisation

Crawford and Pollack (2004) argue that categorisation of a project early in the life cycle can ensure that team members understand the project and its context more completely, aiding in the transfer of lessons learned from previous projects, aiding in resourcing, planning and guiding the use of PM (e.g. tailoring PM processes to the project type). As argued by Shenhar (2001) *"one size does not fit all projects"*, the proper selection of the PM methodology (processes, tools and techniques) indicated to manage each project type is important for the successful management of projects. Organisations should build flexible PM processes that clearly encourages and states how to adjust the standardised processes to account for specifics of projects with significantly different size and complexity (Milosevic & Patanakul, 2005). The disappointment on "one-size-fits-all" idea is being discussed for many years (Yap & Souder, 1994; Eisenhardt & Tabrizi, 1995).

Moreover, as argued by Dvir et al. (2006) the fit between project manager' personality and management style and the types of project they manage is crucial for projects' success. Therefore, the project categorisation is important for the selection of the "right" project leaders, project team members, and competences development needs (Crawford et al. 2006c; Malach-Pines et al. 2009). Malach-Pines et al. (2009), based on questionnaire data demonstrated that project managers whose personality profile was close to the ideal PM profile for a particular project type, were more successful in impact on the costumers, benefit to the organisation and overall success. For example,

leaders of high-tech projects must possess exceptional technical competences, as well as the capability to assess potential value and risk in new, or not yet developed, technology. Another research study, from Müller and Turner (2010) conclude that different types of project require different leadership competencies.

Therefore, one of the reasons to categorise projects is to 'do them right', which means, assigning appropriate resources and PM approach to the management of projects. Other reason is to better manage the portfolio of projects. Aligning projects with strategy and optimising benefits from the portfolio of projects undertaken – 'do the right projects' – means, assigning priority for projects within their investment portfolio, tracking the efficacy of their investment in projects, and creating strategic visibility (Crawford et al. 2006c). Additionally, PM categorisation would also facilitate the identification of the PM competences necessary to manage the current projects (Crawford et al. 2006b).

Several project classification systems exist, such as those by Shenhar (2001), that classify projects along dimensions of increasing technical uncertainty and project scope. Crawford and Pollack (2004) which encapsulates the key issues in the analysis of 'hard' and 'soft' aspects of projects into seven 'dimensions', which are:

1. Goal/ objective clarity: how clearly defined the project goals and objectives are;
2. Goal/ objective tangibility: how tangible the project goals and objectives are;
3. Success measures: the kinds of measures used to judge project success;
4. Project permeability: how subject the project is to risk outside project control;
5. Number of solutions options: the project approach to exploring and refining the goals;
6. Degree of participation and practitioner role: the roles that team members take in managing the project;
7. Stakeholder expectations: what influential stakeholders consider to be a valid application of PM.

Each of the seven dimensions can be estimated on a 0 – 100 scale (see Figure 3.3). On this scale, 0 represents ultimately 'hard' and 100 represents ultimately 'soft'.

Figure 3.3: 'Hard' and 'soft' dimensions framework categorisation from Crawford and Pollack (2004)

A comprehensive study on project categorisation systems was done by Crawford et al. (2005). They identified an extensive list of features used for categorising projects, and realised that the potential list was without end. So they grouped the features into fourteen groups of attributes, and these covered all the categorisations systems they encountered in their literature review and field work. Within each group there was potential for a limitless number of ways of categorising projects, dependent on the needs of the organisation. In their study they also suggested that different PM procedures, competency profiles and leadership styles might be appropriate for different types of project.

Categorisation of projects could also be made in relation to project complexity. Projects are becoming more complex which implies an increasing concern about the concept of project complexity (Baccarini, 1996). Based on the researcher's professional experience, one way to measure the project complexity is to link it, for example, to the PMBoK's areas of knowledge: integration management; scope; cost; time; quality; risk; human resources; communications and procurement (Project Management Institute, 2008). Table

3.5 shows some classification criteria which could be used to measure the complexity of each PM knowledge area. The values to classify each criterion are dependent of the organisation, i.e. the projects handled by the organisation. To obtain a score to classify each project, the organisation should also ponder the weight for each classification criteria.

Table 3.5: Project categorisation system adapted from researcher's professional experience

Knowledge Area	Classification Criteria
Integration Management	Strategic Alignment
	Interdisciplinary demand
Scope Management	Project Nature
	Innovation Level
Time Management	Project Duration
	Time Pressure
Cost Management	Project Cost
	Cost pressure
Quality Management	Project Exposure to External Audits
	Requirement for the Product Liability
Human Resources Management	Project Effort
	Team Size
Communication Management	Variety of Stakeholders
	Number of Stakeholders
Risk Management	Project Risk (Business Impact)
	Number of Risks indicated in the Process Initiation
Procurement Management	Procurement Nature
	Number of Suppliers

3.6.6 Benchmarking to PM Assess and Continuous Improvement

Involving and motivating the organisation to a specific target for improvement requires a major effort and investment, and consequently a very clear idea of how and where the organisation needs to strive for improvements is an important requirement (Grant & Pennypacker, 2006). Benchmarking[11] could be a useful tool to help on the conduction of these efforts. Benchmarking

[11] Dey (2002 p 326) describes benchmarking as "*the search for the best practices, leading to the superior performance of an organisation*".

management practices helps to accelerate and manage change by encouraging a culture of continuous improvement in PM (Barber, 2004; Luu et al. 2008).

There are several benefits of benchmarking: the identification of leading practices such as, how to best develop and deploy PM processes; the comparisons of data with other organisation; the confirmation of good practices and challenges to accepted practices; the improvement learning for both project managers and the organisation (Camp, 1995).

However, there are a number of reasons why it may not be good practice to introduce evaluation via benchmarking of PM practice. These include the appropriateness of the tool, timeliness and cost effectiveness. A main problem with using benchmarking of management practices between different projects is that projects by their very nature are unique. All projects will involve some elements that cannot be directly translated between one another. Therefore, benchmarking may not be appropriate for all management processes because there might be a non-comparable management situation. In addition, the lack of comparable objectivity is a difficulty that is well recognised within PM evaluation exercises. The intangible factors effecting the management of a project include, for example, culture, politics, project environment, institutional arrangements and legislation. Another drawback is that benchmarking does not and cannot address problems that have been previously recognised or encountered. If an aspect of the management is experiencing a difficulty and the comparable partner has not experienced a similar difficulty, it is unlikely that the benchmarking process could provide any solution. Finally, benchmarking requires excessive time and cost of gathering and analysing performance data. This can consume scarce resources. Additionally, finding the ‘right’ company to benchmark the ‘right’ aspects of management, can also be time consuming and expensive (Barber, 2004).

Even with all these difficulties, Barber (2004) argues that the use of benchmarking is recommendable as an evaluating tool that stimulates continual improvement in PM competences and it is predicted that the use of this evaluation tool will increase.

PM practice can be benchmarked using internal or external benchmarking. External benchmarking takes place when a business compares itself with a

'best practice'. For example, using organisations which demonstrate in the way they manage similar projects, or using maturity models (e.g. Project Management Institute, 2013b; Sowden et al. 2010) that provide a systematic framework for carrying out external benchmarking and performance improvement (Demir & Kocabas, 2010). Internal benchmarking occurs when one sub-division of an organisation compares itself with another subdivision with the intention of finding and applying 'best practice' (Haji-Kazemi & Bakhshehsi, 2009).

Internal benchmarking has a number of advantages over external benchmarking. First, the organisation can easily obtain access to detailed information about different projects it has conducted. Second, internal benchmarking reduces the likelihood of cultural and definition problems which can often affect the validity of benchmarking. On the other hand, external benchmarking has its own advantages, for example, it can lead to the discovery of radically different approaches to the same problems, it prevents the company from being only internally focused, the company can develop a concrete understanding of competition, it can utilise new ideas of proven practices, and may generate a higher level of commitment (Dey, 2002; Barber, 2004).

3.6.7 Assessment of Project Management Performance

The terms project management performance and project performance are frequently used indistinctively. However, the objectives of both project management and project performance are different. Project management performance emphasis is towards achieving specific and short-term targets compared to the wider aims of a project (Cooke-Davies, 2001). For example, important parameters to project performance will be the return on investment, profitability, competition and market ability, while to project management performance the focus is usually given to the triple constraints, control of time and cost and quality (Munns & Bjeirmi, 1996; Jha & Iyer, 2007).

Experience has shown that it is possible to achieve 'a successful project' even when management has failed and vice versa (De Wit, 1988). Munns and Bjeirmi (1996, p 83) suggest that "...*the broader decisions in selecting a suitable*

project in the first place are more likely to influence the overall success of the project than can be achieved merely through the techniques of project management. The techniques may help to ensure a successful implementation to the project, but if the project is fundamental flawed from the start it would be unlikely that techniques alone could salvage it".

White and Fortune (2002), from a survey study, already referred earlier to capture the 'real world' experiences of people active in PM, found that the most common criteria used from project managers for defining project success are:

- Meets client's requirements
- Completed within schedule
- Completed within budget
- Meets organisational objectives
- Yields business and other benefits
- Causes minimal business disruption
- Meets quality/ safety standards

The three criteria most cited in the literature (on time, to budget, and to specification) were also the highest ranked success criteria identified in the White and Fortune's survey. However, the 'fit' between the project and the organisation and the consequences of the project for the performance of the business were also reported as important criteria.

Qureshi et al. (2009) argue that the deployment of a framework to evaluate the project management performance has positive and significant impact over the project management performance. The assessment could be made during the life cycle of the project, through the application of an assessment model. An example of such model would be PM performance assessment (PMPA) model developed by Bryde (2003). The author's model, based on the European Foundation of Quality Management (EFQM) business excellence model, proposed six criteria for assessing project management performance: PM leadership, PM staff, PM policy and Strategy, PM Partnership and Resources, PM Life Cycle Process and PM Key Performance indicators, presented in Figure 3.4.

This kind of model could also be the approach to evaluate if the organisation is enhancing or not its PM practice.

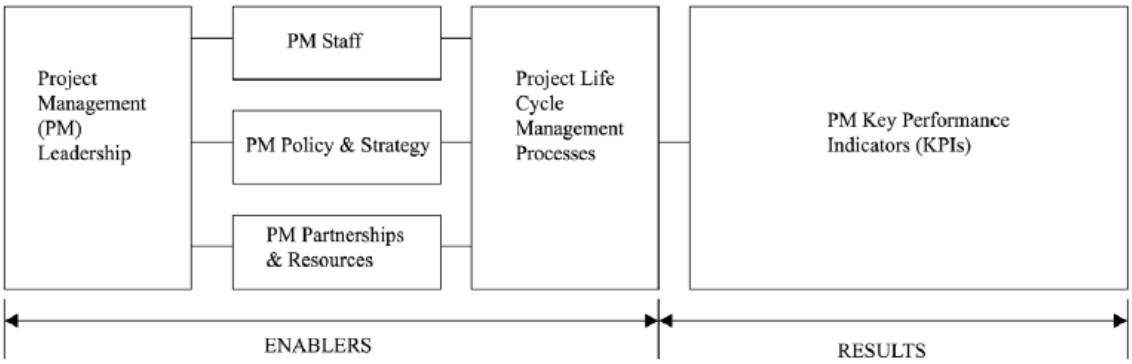


Figure 3.4: PMPA Model from Bryde (2003)

3.7 PMIIs Relating to PM Culture

Culture can be manifest in a variety of ways, such as attitude relating to: planning, formal procedures, regulations, criticism, mistakes, uncertainty, and risk (Ward, 2004). The cultural characteristics can either facilitate or hinder the development of PM. Sometimes barriers are induced from outside the organisation in the form of convictions, prejudices, biases, and routines of professional groups that can blinker thinking (Chapman & Ward, 2002).

Kerzner (2009, p 151) stated that "*project management methodologies regardless how good, they are just simple pieces of paper. What converts these pieces of paper into a world-class methodology is the culture of the organisation.*" Chapman and Ward (2002) argue that some of the most significant barriers to effective project risk management (which could be extended more broadly to PM) are based on unfavourable features of organisational culture[12].

Creating a PM culture in the organisation is essential to improve PM practice (Shi, 2011). PM culture represents organisational attitudes toward PM, for example, how PM is viewed and specifically how the role of project manager is viewed. In some organisations PM is seen as primarily a tool for control, with a strong process emphasis and rigorous emphasis on structure, control and policing. By contrast, for many organisations, PM is viewed as a leadership

[12] Organisational culture represents the values, norms and structures of the organisation (Thomas & Mullaly 2008).

discipline, and project managers are seen as organisational leaders (Thomas & Mullaly, 2008). However, creating a good PM culture cannot be done overnight. It may take years and strong executive leadership (Englund & Bucero, 2006). Englund and Bucero (2006) argue that is senior management that must take the initiative in overcoming the barriers to PM development, for that they should be the first to recognise that PM plays an important role for the success of the organisation.

PM culture is a complex theme, and it could be argued that all the PMIIs mentioned in the previous sections could contribute to the development of a PM culture in the organisation. However, beyond the PMIIs mentioned before, based on the literature review (detailed below through this section) the researcher, judging their relevance and practical application, identified under the theme 'PM culture' three key PMIIs:

- develop awareness of PM value among all staff (from executive staff to team members);
- develop a basic understanding of organisational PM practices among all project stakeholders; and
- establish PM practices as internal standards.

3.7.1 Develop Awareness of PM Value

Previously, in section 2.5 an important assumption of this research study 'PM has value' is discussed. In fact, only if organisations are fully aware of the value of PM they will make further efforts to improve PM practice (Zhai et al. 2009). Organisations investing in PM need to be confident of a return on the effort invested. Therefore, it is crucial for an organisation to increase awareness of both perceived and actual benefits of PM, for example through more effective communication (Lehmann, 2010). All the people in the organisation, especially the top managers, should highly recognise that PM contributes to the success of the organisation (Englund & Bucero, 2006; Shi, 2011).

PM value has been explained differently from different authors, for example Ibbs and Reginato (2002) demonstrated the value of PM by measuring the financial ratio return on investment. However, Thomas and Mullaly (2007) and Zhai et al. (2009) argue that there are different interpretations of value, since

PM also brings to the organisation intangible benefits. Therefore, the existing value measurement frameworks can be categorised into a single dimensional approach and a multidimensional approach (Zhai et al. 2009). The single-dimensional approach is mainly a financial approach, which tries to measure the financial ratio such as cost/benefit[13] ratio and return on investment[14] ratio (ROI) (Kwak & Ibbs, 2000) to indicate the value of PM. It is reasonable to use financial ratios to measure the value of PM in the sense that financial results are important for all organisations. However, only considering the monetary return of PM is obviously not enough, since PM also brings intangible benefits to corporate culture, organisation efficiency, and the satisfaction of clients (Andersen & Vaagaasar, 2009; Eskerod & Riis, 2009; Mengel et al. 2009).

Thomas and Mullaly (2007), borrowing a long standing evaluation framework from human resources development evaluation literature (Phillips, 1998), illustrated within a very simplistic five-level framework (Table 3.6), the different types of organisational value.

Table 3.6: Value framework adapted from Philips (1988) in Thomas and Mullaly (2007)

Different Values of PM
Level 1: Satisfaction: This can be the simplest measure of value. Do the key stakeholders perceive that the PM initiatives provide value? This is measured through perceptions/ self report satisfaction levels as well as through the use of objective measures, such as repeat customers, wherever possible.
Level 2: Aligned Use of Practices: Measures the fit between espoused theories and theories in use. Did the PM implementation result in the desired processes? Do you do what you say you do? So project people know what they are supposed to do? This is assessed through a comparison of practices, policies and procedures with what actually happens on projects?
Level 3: Process Outcomes: What process improvement have you reaped from our PM implementation? How effective is the PM process? This is evidenced by changes over time in things like numbers of change requests, budget performance, learning from past projects and reliability of delivery.
Level 4: Business Outcomes: Improving PM can result in a number of business outcomes depending on the nature of the organisation. What business outcomes are related to these improvements? If organisation handles external projects, for example, improve customer satisfaction and retention, and organisation's ability to attract new customers through reputation effects. If organisation is engaged with internal projects, for example, increase the ability to achieve strategic goals.
Level 5: Return on Investment: This is the most difficult measure of value. For every pound invested in the PM initiatives, what return in terms of cost savings, revenue, can be attributed to it? This measure is calculated based on the quantification of direct business impacts identified in level 4 benefit analysis as compared with the reported expenditures on PM.

[13] Cost/ benefit ratio = £Benefit / £Cost
[14] Return on investment ratio = (£Benefit – £Cost)/ £Cost *100

Zhai et al. (2009) propose a framework describing the value of PM from the stakeholders' perspective. The value of PM is generated in four dimensions (key stakeholders): the enterprise, costumers, subcontractors/ suppliers, and the community. The specific indicators of each value dimension are presented in Figure 3.5. Although this framework has been developed only based on mega-projects, this is a significant contribution to demonstrate PM value.

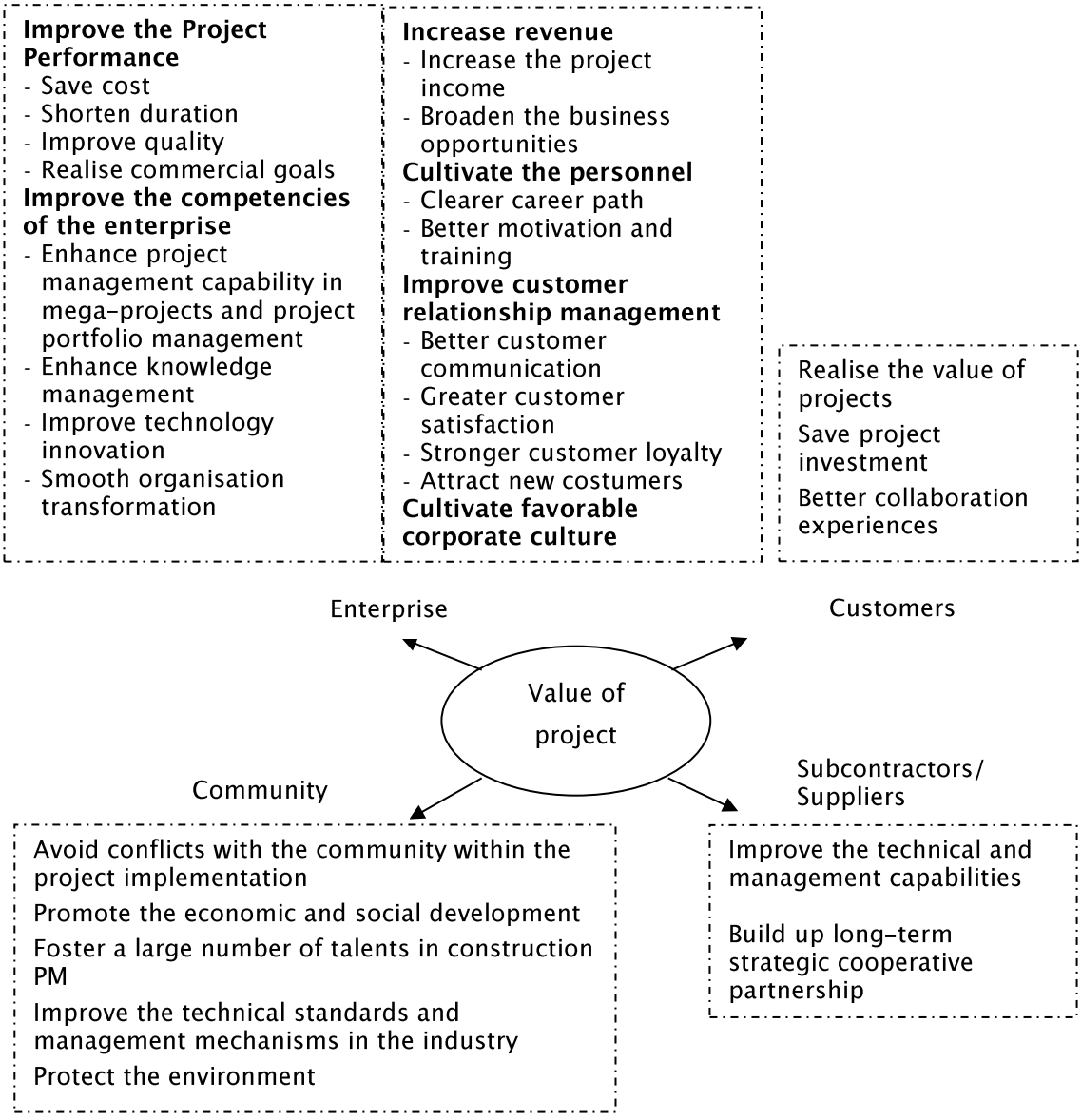


Figure 3.5: Value framework of PM in mega-projects from Zhai et al. (2009)

The frameworks from Thomas and Mullaly (2007) and Zhai et al. (2009) are just two multidimensional approaches examples that organisations can use to develop awareness of PM value among their staff.

3.7.2 Develop a Basic Understanding of Organisational PM Practices

Unfortunately, many people still have the perception that PM is something that project managers do, rather than a discipline in which the whole organisation is involved. The development of a basic understanding of the institutionalised PM processes, tools and techniques its purposes, and its benefits among all staff involved in project activities is important to improve PM practice and create a culture of PM (Shi, 2011). People that are better informed and more aware of what is happening in their organisation, would become more involved and committed to what is happening (Perloff, 2010).

Develop a basic understanding of organisational PM practices among all project stakeholders can be, for example easily facilitated by organisations through training (Thomas & Mullaly, 2008) and the availability of easily, customised, PM documentation (Englund & Bucero, 2006).

To learn and practice PM is not only to learn and practice its tools and techniques, but also to learn, internalise, and practice its work-related values/ beliefs, in order the PM practice became in fact part of the organisation (Kendra & Taplin, 2004). When developing at least a basic understanding of the organisational PM practices, it is important encouraging disagreement to be surfaced; requiring people being direct and open; regarding confrontation strategy as the best way of solving conflict; cross-functional communication and cooperation, and enforcing that everyone plays important roles (Wang & Liu, 2007).

3.7.3 Establish PM Practices as Internal Standards

Milosevic and Patanakul (2005) argue that standardising PM practices may not necessarily improve project success and cannot be argued that increasing the level of standardisation of PM will automatically lead to increase in project success. But, the establishment of institutionalised PM practices as a standard requirement for projects in organisations would facilitate the development of PM culture, as PM practices will make part of the organisation's daily life.

When organisations standardise PM practices and establish the use of them as a standard requirement for the management of projects in the organisation,

they may follow some advices given by Clarke (1999) and Eskerod and Riis (2009):

1. focus on key success factors as a first stage to establish what is a standard requirement (based on the Pareto rule of concentrating on the few things which deliver the greatest benefits);
2. the PM methodology should have only relatively few mandatory requirements but a well-developed governance structure;
3. project managers should have a high level of involvement in the process of PM methodology design;
4. develop an auditing tool for PM, which would allow business to measure itself against 'best practice', against other parts of the organisation, and also identify areas for improvement, providing an opportunity for corporate learning to take place;
5. the development of the PM methodology should be combined with other initiatives to support a common frame of reference, for example, a common PM training, as discussed earlier.

Most of the advices stated above are related in some way to the embedding process, emphasising the relationship between the improving and embedding concepts. For example, it is highlighted the importance of a gradual implementation of PMIIs (1), the key stakeholders involvement (3), and the existence of a PM quality assurance that, among other benefits, would identify areas for improvement (4).

3.8 Conclusions

The chapter attempts to identify from some key studies the most useful PM practices (tools and techniques). The similitude of objectives, the multitude of organisational contexts, and the empirical evidence obtained from a large-scale international survey led the researcher to identify the work of Besner and Hobbs (2006) as the most important reference from the studies identified in literature. However, improving PM practice is not a simple development of a useful tool or technique. Therefore, the improving construct of this study addresses the 'hard' and 'soft' side of PM improvements. The 'hard' side includes, for example, the standardisation of processes. The 'soft' side

encompasses, for example, the development of a culture of learning. As argued by Thomas and Mullaly (2008) it is the interaction of the various initiatives that collectively contribute to realise the PM value.

A number of key PMIIs have been identified in the literature, which might have the greatest impact on improving project management practice. Following the classification by Shi (2011), these key initiatives were grouped under the following themes:

1. Process, tools, and techniques
2. People and organisational learning
3. General management system
4. Project management culture

Table 3.7 presents a summary of the key PMIIs, which were then included in the 'initial framework' for improving PM practice, stating the different authors that addressed each of the initiatives in literature.

From Table 3.7 one major piece of work to explore the key PMIIs stands out as being particularly useful for this Ph.D. research project. The VAPM framework was selected as the main theoretical foundation for the improving construct, which focuses on the identification of the most useful PMIIs. It was selected for several reasons, taking into account similitude of objectives, robustness, empirical evidence obtained, and a multitude of organisational contexts. The VAPM was based on the research findings of Thomas and Mullaly (2008) entitled "Researching the Value of Project Management," a three-year study, involving a multi-disciplinary research team, with over 45 academics and 65 organisations worldwide from very different contexts. Additionally, Shi (2011) interviewed 30 project management practitioners from a variety of industrial sectors in the Chinese context and applied the framework to a case study, which shows that this approach is simple and easy to use. Eleven of the fifteen PMIIs identified are linked to the items identified by Shi (2011). Table 3.8 shows these links between the key PMIIs identified and all the items identified by Shi (2011). Additionally, other four key PMIIs were identified by other authors: benchmarking to assess and continuous improvement; develop project categorisation system; assessment of PM performance; and establish PM practices as internal standards.

Table 3.7: Key themes and PMIIs for improving PM practice

Key Theme	Key PMII	Authors
Processes Tools & Techniques	Standardisation of PM Process	Loo (2002), Milosevic & Patanakul (2005); Thomas & Mullaly (2008); Andersen & Vaagaasar (2009); Shi (2011)
	Standardisation of PM tools and techniques	White & Fortune (2002); Milosevic & Patanakul (2005); Anantatmula (2008); Thomas & Mullaly (2008); Shi (2011)
People & Organisational Learning	Manage PM competences	Loo (2002); Caupin et al. (2006); Crawford et al. (2006b) Project Management Institute (2007); Mengel (2008); Thomas & Mullaly (2008); Andersen & Vaagaasar (2009); Kwak & Anbari, 2009; Eskerod (2010); Shi (2011)
	Establish a PM career path for all PM roles	Turner et al. 2008; Cooke-Davies et al. (2009); Shi (2011)
	Develop a culture of learning	Loo (2002); Burnes el al. (2003); Atkinson et al. (2006); Sense (2007); Shi (2011)
General Management System	Integration of the PM system with the general management system	Milosevic & Patanakul (2005); Milosevic & Srivannaboon (2006); Srivannaboon & Milosevic (2006); Srivannaboon (2006); Meskendahl (2010); Shi (2011); Alsudiri et al. (2013)
	Develop supported infrastructure	Dai & Wells (2004); Hobbs et al. (2008); Pellegrinelli & Garagna (2009); Shi (2011)
	Develop a project sympathetic organisation structure	Maylor et al. (2006); Martinsuo et al. (2006); Shi (2011)
	Empowerment of project managers	Loo (2002); Maylor et al. (2006); Thomas & Mullaly (2008); Shi (2011)
	Develop project categorisation system	Crawford & Pollack (2004); Crawford et al. (2006b); Crawford et al. (2006c); Malach-Pines et al. (2009)
	Benchmarking to PM asses and continuous improvement	Camp (1995); Barber (2004); Luu et al. (2008); Sowden et al. (2010); Project Management Institute (2013b)
	Assessment of project management performance	Bryde (2003); Qureshi et al. (2009)
PM Culture	Develop awareness of PM value among all staff	Ibbs & Reginato (2002); Englund & Bucero (2006); Thomas & Mullaly (2007); Zhai et al. (2009); Shi (2011)
	Develop a basic understanding of organisational PM practices among all project stakeholders	Englund & Bucero (2006); Thomas & Mullaly (2008); Shi (2011)
	Establish PM practices as internal standards	Clarke (1999); Milosevic & Patanakul (2005) Eskerod & Riis (2009)

Table 3.8: Links between the key PMIIs and the items on the VAPM framework

Key PMIIs 'initial framework'	Items* in the Shi's VAPM framework
Standardisation of PM Process	H1.1 / H1.2 / H1.3
Standardisation of PM tools & techniques	H3.1 / H3.2 / H3.3 / H3.4 / H3.5 / H3.6
Manage PM competences	H2.1 / H2.2 / H2.3 / H2.4
Develop PM career path	S2.2
Develop a culture of learning	H2.5
Integration of the PM system with the general management system	S1.1 / S1.2 / S1.3 /S1.4
Develop supported infrastructure	S1.5
Develop a project sympathetic organisation structure	S2.5
Empowerment of project managers	S1.6 / S2.3
Develop awareness of PM value among all staff	S2.1 / S2.4
Develop a basic understanding of organisational PM practices among all project stakeholders	H2.2/ H2.3/ H2.4

As referred in the introduction chapter, in this study a reasonably high abstraction level of PMIIs descriptions was adopted. For example, the key initiative 'standardisation of PM processes', was employed rather than distinguishing different kinds of processes. Each organisation should select the appropriate processes to its organisational context. Even Shi (2011) that have also adopted a high abstraction level of description compared with the existent PM maturity models, have detailed some specific tools, such as PM cost management software and schedule management software. However, Shi (2011) does not offer any discussion about the selection of these particular tools.

The next chapter addresses the embedding construct of this research conceptualisation, looking for the identification of the key factors that would facilitate the embedment of the PMIIs identified or other PM initiatives conducted by organisations.

4. Identifying Key Factors for Embedding PMIIs

4.1 Introduction

The purpose of this chapter is to present a literature based assessment of factors that might assist in embedding PM practice, in order to answer the third research question:

How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance (i.e. key embedding factors)?

In PM, considerable research effort has been directed towards clarifying the reasons for project success and failure, while ignoring important research questions as *why and how does PM spread?* (Whitty, 2005)

A first step to address the third research question was to go through the literature review on change management, in order to understand how organisations manage changes (section 4.3). But, the theories under change management were not helpful. However, research reported in innovation diffusion literature offered potentially relevant insights (section 4.4). Therefore, to facilitate and support the embedment of a PMII in organisations the study conceptualises PMIIs as innovations whose diffusion, dissemination, implementation, and routinisation need to be understood and specified.

Only three studies were found which have addressed PM as an innovation. Martinsuo et al. (2006) used institutional and innovation diffusion theories to explore the adoption of project-based management as an organisational innovation. Hobbs et al. (2008) explored the introduction of project management offices as an organisational innovation using a combination of survey and qualitative studies. Chan & Thong (2009) used diffusion of innovation theories to develop a conceptual framework for agile methodologies acceptance.

From literature on diffusion, mainly from the Greenhalgh's study, six main themes for embedding PM practice were identified:

1. PMII (innovation) attributes;

2. Adopter and adoption process by individuals;
3. Communication and influence (diffusion/ dissemination);
4. Inner context;
5. Outer context;
6. Implementation.

Several key embedding factors related to the six themes were identified and discussed in detail through the section 4.5 to 4.10.

Three of the four phases of the process of embedding a PMII (diffusion, dissemination, implementation and routinisation) were identified as themes. The literature on the routinisation of innovations was very sparse, and parenthetically linked to the theme 'implementation' (Greenhalgh et al. 2004), and so as a result, the direct key embedding factors related to 'routinisation' were not identified from literature review. As referred in the introduction chapter, in this study the diffusion and dissemination of PMIIs is seen as the process of 'communication and influence' for the adoption decision of the PMII by the organisation.

4.2 Embedding Knowledge/ Practices in Organisations

Only by understanding the way knowledge is embedded within institutional and cultural contexts, is it possible to appreciate fully both the obstacles and practical solutions to the effective embedment of new practices (Bresnen & Marshall, 2001).

In general, it is necessary to embed new professional knowledge in individuals and organisations, in order to keep practice current, to reflect changing governmental, environmental, and societal concerns, to respond to new understandings. Nevertheless, the knowledge embedding process in organisations is poorly understood (Cranefield & Yoong, 2009).

Cranefield and Yoong (2009) argue that the embedding process could be seen as spanning the final stages of the knowledge transfer. Knowledge transfer is a complex and structured process, comprising various stages, with each stage corresponding to a unique set of activities and challenges (Szulanski, 1996; Szulanski, 2000; Kwan & Cheung, 2006). For example, Szulanski (1996)

suggests that there are four distinct stages in a transfer: initiation (comprises all events that lead to the decision to transfer), implementation (the initial implementation effort), ramp-up (the ramp-up to satisfactory performance), and integration (the subsequent follow-through and evaluation efforts to integrate the practice with other practices of the recipient). However, embedding a PMII in this research is studied as a broad process, which comprises diffusion, dissemination, implementation and routinisation, i.e. includes all the stages of knowledge transfer, since the efforts made to lead the decision of adoption to its integration with other practices of the organisation.

Another area of literature portrays knowledge embedding as an ongoing process that occurs as part of organisational learning (Sanchez, 2005) (see section 3.5.3). Unfortunately, studies are often focused around knowledge sharing (e.g. Liebowitz & Megbolugbe, 2003; Oluikpe, 2007) rather than on the intended result, knowledge that is embedded in practice.

An interesting study (cited for over 5.600 papers) "Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm" conducted by Szulanski (1996), gives some light on key embedding factors.

Szulanski (1996, p 29) defines *'stickiness'* as *"the difficulty of transferring knowledge within the organisation."* The author argues that there are several independent variables to 'stickiness' of transfer best practice within the organisation:

1. Causal ambiguity: reflects the recipient's depth of knowledge about cause-effect relationships of adopting a new practice;
2. Unproven knowledge: degree of conjecture on the utility of the transferred knowledge;
3. Source lacks motivation: motivation of the source unit to support the transfer;
4. Source not perceived as reliable: degree to which the donor of the 'best practice' is perceived as reliable;
5. Recipient lacks motivation: motivation of the recipient unit to support the transfer;
6. Recipient lacks absorptive capacity: ability of the recipient unit to identify, value and apply new knowledge;

7. Recipient lacks retentive capacity: ability of the recipient unit to routinize the use of new knowledge;
8. Barren organisational context: degree to which the organisational context supports the development of transfers;
9. Arduous relationships: ease of communication and intimacy of the relationship between the source of the knowledge and the receipt unit.

During the empirical work of this study, it is verified if these variables (factors) are pertinent to the embedment of PMIIs in organisations. These variables are discussed in more detail in the following sections.

Szulanski (1996) tested these variables using 271 questionnaires of 122 transfers of 38 'best practices'[15] in eight companies. Contrary to conventional wisdom that places primary blame on motivational factors, Szulanski found that the major barriers to the transfer of practice are: the 'lack of absorptive capacity of the recipient'; 'causal ambiguity'; and an 'arduous relationship between the source and the recipient'.

In fact, a motivated adopter can intensify, rather than mitigate, the difficulty encountered during the process of embedding new practices (Szulanski, 2000). Highly motivated adopters have been found to exacerbate problems of implementation by prematurely dismissing outside help, expanding seemingly straightforward modifications into major projects, making unnecessary modifications to preserve pride of ownership and status. Szulanski (2000) argues that this counterintuitive finding suggests the intriguing hypothesis that high motivation can be a 'double-edged sword' in that it may help in the beginning of the process but also complicate its implementation.

The general problem with innovations in organisations is that their widespread diffusion requires that they are context-independent in order to maximise transferability (for example, across projects, organisations, sectors) (Bresnen et al. 2004). However, as in innovation in general, in PM organisations need to reinterpret PM practices to suit their own particular circumstances (Cooke-Davies et al. 2009). The resulting process of translation can lead to problems

[15] The sample contained both technical and administrative practices. Examples of technical practices are software development procedures and drawing standards. Examples of administrative practices are upward appraisal and activity-based costing (Szulanski, 1996).

and/or distortions in implementation as new practice is reinterpreted and reconstructed to suit diverse operating conditions and organisational contexts. Nevertheless, ironically, this process of translation also means that it is the inherent ambiguity or interpretative flexibility of new management ideas that is the key to their effective diffusion within and across organisations (Clark & Staunton, 1989).

As the literature on embedding PM practice seems limited, in order to give some light on how to facilitate embedding process of PMIIs, literature review was conducted under the topic change management in the following section.

4.3 Managing Change

There is a consensus among academics and practitioners that organisations are facing unprecedented levels of change and consequently the ability to manage change is, or should be, a core organisational competence (Dunphy et al. 2003). Given the prevalence and importance of organisational change and the difficulty reported by many organisations in managing their changes (Styhre, 2002; Burnes, 2004b), there has been much debate over the last 25 years in particular as to the most appropriate way to manage change (Styhre, 2002; Burnes et al. 2003; Burnes, 2004a; Burnes, 2005).

Planned change

The planned change is one of the most important and foundational areas of the change management literature (Cummings & Worley, 2009). Probably the most influential of these planned models is the work of Kurt Lewin (Burnes, 2004a), the planned approach to change, which dominated the theory and practice of change management for over 40 years. However, since the 1980's, issues of complexity have given rise to questions about the validity of Lewin's approach to planned change which led into a discussion of complexity theory (Burnes, 1996). Complexity theories, like the punctuated equilibrium model of change, incremental model of change, and continuous transformation model, categorised as emergent approaches, are increasingly being seen by academics and practitioners as a way of understanding organisations and promoting organisational change (Burnes, 2005).

Looking at Lewin's contribution to change theory and practice, there are three key points to note:

1. Lewin's work stemmed from his concern to find an effective approach to resolving social conflict through change group behaviour (whether these conflicts to be at the group, organisational or social level).
2. Lewin promoted an ethical and humanist approach to change, that saw learning and involvement as being the key processes for achieving behavioural change.
3. It concerns to the nature of Lewin's work. The planned approach to change is based on four mutually reinforcing concepts, namely *field theory*, *group dynamics*, a*ction research* and the *3-step model*, which are used in combination to bring about effective change. *Field theory* is an approach to understanding group behaviour by trying to map out the totality and complexity of the field in which the behaviour takes place. *Group dynamics* – it is not possible to change the behaviour of a group successfully unless one understands the interactions (dynamics) between its members. *Action research* – change requires action, it is necessary to analyse the situation, identifying all the possible alternative solutions and choosing the one most appropriate. To be successful, there has also to be a 'felt-need'. If felt-need is low in a group or organisation, introducing change becomes problematic. Finally, the *3-step Model*, step 1: unfreezing, the equilibrium needs to be destabilized (unfrozen) before old behaviour can be discarded (unlearnt) and new behaviour successfully adopted, step 2: moving and step 3: refreezing (Burnes, 2004a).

Especially the concepts of *field theory* and *group dynamics* could be useful to manage the common resultant conflicts of embedding PM practice (organisational change) through change group behaviour. Both concepts are useful to analyse and understand how social groupings are formed, motivated and maintained.

Most approaches to organisational change could be reduced to Lewis *3-Step model* (for more detailed information see Elrod II and Tippett, 2002, p 286). One of the criticisms raised of Lewin's model is that it does not deal with issues associated with organisational politics (Cummings & Worley, 2009). However, his work on *field theory* and *group dynamics* does seem to cover this area (Burnes, 2004a). For example, Dickens and Watkins (1999, p 127) argue

that Lewin's approach is *"…intended to foster change on the group, organisational and even societal levels"*. Other criticisms are that his work assumed organisations operate in a stable state and was top-down and management-driven (Burnes, 2004a).

Complexity theory and contingency theory

Criticisms of planned change led to the development of complexity theory and contingency theory. Contrary to the mechanistic view implied by linear models of change, complexity theory puts into question the linearity and singular direction of such organisation change models. Complexity theory proposes that changes are produced on the basis of a multiplicity of interconnected causes and effects whose relationships are difficult to understand when viewed from the perspective of an analytical framework that assumes linearity (Stacey et al. 2000; Styhre, 2002; Burnes, 2005). The essence of contingency theory becomes one of abandoning the view that there is "one best way" to organise in favour or believing that the best solution is dependent on the type of changes the organisation wishes to undertake and, according to the organisation's context, the nature of the environment to which the organisation relates (Burnes 1996; Scott, 1998). Over the past 25 years, these emergent approaches, based on complexity theories, appear to have superseded the planned approach as the most appropriate. However, as Burnes (2004b) argues planned and emergent are complementary approaches, rather than competing approaches.

Leading the change process of embedding new practices

The embedding of a new practice can be difficult if the organisation's culture provides a great deal of resistance toward the change. Strong executive leadership may be necessary such that the barriers to change can be overcome quickly (Kerzner, 2009), providing support and ensuring continuing priority of improvements. The NHS Modernisation Agency study (2003) concludes that the leaders should:

- recognise the efforts and achievements as well as encourage and support contributions to sustaining improvements;
- dedicate time for those involved, to meet, plan, develop and undertake improvement activities;

- regard the new practice as priority for all involved and ensure that it does not enter in conflict with other priorities or interests;
- give to people the sense of 'ownership' of the new practice facilitated by the involvement of all levels and people in all stages of the process of change, fundamentally in the early stages, and finally;
- identify and prevent the barriers to embed a new practice, for example, changes to organisation, external pressures, competing demands, short-term contracts or funding.

The organisation should be ready for change (Greenhalgh et al. 2004). Therefore, embedding PM practice requires strategies for reducing resistance to change, through for example, as argued by Ward (2004) in respect to risk management, education, communication, participation and involvement, facilitation and support, and offering incentives. This implies a change process that first clarifies the need for, and the relevance of, a new PM practice, seeks to improve stakeholders' understanding of what is involved, and provides motivation for individuals to use it. Additionally, there is a need to ensure that PM skills are developed, and that individuals have sufficient time and resources to apply PM in individual context. In other words, an organisation should have the necessary resources to support the change (Greenhalgh et al. 2004). From the researcher's professional experience, in practice these things usually fail, and consequently organisations use PM 'poorly'.

Most of the models, planned or emergent approaches, still remain quite general and vague about how to plan and implement one change. There are no differentiation of change processes by change types made. Boundaries and measurable objectives of change processes are not defined (Whelan-Berry et al. 2003). Therefore, the researcher looked for the diffusion of innovations theories, in order to shed some light on how to facilitate the embedding process of PMIIs in organisations.

4.4 Diffusion Theories

Diffusion is a process concerned with the spread of knowledge and practices that are perceived as new ideas. Rogers (2003) an authoritative author in this area describes in a simple way the main elements in the diffusion of

innovations: i) an innovation, ii) which is communicated through certain channels, iii) over time, iv) among the members of a social system[16].

Rogers (2003) argues that in the process of diffusion we should carefully pay attention to: (1) the five attributes of an innovation (such as a PMII) which determine its rate of adoption: relative advantage, compatibility, complexity, trialability and observability; (2) re-invention; (3) nature of adoption decision; (4) homophily; (5) interpersonal channels; (6) opinion leadership; and (7) norms, discussed in more detail in the following sections.

The literature on diffusion of innovation is substantial. Consequently, the researcher looked for some key references. For example, Rogers (2003), for being a prominent author in diffusion of innovations; Venkatesh and Bala (2008) which had developed the theory of Technology Acceptance Model (TAM), one of the most used theories for individual acceptance; and Greenhalgh et al. (2004) which conducted one of the most comprehensive reviews of research on innovations, and had as the unit of adoption the organisation and not just individuals, which it is the focus of this research.

Understanding the factors influencing user adoption and sustained usage of innovations, in other words the innovation embeddedness, in the workplace is a critical issue for researchers and practitioners (Venkatesh et al. 2000). Several models have been applied to explain individual adoption and use of technologies in the workplace. For example: the theory of reasoned action; the Technology Acceptance Model (TAM); the theory of planned behaviour (TPB); the decomposed theory of planned behaviour; and innovation diffusion theory (Venkatesh & Brown, 2001). TAM and TPB are the two widely used models (Venkatesh et al. 2004), described in more detail in the following sub-sections.

4.4.1 Theory of Planned Behaviour (TPB)

According to the theory of planned behaviour (TPB), behavioural intention (BI), the key independent variable, is determined by attitude toward behaviour (A), subjective norm (SN), and perceived behavioural control (PBC).

[16] A social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal (Rogers, 2003).

The following equation help capture the essence of predicting behavioural intention:

$$BI \approx A + SN + PBC \qquad (1)$$

Attitude toward behaviour is defined as a person's favorable/ unfavorable evaluation of the behaviour in question; subjective norm is defined as the perceived social pressure to perform (or not perform) the behaviour in question, and perceived behavioural control relates to the extent to which the person believes that has control over personal or external factors that may influence or constrain the behavioural performance (Venkatesh et al. 2000; Venkatesh & Brown, 2001).

4.4.2 Technology Acceptance Model (TAM)

TAM adapted from the theory of reasoned action (TRA), offers a powerful and parsimonious explanation for user adoption and use behaviour (Venkatesh & Bala, 2008). TAM suggests that user acceptance is determined by two key beliefs, namely 'perceived usefulness' and 'perceived ease of use' (Davis, 1989). 'Perceived usefulness' is defined as the extent to which a person believes that using a particular technology will enhance her/his job performance, while 'perceived ease of use' is defined as the degree to which a person believes that using a technology will be free from effort (Venkatesh & Morris, 2000). TAM is the most widely applied model of user adoption and use (Venkatesh & Bala, 2008).

Information technology (IT) adoption and use is an issue that has received the attention of researchers and practitioners for over two decades. Venkatesh (2000) developed a theoretical model of the determinants of 'perceived ease of use', of IT solutions which are: computer self-efficacy; perception of external control; computer anxiety; computer playfulness; perceived enjoyment; and objective usability, represented in Figure 4.1.

Venkatesh and Davis (2000) proposed an extension of TAM, labeled as TAM2, by identifying and theorising about the general determinants of 'perceived usefulness', which they identified as: subjective norm; image; job relevance;

output quality; result demonstrability; and perceived ease of use, and two moderators experience and voluntariness, represented in Figure 4.2.

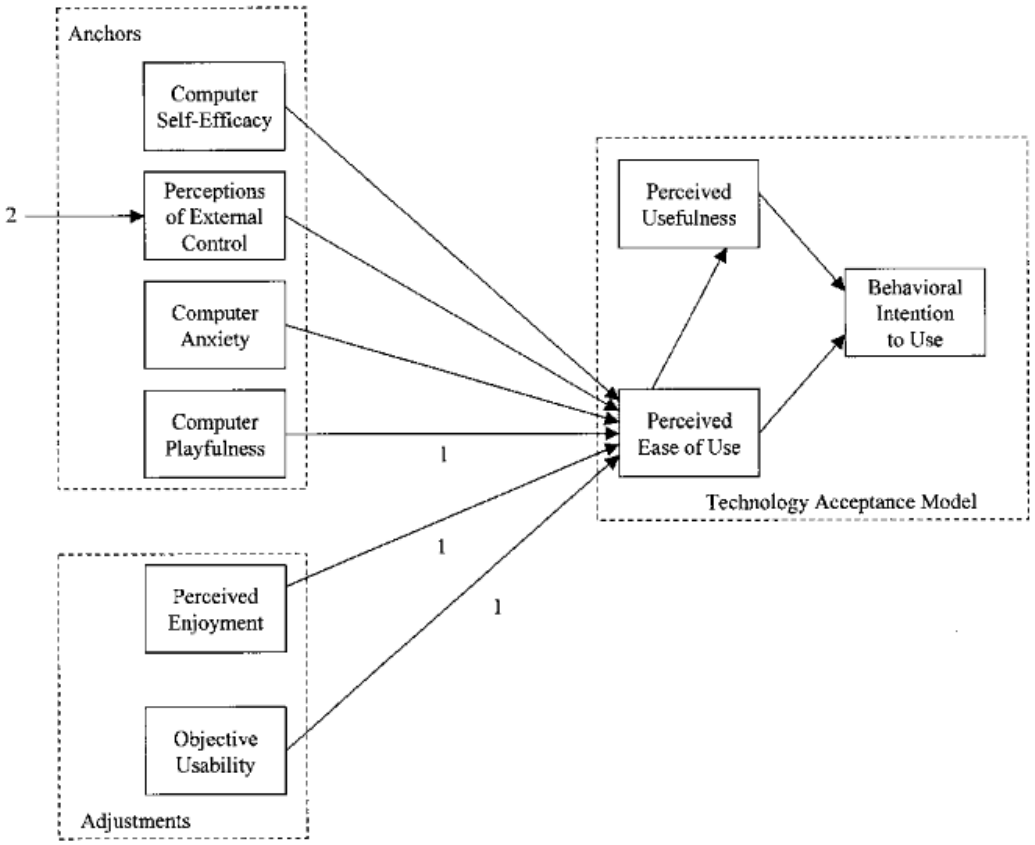


Figure 4.1: Theoretical model of the determinants of perceived ease of use from Venkatesh (2000)

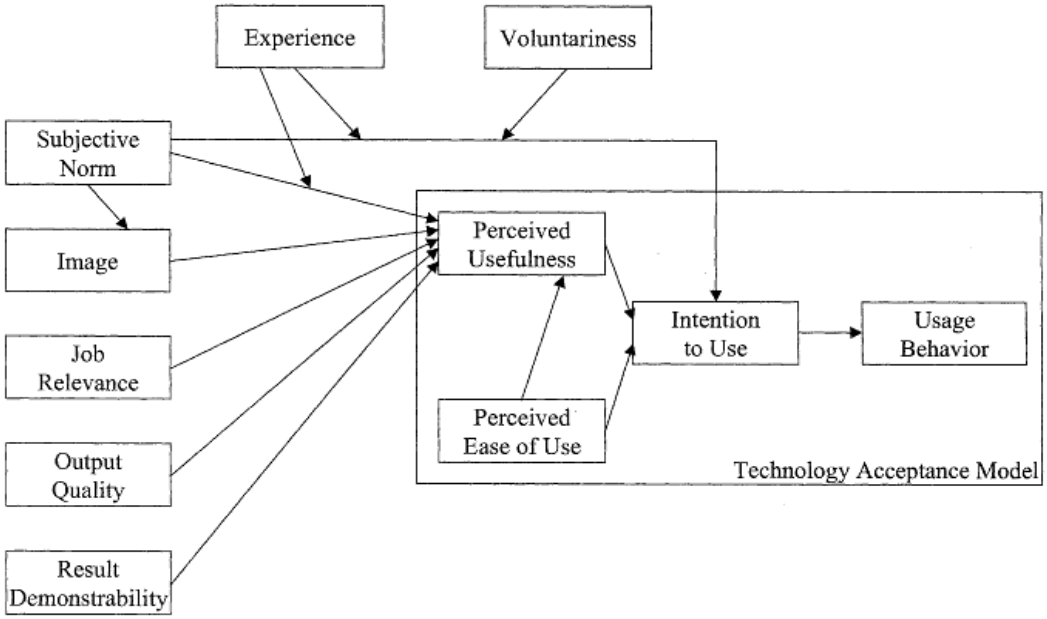


Figure 4.2: TAM2 extension of TAM from Venkatesh and Davis (2000)

In 2008, Venkatesh and Bala with the objective of presenting a complete nomological network of the determinants of individuals' IT adoption and use, developed TAM3, which is a combination of the model of the determinants of 'perceived ease of use' from Venkatesh (2000) and TAM2, which presents the determinants of 'perceived usefulness' (Venkatesh & Davis, 2000). Venkatesh and Bala (2008) suggest three theoretical extensions beyond the model of the determinants of 'perceived ease of use' and 'perceived usefulness' represented by the thick lines in Figure 4.3. Venkatesh and Bala (2008) tested TAM3 in longitudinal field studies conducted at four different organisations using Partial Least Squares, a component-based structural equation modeling technique, to analyse the data.

The identification of the technology acceptance model (TAM3) from Venkatesh and Bala (2008) was based mainly on the perception of the researcher of the importance of the two main variables of this model: 'perceived usefulness' and 'perceived ease of use'. From the researcher's professional experience, these two factors are vital for the individual adoption and consequently embedment of a new PM practice in the organisation.

The 'perceived usefulness' and the 'perceived ease of use' were identified as key factors for embedding PM practice (see section 4.6). As explained before, it was necessary to make some judgments about the level of detail to use to distinguish different embedding factors. Reasonably high level of factor description was adopted, therefore just the factors 'perceived usefulness' and 'perceived ease of use' were used rather than the variables that determine them.

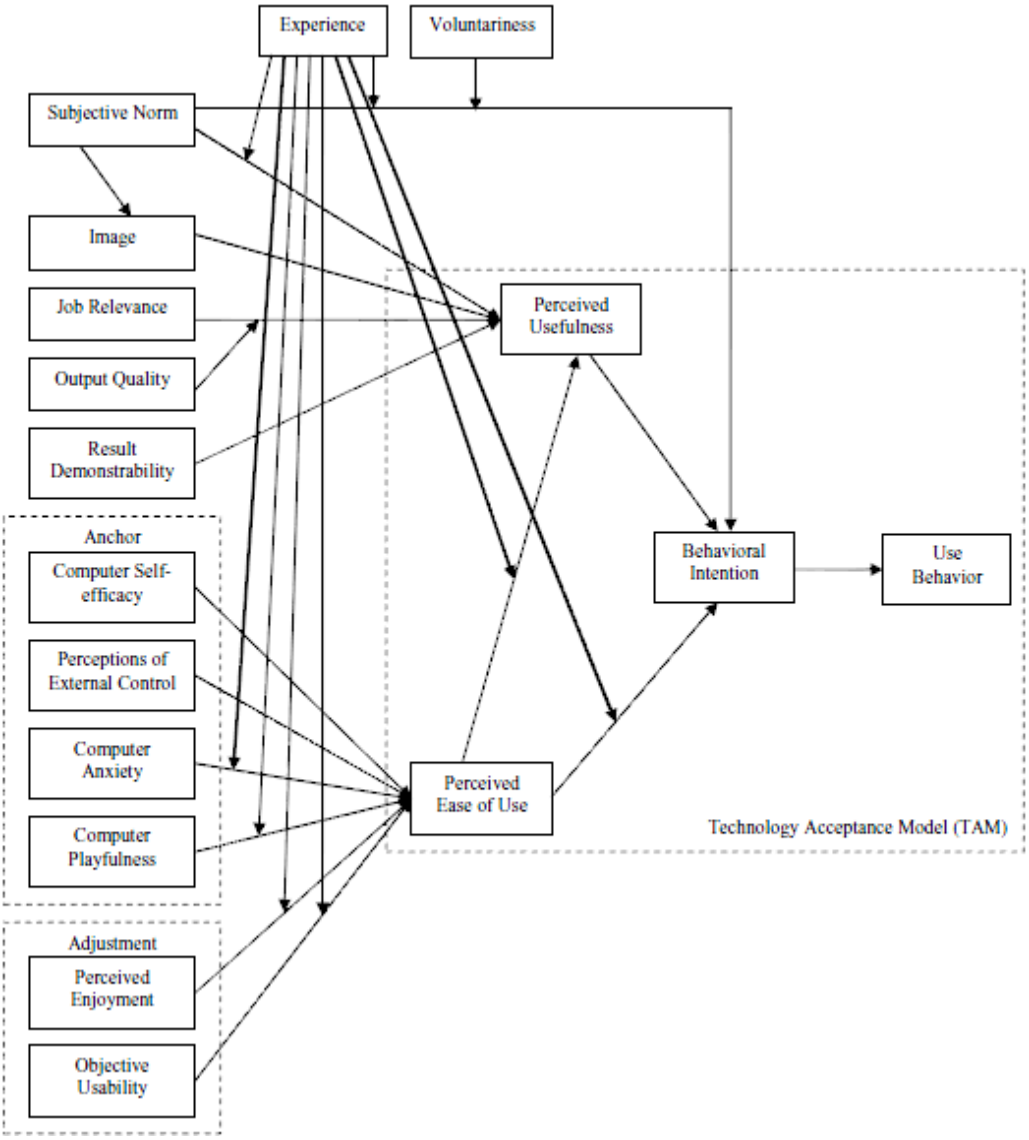


Figure 4.3: Technology acceptance model 3 from Venkatesh and Bala (2008)

4.4.3 An Organisational Perspective – Greenhalgh et al. Model

As noted in the introduction chapter, most of the research on diffusion of innovations focused on simple, product-based innovations, for which the unit of adoption is the individual (Venkatesh et al. 2000; Venkatesh & Brown, 2001; Rogers, 2003; Venkatesh & Bala, 2008). However, in the present research study our concern is beyond the individual adoption, and the unit of adoption is the organisation. In such circumstances, there is almost always a formal decision making process, an evaluation phase, and planned and sustained efforts at implementation.

Greenhalgh et al. (2004) present a conceptual model, which was the result of an extensive literature review to address the question posed by the UK Department of Health – *"How can we spread and sustain innovations in health service delivery and organisation*?" This research question is similar to the third research question of this Ph.D. research project: *How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance?* The main difference is the nature of innovations, in Greenhalgh's study are new practices (innovations) in the health service area, and in the present study are new practices in PM area.

The Greenhalgh's conceptual model is a good model mainly for three reasons:

1. Other existent models, as the well-known diffusion of innovation from Rogers (2003), tend to focus on limited aspects of innovation. For example, Rogers' diffusion of innovation model addresses the stages of innovation adoption. The conceptual framework from Wejnert (2002), integrates previous models of diffusion of innovation, discusses characteristics of innovations, adopters and environmental context, but ignores the process and dynamic issues related to innovation, such as adoption, implementation and routinisation.
2. Greenhalgh's conceptual model is the result of systematic review of the literature that was undertaken according to an explicit, rigorous and reproducible methodology, of empirical research studies. The authors developed a new technique, which they called *meta-narrative review*. A *meta-narrative* is the unfolding "storyline" of research in a particular scientific tradition (defined as a coherent body of theoretical knowledge and a linked set of primary studies in which successive studies are influenced by the findings of previous studies). The authors mapped the meta-narratives (i.e. traced the historical development of concepts, theory, and methods in each research tradition) by identifying the seminal theoretical models proposed by recognised experts. For further information see Greenhalgh et al. (2005a) paper where the *meta-narrative* approach is explained in detail. The systematic review covered 13 research areas that had, largely independently of one another, provided evidence relevant to the diffusion of innovations. These areas were:
   - rural sociology
   - medical sociology

- communication studies
- marketing
- development studies
- health promotion
- evidence-based medicine
- structured determinants of organisational "innovativeness"
- studies of organisational process, context and culture
- Interorganisational studies (networks and influence)
- knowledge utilisation
- narrative studies and
- complexity studies

which make the study one of the most comprehensive reviews of research on innovations (Carayon, 2010). The Greenhalgh et al. (2004) paper titled *"Diffusion of Innovations in Service Organizations: Systematic Review and Recommendations"* was cited in almost 2000 publications, and the work was published later on the book *'Diffusion of innovations in health service organisations: A systematic literature review'* (Greenhalgh et al. 2005b).

3. Greenhalgh et al. (2004) tested the explanatory power of the model on four case examples of the spread and sustainability of complex innovations in UK service delivery and organisation. The authors mapped the different elements of the model against what was known about the different cases through an in-depth analysis of context and processes. The model proved to be a useful analytical tool for the four case studies. Although, this study had been used only by health care sector (e.g. Carayon, 2010), the Greenhalgh et al. (2004) paper has been cited in almost 2000 publications.

The conceptual model (Figure 4.4) tried to incorporate all the influences to the success of initiatives in organisations, particularly, to the spread of good ideas for improving health care services. The model has seven key areas that interact in subtle and complex ways to influence the success of initiatives to spread good ideas for improving health services:

1. the attributes of the innovation;
2. the adoption process as engaged in (or not) by individuals;
3. communication and influence (diffusion/ dissemination);
4. the inner (organisational) context;

5. the outer (extra-organisational) context;
6. implementation process;
7. linkage among components of the model.

Although this study was conducted in a specific area, the diffusion, dissemination and routinisation of new practices in health service delivery and organisation might be applied to PM practices. The Greenhalgh's model was one of the main theoretical foundations that inspired the researcher on the identification of the themes and factors for embedding PMIIs in organisations. However, like any model, Greenhalgh's model is a simplification of reality and should be used with caution. Therefore, in order to try to enrich the development of the 'initial framework' in the embedding construct, the study considered other pieces of work from several authors, such as: Venkatesh and Bala (2008), Szulanski (1996; 2000), and Green (2004) as explained in the following sections. For example, from Venkatesh and Bala (2008) two key embedding factors 'perceived usefulness' and 'perceived ease of use' were identified, which were not included explicitly, but only implicit, in the conceptual Greenhalgh's model. Some of these perceived implicit incorporations can be seen in the following examples:

- 'perceived usefulness' in the innovation attribute 'relative advantage', for which Greenhalgh et al. (2004) argue innovations that have a clear, unambiguous advantage in either effectiveness or cost-effectiveness are more easily adopted;
- 'perceived ease of use' in the innovation attribute 'complexity', for which Greenhalgh et al. (2004) argue innovations that are simple rather than complex to use would be more easily adopted. In fact, 'complexity' is a determinant for 'perceived ease of use', and 'relative advantage' is a determinant for 'perceived usefulness'.

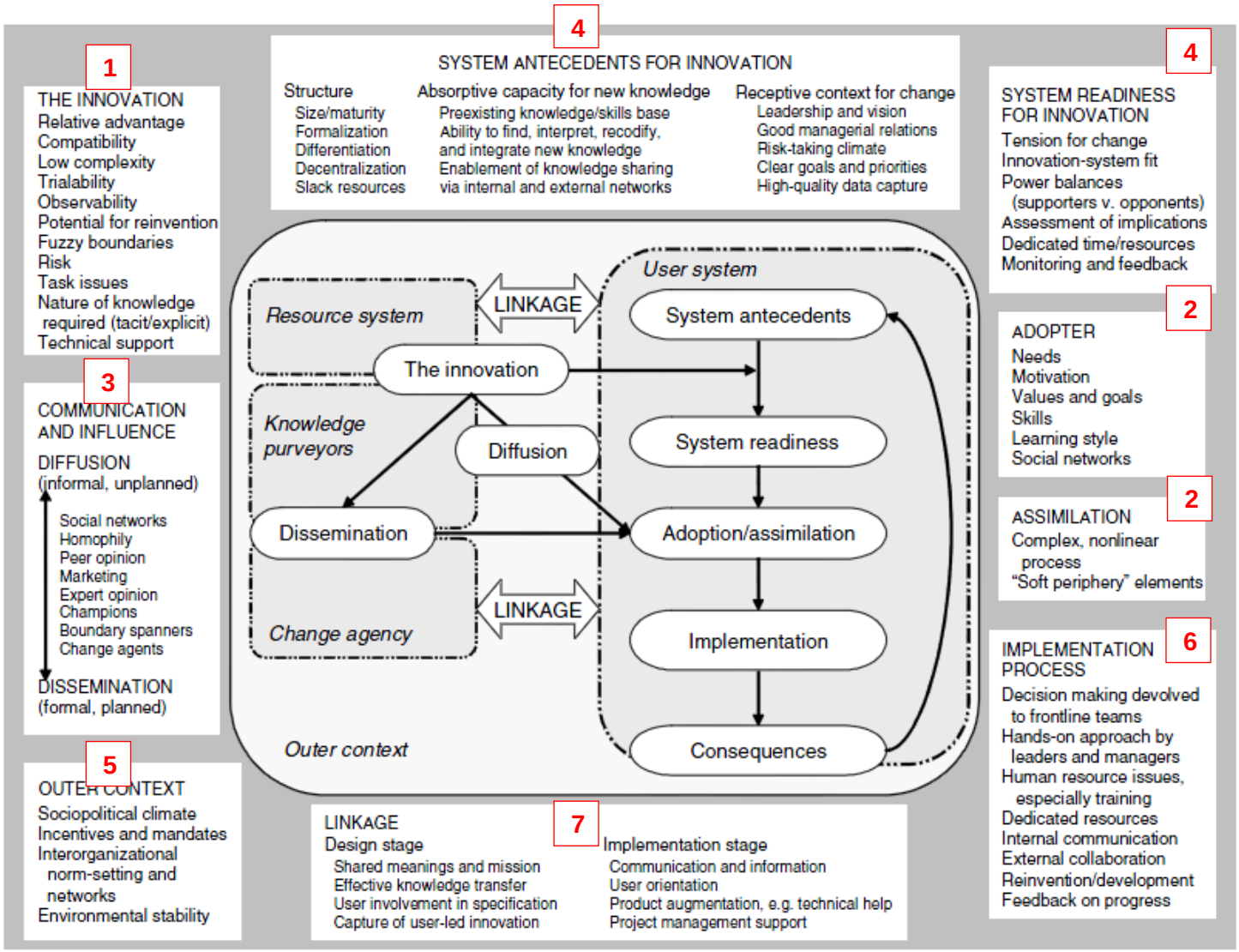


Figure 4.4: Greenhalgh's conceptual model for the diffusion and sustainability of innovation in service delivery and organisation from

4.5 Factors Relating to PMII (Innovation) Attributes

This study conceptualises PMIIs as innovations, and several empirical studies have been conducted on the description of innovations' key attributes that influence their adoption (e.g. Wejnert, 2002; Rogers, 2003; Greenhalgh et al. 2004). As a result, based on the literature review (detailed below through this section) the researcher, judging their relevance and practical application, identified under the theme 'PMII (innovation) attributes':

- relative advantage;
- compatibility;
- complexity;
- trialability;
- observability;
- re-invention;
- causal ambiguity; and
- unproven knowledge,

as likely key factors to embed PMIIs.

Relative advantage

Relative advantage is the degree to which an innovation is better than the idea it supersedes (Rogers, 2003). As argued by Desmond (2006) the merits of an idea are certainly important to the rate and extent of its diffusion. Innovations that have a clear, ambiguous advantage in terms of their effectiveness or cost-effectiveness will be more easily adopted (Rogers, 2003; Greenhalgh et al. 2004).

Compatibility

Compatibility is the degree to which an innovation is consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). In addition, it is important the coherence with other management practices of the organisation. Innovations that are compatible will be more easily adopted (Rogers, 2003; Greenhalgh et al. 2004). Bresnen et al. (2004) argue that the degree of alignment between new knowledge of a new PM practice and existing practices is likely to have an important bearing on the extent to which new knowledge is shaped as it is embedded in practice. An approach to increase the compatibility of a PMII within the organisations is to

consider the cultural characteristics of the organisation, and develop for example, processes, tools and techniques customised to the complexity, cultural and structural characteristics of the organisation (Cooke-Davies et al. 2009).

Complexity

Innovations that are simple rather than complex to use would be more easily adopted (NHS Modernisation Agency 2003; Rogers, 2003; Greenhalgh et al. 2004). Organisations should recognise the complexity of a PMII, for example, the complexity of standardise PM processes, tools and techniques, and appropriately simplify the PMII. For example, dividing into small pieces and adopting pieces of the innovation incrementally. In other words, the organisation might use an incremental approach to implement innovations, from simple to complex; from low to high knowledge (Carayon, 2010). The user perceived complexity of an innovation can also be reduced by demonstration of use and practical experience (NHS Modernisation Agency 2003).

Trialability

Trialability is the degree to which an innovation may be experimented with on a limited basis (Rogers, 2003). Innovations that can be experimented with by intended users on a limited basis will be more easily adopted (Rogers, 2003; Greenhalgh et al. 2004).

Observability

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2003). If the benefits of an innovation are visible to intended adopters, it will be more easily adopted (Rogers, 2003; Greenhalgh et al. 2004). Therefore, it is very important to the discipline of PM to demonstrate its value. As referred in section 3.7.1, the tangible benefits of PM practice are not easily demonstrated, such as the metric return on investment.

Re-invention

Re-invention is the degree to which an innovation is capable of adaptation, refinement or modification (Rogers, 2003). If a potential adopter have the opportunity, autonomy, and support to adapt, refine or modify an innovation to suit his or her own needs, it will more easily be adopted (Rogers, 2003; Greenhalgh et al. 2004). Most innovations go through some form of

modification, either before, during or after implementation, to improve their effectiveness and fit within the organisation (Rogers, 2003).

Causal ambiguity or uncertainty

Causal ambiguity or uncertainty reflects the adopter depth of knowledge about the cause-effect relationships of adopting new practice (Szulanski, 1996). The search for new practices and the decision to proceed with its embedment inevitable occurs under some degree of uncertainty (Szulanski, 2000). If a new practice carries a high degree of uncertainty of outcome that the individual perceived as personally risky, it is less likely to be adopted (Greenhalgh et al. 2004).

Unproven knowledge

Unproven knowledge relates to the degree of conjecture on the utility of the knowledge to embed. If a new practice has no proven record of past usefulness is more difficult to adopt (Szulanski, 1996; 2000). As argued by Englund and Bucero (2006), it is important to use proven PM principles.

4.6 Factors Relating to Adopter and Adoption Process

Adoption of PMIIs (innovations) is typically accomplished by individuals (adopters). Based on the literature review (detailed below through this section) the researcher, judging their relevance and practical application, identified under the theme 'adopter and adoption process by individuals' six key factors:

- Adopter motivation;
- perceived usefulness;
- perceived ease of use;
- beliefs of similarity or difference from others industries;
- gender and age differences;
- nature of adoption decision – mandatory.

Adopter Motivation

The adoption and continued usage of new practices (innovations) by adopters depend on their motivation (Szulanski, 1996; 2000; Greenhalgh et al. 2004). Adopters need to be convinced that the new practice will help them to meet

their own objectives in a cost effective manner, both directly and indirectly through enhanced organisation performance (Ward, 2004).

Adopter's interest and involvement is influenced by how the new practice has been launched (NHS Modernisation Agency, 2003). For example, if adopters are reluctant to accept external knowledge. This phenomenon is referred to as the not-invented-here (NIH) syndrome (Katz & Allen, 1982; Lichtenthaler & Ernst, 2006). The researcher, as a consultant, has experienced this syndrome in Portuguese companies, particularly in the construction sector. This lack of motivation may result in passivity, feigned acceptance, sabotage, or outright rejection in the use of new practice.

Perceived usefulness

The Technology Acceptance Model (TAM3) posits that adopter acceptance is determined by two key beliefs, namely 'perceived usefulness' and 'perceived ease of use' (Venkatesh & Bala, 2008). Perceived usefulness is the person believes that a particular technology will enhance her/ his job performance. As argued by Greenhalgh et al. (2004) a new practice is more likely to be adopted if adopters are aware of the new practice, have sufficient information about what it does and how to use it, and are clear about how the new practice would affect them personally.

In the case of PMIIs, one way that perceived usefulness can be improved is by increasing awareness of the benefits of good PM practices, which can be carried out, for example, through more effective communication (Clarke, 1999). Mengel et al. (2009) argue that it is necessary to be aware of people's sense of satisfaction (and dissatisfaction) in PM implementations, since it is a crucial factor when it comes to the (perceived) value of PM to organisations. Therefore, perceived usefulness maybe strongly influenced by the capacity of the organisation to demonstrate the PMII value.

Perceived ease of use

Perceived ease of use is defined as the degree to which a person believes that using a technology will be free from effort (Venkatesh, 2000; Venkatesh & Morris, 2000; Venkatesh & Bala, 2008). In the case of PMIIs, a new PM practice is more likely to be adopted if adopters perceive that a new practice is easy to use.

Beliefs of similarity or difference from other industries

Bresnen and Marshall (2001) argue that the transfer of new management ideas from other industries might be affected by the adopter's beliefs of similarity or difference from others industries. For example, from the researcher's professional experience, in Portugal, professionals have the perception that PM is more suitable to IT industry rather than construction industry. As a consequence, construction practitioners have more difficulty with the adoption of new PM practices, such as, earned value management, than IT practitioners.

Gender and age differences

There is a significant body of evidence even outside the domain of information systems in general supporting the viewpoint that gender can play a critical role in influencing behaviours in a wide variety of domains (Venkatesh & Morris, 2000).

Gender differences were observed even when key potential confounding variables (i.e. income, occupation and education levels), were taken into account (Venkatesh et al. 2000). Venkatesh et al. (2000) employed the theory of planned behaviour (TPB) (section 4.4.1) to show that men and women adopt very different decision processes in evaluating new adoptions. For example, for men it is more important to emphasise productivity-enhancement factors, such as perceived usefulness of a new practice, while for women factors that may be more salient are claims by peers or other referents and the availability of adequate support. While men still represent a majority of the workforce, the number of women at all levels of the organisation hierarchy continues to rise. Therefore, models that overlook gender as an important factor may overestimate the influence of productivity-oriented factors, while simultaneous underestimating the importance of ease of use perceptions and social influences (Venkatesh & Morris, 2000; Venkatesh et al. 2004).

Morris and Venkatesh (2000) also employed the theory of planned behaviour (TPB) and concluded that at least for technology adoption decisions, age, in fact, matters. Younger workers are more strongly influenced by their own favorable/ unfavorable evaluation of the behaviour in question, if they perceive or not, the usefulness of the adoption. In contrast, older workers are more strongly influenced by (1) perceived social pressure to perform (or not perform) the behaviour in question, and (2) the extent to which the person

believes he/ she has control over personal or external factors that may influence or constrain the behavioural performance.

However, like it happens with women, the effect of perceived social pressure to perform (or not perform) the behaviour in question diminished over time, (Morris & Venkatesh, 2000). Given increases in the expected working life of individuals, this finding has important implications for the process by which new management approaches are developed, introduced and managed within organisations.

Nature of adoption decision - mandatory

Rogers (2003) describes the innovation-decision process as the mental process through which an individual (or other decision-making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject the use of the new idea, and to the confirmation of this decision. Individuals seek information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences.

The decision by an individual within an organisation to adopt a particular innovation is rarely independent of other decisions. Rogers (2003) argues that the nature of adoption decision might be:

- optional, i.e. the choice to adopt or reject an innovation by an individual is independent of other individuals in the organisation;
- collective, i.e. the individual has a "'vote" but ultimately must follow the decision of a group;
- authoritative (mandatory), i.e. the individual is told to adopt the innovation; and
- contingent, i.e. it is dependent on a decision made by someone else in the organisation.

Greenhalgh et al. (2004) argue that generally, the fastest rate of initial adoption results from authoritative (mandatory) decisions, but may also reduce the chance that the innovation is successfully implemented and routinised. The researcher's professional experience suggests that it is important that the nature of the adoption decision is mandatory (authoritative), i.e. the new PM practice implemented in the organisation must be used, since, in most cases, if it is optional, practitioners will simply not routinely use it.

4.7 Factors Relating to Communication and Influence (Diffusion/ Dissemination)

Most types of communication and influence can be thought of as lying on a continuum between pure diffusion and active dissemination. As referred in the introduction chapter, in pure diffusion, the spread of innovations is unplanned, informal, decentralised, and principally horizontal or mediated by peers. In active dissemination, the spread of innovation is planned, formal, often centralised, and likely to occur more through vertical hierarchies.

Based on the researcher's judgment of their relevance in literature and practice under the theme 'communication & influence' a total of ten key factors were identified, as might influence the embedment of PMIIs:

- demonstrating the PMII value;
- homophily;
- interpersonal channels;
- opinion leaders;
- use of rhetoric theory;
- adopter involvement;
- motivation of the source of the knowledge;
- credibility of source of the knowledge;
- relationship between the source of the knowledge and the adopter; and
- feedback on the PMII impacts.

Demonstrating the likely value of a PMII

Earlier in section 3.7.1, it was discussed the importance of the PMII 'develop awareness of PM value' in general to improve PM practice. Here as an embedding factor, it is discussed the importance of the effective communication of the value of a particular PMII across the structural boundaries within the organisation prior to its implementation, namely, as argued by Englund and Bucero (2006) the positive bottom-line impact on the organisation. In particular to risk management, Ward (2004) argues that effective risk management should provide a process that has visible, direct benefits to the parties involved. Several studies have demonstrated the benefits of investing in PM, for example, the study – "Researching the Value of PM", from Thomas and Mullaly and their colleagues (Thomas & Mullaly, 2008). However, it is important that organisations evaluate project and organisational

performance impact of a particular PMII to the organisation. The advantages of new practices must be recognised and acknowledge to key people involved in the process (NHS Modernisation Agency, 2003). The costs associated with not applying the specific PMII, should also be described and evaluated.

Showing adopters the value of a PMII would increase the 'perceived usefulness' by the user, which is, as discussed above, crucial to the adoption of innovations (Venkatesh & Bala, 2008). To demonstrate and measure the PMII value organisations could also use for example the five level framework from Thomas and Mullaly (2007) or the framework from Zhai et al. (2009) discussed in section 3.7.1.

Homophily

Homophily is the degree to which two or more individuals who interact are similar on certain attitudes, such as beliefs, education, social status, and likes (Rogers, 2003). The adoption of an innovation by individuals is more likely if they are homophilous (NHS Modernisation Agency, 2003; Rogers, 2003; Greenhalgh et al. 2004). Most human communication takes place between individuals who are homophilous. However, the heterophily is often present in diffusion of innovation, which leads to special problems in securing effective communication. But, according to (Rogers, 2003), the nature of diffusion demands that at least some degree of heterophily be present between the participants in the communication process.

From the researcher's professional experience, some failures of PMIIs are caused by a 'high level' of heterophily between the change agent, often an external consultant, and the adopter. Ideally, the support and involvement of external consultants should be homophilous with the members involved in the process of change.

Relationship between the source of the knowledge and the adopter

The type of relationship between the source of the knowledge and the adopter will influence the likelihood of adoption (Szulanski, 1996; Greenhalgh et al. 2004). As argued by Szulanski (1996, p 32) *"An arduous (i.e., laborious and distant) relationship might create additional hardship in the transfer"*. A capable and trustworthy source is more likely to influence the behaviour of the adopter (Szulanski, 2000). Regarding the focus of this research, we might say, that a distant and very formal relationship between the source of knowledge

and the adopter might create additional difficulty in the PMII embedment. On the contrary, an intimacy relationship might create an easier environment for embedding.

Interpersonal channels

Interpersonal channels are the most effective channels in forming and changing attitudes toward an innovation (NHS Modernisation Agency, 2003; Rogers, 2003; Greenhalgh et al. 2004). Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. Mass media channels are more effective in creating knowledge of innovation, whereas interpersonal channels are more effective in forming and changing attitudes toward an innovation, and thus in influencing the decision to adopt or reject, in this research, a PMII (Rogers, 2003). Therefore, as argued by Greenhalgh et al. (2004) the adoption of new practices by individuals is powerfully influenced by the structure and quality of their social network.

Opinion leaders

Certain individuals have particular influence on the beliefs and actions of their colleagues. Opinion leadership is the degree to which an individual is able to influence informally other individuals' attitudes and behaviour (Rogers, 2003). It is important the existence of opinion leaders, influencers who will encourage the adoption of new practices, who could have active local networks to spread new practices (NHS Modernisation Agency, 2003; Greenhalgh et al. 2004). As argued by Loo (2002) the no existence of influencers of PM principles in the organisation is a potential barrier for achieving PM improvements. However, it is important to realise that opinion leaders can have either a positive or negative influence on the adoption of innovations (Ferlie et al. 2005). Therefore, organisations should determine and nurture individuals who already support PM practice (Englund & Bucero, 2006), in order to help overcoming the scepticism and resistance among key individuals. These individuals (near-pears) would serve as role models, whose innovation behaviour tends to be imitated by others in their system. Consequently, this research project suggests that specific roles and relationships, the effective use of teams who drive changes, and provide guidance and support, might be key to successfully embed a PMII.

Use of rhetorical theory

Green (2004) argues that the diffusion of an innovation depends on the discursive justifications to rationalise it. Rhetoric is a type of instrumental discourse used to persuade audiences, reach reliable judgments or decisions and coordinate social action. Rhetorical theory emphasises how social actors' cognitive limits enable language to shape both the means and ends of their actions. A rhetorical perspective suggests that managers play an active role in the diffusion process, because what managers say, and how they say it, matter a great deal (Watson, 1995).

Rhetoric can influence the motives driving firms to adopt innovations and shape the social structure through which those practices diffuse (King & Kugler, 2000). The basic assumption underlying a rhetorical theory of diffusion is that the type and sequence of discursive justifications determine the speed and extent of diffusion that a practice achieves, and shapes the degree of taken-for-grantedness that the practice attains. Rhetorical theorists propose three main types of rhetorical justifications (Bizzell & Herzberg, 1990; Herrick, 1997; King & Kugler, 2000):

- Pathos justifications (e.g. fear, greed) impact emotion and are likely to elicit powerful yet unsustainable social action.
- Logos justifications affect the logical part of the mind; they tend to elicit methodical calculation of means and ends to achieve efficiency or effectiveness.
- Ethos justifications (e.g. sacrifying self-interests for honor, tradition, or justice) impact moral or ethical sensibilities.

Green (2004) suggests that the sequence of justifications that those seeking innovations should pursue to enhance the probability of diffusion is pathos, followed by logos, and ending with ethos justification. Pathos will have a rapid rate of initial adoption, with logos a broad diffusion, and with ethos a slow abandonment.

In addition, the rhetorical theory indicates that to diffuse an innovation by an organisation we need to find a good justification more than give many small reasons (Green, 2004). The more compelling and convincing a justification of supporting a managerial practice is, the less the justification needs to be repeated or sustained in order to maintain the practice. However, it is important to note, that when organisations are embedding new practices

should also look to the weaknesses of the new practice, since when practitioners are looking for innovations, tend to look just for the strengths and ignore the weaknesses (Bresnen & Marshall, 2001).

Adopter involvement

Early and widespread involvement of adopters in the implementation process of a new practice enhances the success of embedment of the new practice in the organisation (NHS Modernisation Agency, 2003; Greenhalgh et al. 2004). Involvement is seen as a key process for achieving behavioural change (Burnes, 2004a). For example, Eskerod and Riis (2009) argue that project managers should have a high level of involvement in the implementation of PM methodologies.

Motivation of the source of the knowledge

It is important the motivation of the source unit to support the embedment of new practices (Szulanski, 1996; 2000). If the knowledge holders have fear of losing ownership of the knowledge, they would not be motivated to support the effective embedment of the new practice, creating difficulties in the embedding process.

Credibility of source of the knowledge

For the success of a new practice embedment it is very important the recognition by the adopter of the credibility of the source of the knowledge, i.e. the degree to which the donor of the 'best practice' is perceived as reliable, that is a trustworthy source (Szulanski, 1996; Greenhalgh et al. 2004). As argued by Perloff (2010) a trustworthy source is more likely than others to influence the behaviour of the adopter.

Feedback on the PMII impacts

Accurate and timely information about the impact of the implementation of the new practice (through efficient data collection and review systems) increases the chance of successful embedment (Greenhalgh et al. 2004).

4.8 Factors Relating to Inner Context

As mentioned in the introduction chapter, different organisations provide widely differing contexts for innovations, and a number of features of

organisations (both structural and 'cultural') have been shown to influence the likelihood that an innovation will be successfully embedded (Nystrom et al. 2002; Sharma & Rai, 2003). For example, Bresnen et al. (2004) argue that the embedment of new management knowledge in project based organisations is likely to be significantly influenced by the complex interplay between wider structural conditions within the organisation and the existing routines used by project managers.

Under the theme 'inner context', based on the researcher's judgment of their relevance in literature and in practice, identified four key factors that might influence the embedding of PMIIs in organisations:

- structure and resources to support change;
- absorptive capacity for new knowledge;
- receptive context for change;
- readiness for change.

Structure and resources to support change

Greenhalgh et al. (2004) argue that organisations are more likely to embed innovations, if their structure is large (size); mature; functionally differentiated (i.e. divided into semi-autonomous departments); and specialised (with foci of professional knowledge); it has decentralised decision making structures (not formal structure). Formal structures and systems and very formal relationships between the source of the innovation knowledge and the adopter create additional difficulty in the embedment of innovations (Ghoshal & Bartlett, 1994; Szulanski, 1996; 2000; NHS Modernisation Agency, 2003).

In addition, if there are dedicated and on-going resources for the innovation its embedment in the organisation is more likely (NHS Modernisation Agency, 2003; Greenhalgh et al. 2004). As argued by Loo (2002) one of the potential barriers for achieving PM improvements is that everyone is already busy and improvements require allocating even more time and energy into work. From the researcher's professional experience, small organisations may find more challenging to have access to PM expertise and resources available to engage in PMIIs, because of its small size. One mechanism to make available the necessary resources is to have the top management support.

Absorptive capacity for new knowledge

Absorptive capacity for new knowledge is the ability of the organisation to identify value and apply new knowledge. Adopters might be unable to exploit outside sources of knowledge, that is, they may lack absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002). An organisation that is systematically able to identify, capture, interpret, share and re-codify new knowledge, to link it with its own existing knowledge base, and to put it to appropriate use, will be better able to embed new practices (Szulanski, 1996; 2000; Greenhalgh et al. 2004).

Greenhalgh et al. (2004) assume that there are prerequisites for absorptive capacity, which include:

- the organisation's existing knowledge and skills base (especially its store of tacit, uncodifiable knowledge);
- pre-existing related technologies, and;
- a "learning organisation" culture, and proactive leadership directed toward sharing knowledge. This can occur through direct participation on multidisciplinary projects that involve new practices or through project reviews in which cycles of learning and feedback occur (Carayon, 2010).

Receptive context for change

An organisation that has the general features associated to a receptive context for change will be better able to embed innovations (Greenhalgh et al. 2004). These features include strong leadership and support, i.e. sponsorship (Kotter, 1996; Loo, 2002; Nystrom et al. 2002; Sharma & Rai, 2003; Englund & Bucero, 2006; Kerzner, 2009), clear strategic vision, good managerial relations, visionary staff in key positions, a climate conducive to experimentation and risk-taking, and effective monitoring and feedback systems (Greenhalgh et al. 2004).

Leadership may be especially helpful in encouraging organisational members to break out of the convergent thinking and routines that are the norm in large, well-established organisations.

Commitment by top management has been identified as a critical factor in the change management literature in general (Kotter, 1996). From the researcher's professional experience, top management support and continued commitment to the PMIIs is critical for the success of its embedment. Involving top

managers and other organisational leaders early in the embedding process is important to provide the necessary support and commitment for the PMIIs embeddedness.

Readiness for change

An organisation may be amenable to innovation in general but not ready or willing to embed a particular innovation. An organisation that has readiness for change will be more capable to embed innovations (NHS Modernisation Agency, 2003; Greenhalgh et al. 2004).

An organisation is ready for the embedment of innovations if there is tension for change. There is a generalised pressure on organisations to improve project performance; this creates a more receptive environment to change. Organisational readiness for innovation is also influenced by the:

- innovation–system fit, i.e. the fit between the innovations and the organisation's values, norms, strategies, goals and ways of working
- assessment of implications: has the impact of the innovation effort been fully assessed and anticipated?
- support: is there adequate support for innovations within the organisation?
- dedicated time and resources: have resources been allocated to the innovation? and
- capacity to monitor and evaluate the innovation: is there a system in place for evaluating the actual and anticipated effects of the innovations?

All of this requires significant preparation work before the PMII implementation to ensure that the organisation is ready for the change.

4.9 Factors Relating to Outer Context

The success of an organisation to embed a PMII, also depends on ideas and information brought together from outside. Based on the researcher's judgment of their relevance in literature and in practice, the main external factors identified that might influence the embedment of PMIIs are: interorganisational PM practices and external mandates.

Interorganisational PM practices

An important influence on an organisation's decision to embed is whether a threshold proportion of comparable (homophilous) organisations have done or plan to do the same innovations (Greenhalgh et al. 2004). One mechanism to improve the dissemination of new practices is to create collaborative groups of organisations interested in new improvements. Effective collaborative groups would be those with motivated participants that have effective facilitation and technical support on the new practice (Johnston & Linton, 2000; Carayon, 2010).

The dominant perspective in the diffusion innovation literature reviews contains proinnovation biases, which suggest that innovation and the diffusion of innovations will benefit adopters. Abrahamson (1991) focused attention on three less dominant perspectives: fad perspective; fashion perspective and forced-selection perspective. Fads and Fashions in management are well understood phenomena (Abrahamson & Fairchild, 1999; Whitty & Maylor, 2009). Fads or fashions could facilitate the diffusion of technically inefficient new management approaches or administrative technologies. According to the fads and fashions theory proposed by Abramson (1991) decision makers feel impelled to accept innovations as some practices come to be seen as more modern, professional or leading edge. The forced-selection perspective indicates that a number of organisations control sufficient power to dictate which new management approaches or administrative technologies will diffuse across organisations, which might not be the case of PMIIs.

External mandates

External mandates (political 'must-dos') increase the predisposition of an organisation to embed a new practice (Greenhalgh et al. 2004). These external mandates in PM area use to come from clients. For example, Martinsuo et al. (2006) from a survey questionnaire have identified external pressure as one of the two main drivers for introducing project-based management (the other driver was internal complexity).

4.10 Factors Relating to Implementation

The success of an organisation to embed a PMII also depends on the implementation process. However, the success of implementation and the chances of routinisation are also critically dependent on attributes of the innovation, the behaviour of individual adopters, the nature of communication and influence (diffusion/ dissemination), and various structural and sociological features of the organisation and its wider environment, discussed in the earlier sections. Therefore, under the theme 'implementation' several factors were identified, however these factors are also related to other themes, for example 'resources to support change' identified under the theme 'inner context' or the 'feedback on the PMII impacts' identified under the theme 'communication & influence'. As a result, in this theme only two key embedding factors from literature were identified: specific training and effective change agents.

Specific training

The successful implementation and routinisation of a new practice is more likely if the adopter has sufficient information about what it does and how to use it, having sufficient training and support on task issues (Greenhalgh et al. 2004). Carayon (2010) argues that if a new practice changes the way work is done and tasks are performed, attention should be dedicated to training so that organisation workers learn the new tasks and working methods. When job changes and there are few and clear, high-quality training materials available, and timely on-the-job training is provided, successful implementation and routinisation is more likely (Greenhalgh et al. 2004). Loo (2002) found that the organisational sightedness was seen as one impediment to investing funds in training for the long term payoff. The costs of training and time way from job for training courses were seen as barriers, and the inadequate investment in training results in a potential barrier for achieving PM improvements.

The implementation of a new practice usually involve a two-step sequence of first "learning before doing" (Pisano, 1996) – either by planning (Argote, 1999) or by experimenting in a contrived setting before knowledge is actually put to use by the adopter – and then "learning by doing" which entails the resolution of unexpected problems that arise when new knowledge is put to use by the recipient (Hippel & Tyre, 1995).

Effective change agents

A change agent is an individual who attempts to influence clients' innovation-decisions in a direction that is deemed desirable by a change agency. As argued by Desmond (2006) the power of the promoter of a certain idea is of great importance for the diffusion of new ideas. An aide is less than fully professional change agent who intensively contacts clients to influence their innovation-decisions. Aides are usually homophilous with the average client, and thus provide one means of bridging the heterophily gap frequently found between professional change agents and their client audience (Rogers, 2003).

Usually, change agents transfer their knowledge and expertise to a small group of selected employees. Over time, this group of employees gains the knowledge and experience of the new practices and can represent the seeds for disseminating knowledge and skills through the organisation (Carayon, 2010).

If a change agent is part of the innovation, the likelihood of a successful innovation adoption increases (Rogers, 2003) and the consequently embedment. From the researcher's professional experience, in the PM area is common that change agents are external to organisations. In this case, external change agents will be more effective if they are: 1) selected for their homophily and credibility with the potential adopters of the new practice; 2) trained and supported to develop strong interpersonal relationships with potential adopters and to explore and emphasise the adopter's perspective; 3) encouraged to communicate the adopter's needs and perspectives to the developers of the new practice; 4) able to empower the adopters to make independent evaluative decision about the new practices (Greenhalgh et al. 2004).

Menon and Pfeffer (2003) found that organisational members are more likely to value knowledge from external than from internal sources. Individuals might value external knowledge because they are less familiar with its limitations and because valuing external knowledge would not reduce their own status.

4.11 Conclusions

The conceptual model for the spread and sustainability of innovation in service delivery and organisation from Greenhalgh et al. (2004), and the technology acceptance model3 (TAM3) from Venkatesh and Bala (2008) were selected as the main theoretical foundation for the embedding construct. These two works were selected for numerous reasons, taking into account the similitude of objectives, robustness, empirical evidence obtained, multidisciplinary teams and multitude of organisational contexts (Greenhalgh model), but also due to the relevance of the variables being used, namely 'perceived usefulness' and 'perceived ease of use' (TAM3).

Through literature review a number of key factors were identified, which might have greatest impact on embedding PMIIs. Table 4.1 presents a summary of the key embedding factors with the different authors that addressed each of them in literature.

The identification of the key embedding factors is intended mainly as a memory aide for considering the different aspects that might have impact in the successful embedment of a PMII. It should not be viewed as a prescriptive formula for success. As argued by Greenhalgh et al. (2004) organisations that are making efforts toward improving practice are likely to go through a "messy" process. Carayon (2010) argues that organisations should be aware of innovation adoption stages and adapt innovations to the adoption stage. Translating this idea for the PMIIs embedding process, different concerns are dominant at different stages of the process, i.e. the key embedding factors might assume a higher or a lower influence in the process depending on the embedding stage. The key embedding factors related to 'PMII (innovation) attributes', 'adopter & adoption', 'inner context' and 'outer context' might have influence during the whole embedding process. However, the factors related to 'communication & influence' would have more influence during the process stage diffusion and dissemination, and the factors related to 'implementation' would have more influence during the stage implementation. For example, an organisation that wants to embed a systematic process to progress reporting using the earned value management (EVM) technique, would start, in the 'communication & influence' (diffusion/dissemination) stage, concentrating efforts to create awareness of the value of the EVM

Table 4.1: Key themes and factors for embedding PMIIs

Theme	Factor	Authors
PMII (Innovation) Attributes	Relative advantage	Rogers (2003); Greenhalgh et al. (2004)
	Compatibility	
	Complexity	
	Trialability	
	Observability	
	Re-invention	
	Causal ambiguity or uncertainty	Szulanski (1996; 2000); Greenhalgh et al. (2004)
	Unproven knowledge	Szulanski (1996; 2000); Englund & Bucero (2006)
Adopter & Adoption	Adopter motivation	Szulanski (1996; 2000); NHS Modernisation Agency (2003); Greenhalgh et al. (2004); Ward (2004)
	Perceived usefulness	Venkatesh (2000); Venkatesh & Morris (2000); Venkatesh & Davis (2000) Venkatesh & Bala (2008);
	Perceived ease of use	
	Beliefs of similarity or difference from others industries	Bresnen & Marshal (2001)
	Gender and age differences	Morris & Venkatesh (2000); Venkatesh & Morris (2000); Venkatesh et al. (2000); Venkatesh et al. (2004)
	Nature of adoption decision-mandatory	Rogers (2003); Greenhalgh et al. (2004)
Communication & Influence	Demonstrating the PMII value	NHS Modernisation Agency (2003); Englund & Bucero (2006); Thomas & Mullaly (2007); Thomas & Mullaly (2008); Zhai et al. (2009)
	Homophily	Loo (2002); Rogers (2003); NHS Modernisation Agency (2003); Greenhalgh et al. (2004)
	Interpersonal channels	
	Opinion leaders	
	Use of rhetoric theory	Green (2004)
	Adopter involvement	Burnes (2004a); Greenhalgh et al. (2004); Eskerod & Riis (2009)
	Motivation of the source of the knowledge	Szulanski (1996; 2000)
	Credibility of source of the knowledge	Szulanski (1996; 2000); Greenhalgh et al. (2004)
	Relationship between the source of the knowledge and the adopter	
	Feedback on the PMII impacts	Greenhalgh et al. (2004)
Inner Context	Structure and resources to support change	Szulanski (1996; 2000); Loo (2002); NHS Modernisation Agency (2003); Greenhalgh et al. (2004)
	Absorptive capacity for new knowledge	Szulanski (1996; 2000); Greenhalgh et al. (2004)
	Receptive context for change	Loo (2002); Nystrom et al. (2002); Sharma & Rai (2003); Englund & Bucero (2006); Greenhalgh et al. (2004); Kerzner (2009)
	Readiness for change	NHS Modernisation Agency (2003) ; Greenhalgh et al. (2004)
Outer Context	Interorganisational PM practices	Abrahamson (1991); Abrahamson & Fairchild (1999); Johnston & Linton (2000); Greenhalgh et al. (2004); Whitty & Maylor, 2009
	External mandates	Greenhalgh et al. (2004); Martinsuo et al. (2006)
Implementation	Effective change agents	Rogers (2003); Greenhalgh et al. (2004)
	Specific Training	Greenhalgh et al. (2004); Carayon (2010)

technique, and gathering information about the technique needs to be disseminated; in the implementation stage, training on the concept and use of the technique may be necessary. Over time, in the routinisation stage, the organisation would evaluate and communicate the impact of the use of EVM technique to project management performance.

This chapter and chapters 3 and 2 comprise the literature review of this research project. The literature review was conducted as a first attempt at framework conceptualisation for embedding useful PMIIs gave rise to the 'initial framework', presented in Figure 4.5. The 'initial framework' includes a total of fifteen key PMIIs and thirty two key embedding factors, categorised into different themes. During literature review it was not explored how the identified key PMIIs and key embedding factors are related. Therefore, the 'initial framework' just shows a link between the boxes 'key themes and PMIIs to improve' and 'key themes and factors to embed' to highlight the relationship between these two concepts.

The 'initial framework' developed includes a plausible set of key PMIIs and embedding factors. However, a different researcher setting out to answer the same research questions might have produced a different 'initial framework'. A different set of primary sources might have been identified. For example, Chan and Thong (2009) conducted a critical review and developed a conceptual framework for the acceptance of agile methodologies (e.g. Scrum or XP), and adopted a knowledge management perspective to the acceptance of agile methodologies due to the central roles played by knowledge creation, knowledge retention, and knowledge transfer in the use of agile methodologies. Chan and Thong (2009) argued that the acceptance is influenced by the key knowledge outcomes (knowledge creation, retention, and transfer), the knowledge outcomes are influenced by several factors identified from literature and based on the framework by Argote et al. (2003b) they classify the factors into:

- Ability-related factors (includes: systems development methodology self-efficacy; experience; training; and external support)
- Motivational related factors (includes: career consequence; top management support; voluntariness, subjective norm, and organisational culture)

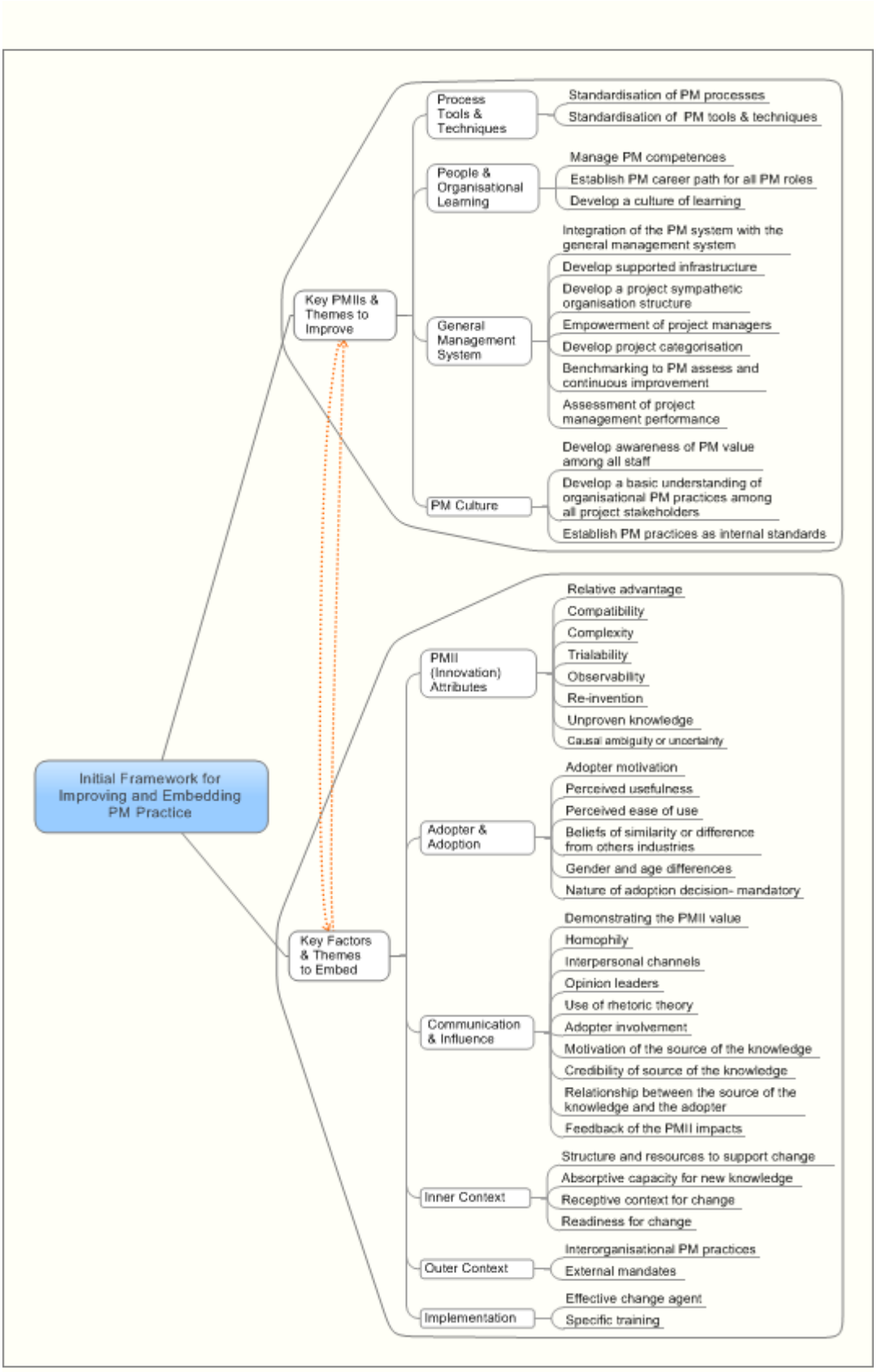


Figure 4.5: 'Initial framework' for improving and embedding PM practice

- Opportunity related factors (includes: teamwork; communication; shared understanding; and arduous relationship).
- Agile methodology characteristics related factors (includes: perceived usefulness; perceived ease of use; perceived compatibility; result demonstrability; and perceived maturity)

Although Chan and Thong (2009) presented a distinct conceptual model from the 'initial framework' developed in this research, most of the factors identified by Chan and Thong (2009) are in 'some way' identified also in the 'initial framework', even if not explicitly, using the same words, as it happens with the factors 'perceived usefulness' and 'perceived ease of use'. But with similar words or similar meaning, with for example: result demonstrability, classified as an agile methodology characteristic, and in the 'initial framework' is identified 'feedback on PMII impacts' under the theme 'communication & influence '.

The research here reported was followed by an exploratory empirical work, in order to progress in the development of the framework, namely, shaping ideas, concepts, and insights to the inner working of improving and embedding PM practice. The following Chapter 5 – research methodology justifies and describes the steps of the empirical work.

5. Research Methodology

5.1 Introduction

This chapter explains the research methodology that was used in this thesis. The researcher begins by explaining the methodology of the study through discussion of the main rationale and philosophical assumptions that underlie the study, including ontological and epistemological views. Based on these underlying assumptions, a mixed methodology approach was chosen, incorporating both qualitative and quantitative data collection instruments, in order to better address the different research questions. However, they are not answered independently, and the methods proposed feed from each other in a process of data collection.

The chapter describes separately how the empirical work was conducted. The first phase involved semi-structured interviews from different organisational contexts (industry, size, strategy and project types). The second phase involved a questionnaire survey with the objective of getting views from more people and exploring and confirming the framework developed from the interview analysis. In addition, to enrich the framework, the questionnaire survey is also used to define the main inter-relationships between the key PMIIs and key embedding factors, as well as, to find if the PMIIs and embedding factors are dependent on the organisational contexts.

Figure 5.1 gives an overview of the research methodology, which shows the need to provide an explanation of the philosophical paradigm, strategy and methods used. Particular importance was given to the assurance of the research quality within and across the investigation phases.

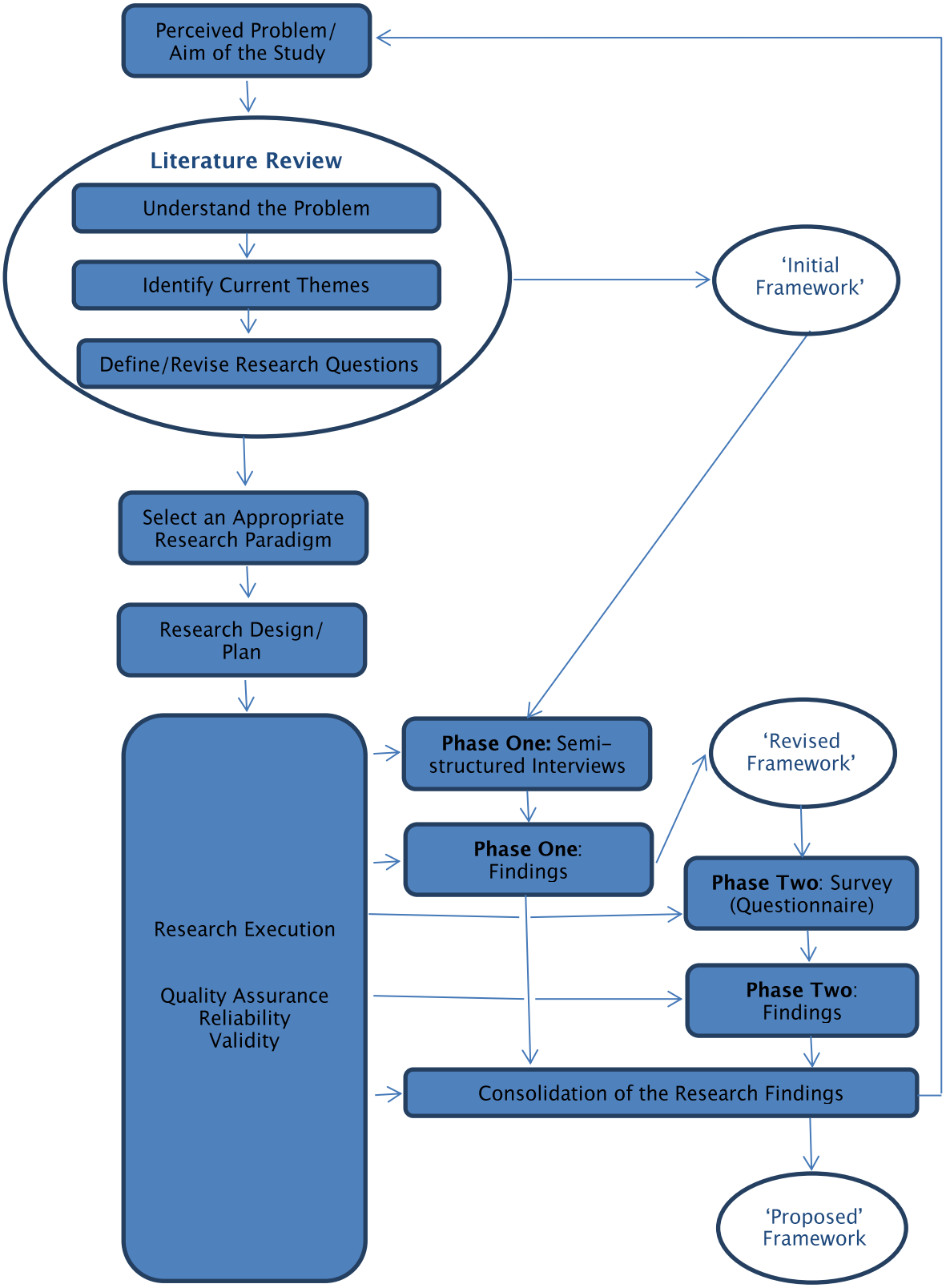


Figure 5.1: Overview of the research methodology

5.2 Research Philosophy

A research philosophical paradigm refers to the progress of scientific practice based on people's philosophies and assumptions about the world and nature of knowledge (Hussey & Hussey, 1997). In other words, it is a way of examining social phenomena from which particular understandings of these phenomena can be gained and explanations attempted (Saunders et al. 2009). As argued by Lincoln and Guba (1985, p 85) *"paradigms represent a distillation of what we think about the world".*

The research philosophical paradigm adopted is the culmination of thinking clearly about the epistemological and ontological choices that best serve the objectives of the research within a given research environment (Guba & Lincoln, 1994). Epistemology[17] is intimately related to ontology[18], as ontology involves the philosophy of reality and epistemology addresses how we come to know that reality (Krauss, 2005). The research philosophical paradigm governs the overall approach of the research, and as such is perhaps the most important choice that must be made.

The main research philosophical paradigms are the positivistic and the interpretativist. Other authors use different terms to define these two philosophies, for example, positivistic philosophy as quantitative, objectivist, scientific, experimentalist or traditionalist, and interpretativist philosophy as qualitative, subjectivist, humanistic, and phenomenological.

Positivism attempts to "*explain and predict what happens in the social world by researching for regularities and causal relationships between its constituent elements"* (Burrell & Morgan, 1979, p 5). The positivist philosophy is based on the approach used in the natural sciences, which assumes that social reality is independent of human perception, existing regardless of our awareness of it. This approach holds that there are facts about the social world that can be collected and analysed independently of the people from whom the facts were obtained (Saunders et al. 2009). In other words, Positivists generally assume that reality is objectively given and can be described by measurable properties, which are independent of the observer, or researcher, and his/ her

[17] Epistemology is concerned with the study of knowledge and what we accept as being a valid knowledge (Saunders et al. 2009).
[18] Ontology is concerned with the nature of reality (Krauss, 2005).

instruments. The positivist philosophy is normally associated with a quantitative research approach. The positivist approach is typified by formal propositions, measurable variables and the drawing of inferences about a phenomenon from a sample to a population (Creswell, 2009). This positivist research philosophy is for example suitable for examining research hypothesis (Johnson & Duberley, 2000).

In contrast, an interpretativist approach is concerned with understanding human behaviour from the participant's own frame of reference. It assumes that social reality is in our minds, and therefore, the act of investigating reality is viewed as having an effect on that reality (Saunders et al. 2009). The essence of the interpretativist approach is that attitudes and behaviour are determined by their social setting, that is, they are 'socially constructed'. Interpretativist philosophy is normally associated with a qualitative research approach. A qualitative approach involves examining and reflecting on perceptions in order to gain an understanding of social and human activities (Hussey & Hussey, 1997).

Positivism, in its various forms, pursues generalisations in order to establish principles or laws to govern its object; whereas interpretativism seeks particular explanations (Saunders et al. 2009). The pursuit of explanations that rely upon identifying general patterns based upon cause and effect marginalises the particular, while a focus upon the particular frustrates the emergence of common patterns, shared meanings and normative recommendations (Smyth & Morris, 2007).

The positivistic and interpretativist philosophies are two extremes and very few people would operate within their pure forms. There are a number of alternative philosophical paradigms most of which underline the fact that there are not just two philosophical paradigms but a whole range (Hussey & Hussey, 1997).

There exists different categorisations for philosophical paradigms, for example Burrell and Morgan (1979) developed a categorisation of social sciences paradigms, which can be used in management and business, research to generate fresh insights into real-life issues and problems. They categorised in four paradigms: functionalist; interpretative; radical humanist; and radical structuralist. The four paradigms are arranged to correspond to combinations

of four conceptual dimensions: radical change and regulation and subjectivist and objectivist. The latter two terms are related with ontology which could be seen as subjective reality: phenomenological' perspective or an objective and singular reality: positivists' perspective. The radical change dimension approaches organisational problems from the viewpoint of overturning the existing state of affairs; the regulatory dimension seeks to work within the existing state of affairs, gradually introducing small changes.

Guba and Lincoln (1994) suggest also four paradigms: positivism, post-positivism (or critical realism), critical theory and constructivism. An alternative categorisation has been suggested by Johnson and Duberley (2000) presented in Figure 5.2 in the blue squares. The Figure also represents other categorisations from the authors mentioned above, except the four paradigms from Burrell and Morgan (1979) because the authors have introduced a new dimension regulation – radical change beyond the more common ontological and epistemological dimensions.

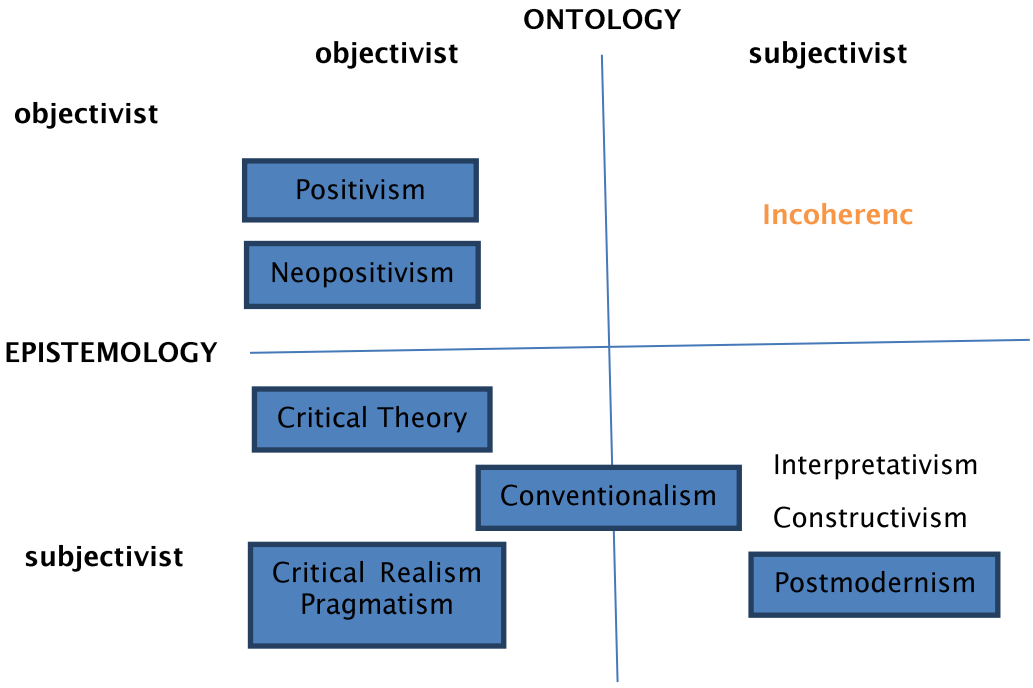


Figure 5.2: Research paradigms adapted from Johnson and Duberley (2000)

Smyth and Morris (2007) studied research practice in the light of PM philosophical paradigms and their more general epistemological underpinnings and conclude that positivism appears to have been the dominant research epistemology – over 66% in the sample of 68 papers from 2005 in the International Project Management Journal reviewed.

Nevertheless, how to embed PM into organisations is not an objective reality, and epistemologically the researcher understands the importance of the interaction with the participants to investigate the problem. Ontologically the researcher sees the reality behind her research problem as subjective. There is no one 'right' way to improve and embed PM practice in organisations, since it is likely very dependent on the organisational context, for that matter clearly suggests that the dominant research philosophy of this study is interpretative. Indeed, the philosophical orientation of this research study is the social constructionism.

The basic claim of both social constructionism and its related theoretical orientation known as constructivism is that realities are constructed rather than discovered (Shotter, 1993; Sarbin & Kitsuse, 1994; Burr, 2003). The researcher starting point is the notion of the social world, not as a fixed or objective entity, external to individuals and impacting on them in a deterministic way, but as constructed by individuals through their social practices (Cohen et al. 2004). Social constructionism main proposition is that members of any social system enact their particular worlds through social interaction where ideas, concepts and beliefs are discussed and shared with others. Reality is thus a social product which cannot be understood apart from the co-constructed meanings of the social actors involved in its enactment (Shotter, 1993; Sarbin & Kitsuse, 1994). Social constructionist approach is recognised as *"a challenge to the primacy and priority of the individual, in effect, placing relationship, the social, as prior and primary"* (Stacey, 2001, p 55).

Burr (1995) argues that social constructionism is a recent movement which has emerged from the combined influences of a number of North American and British writers from the disciplines of sociology and social psychology dating back more than thirty years. Burr (1995) outlines four key assumptions underpinning social constructionism. First, *a critical stance toward taken-for-granted knowledge.* Social constructionism invites researchers to challenge conventional understandings and to understand the processes by which such understandings come to be seen as "natural or true". Burr's second point concerns *historical and cultural specificity*. The knowledge and meaning are historically and culturally constructed through social processes of action (Young & Collin, 2004). That is, our understandings of the world must not be

seen as static or inevitable, but as historically and culturally situated, changing and developing across time and space. Third, *knowledge is sustained by social processes*. As its label suggests, social constructionism views the construction of knowledge as an interactive process. In their daily lives, people create and recreate versions of reality through social practice. What we think of as "true", therefore, is not some external reality, but what is currently accepted as such. In this sense, as argued by Cohen et al. (2004), the construction of knowledge is a negotiated process is which certain interpretations are privileged whilst others are eclipsed. This leads to Burr's fourth point, that *knowledge and social action go together.* That is, particular versions of reality lead to particular forms of action, and away from others. Given the dominance of certain understandings and the subordination of others, it follows that social action will work in the interests of more powerful groups and against those in weaker positions (Cohen et al. 2004).

These four tenets of social constructionism had important implications for the study of improving and embedding PM practice in organisations, in terms of both what we study and how we study it. As regards what we study, they encourage the researcher to question the use of conventional models, such as the PM maturity models, to improve PM performance, and seeks to find key PMIIs, in which organisations should concentrate their efforts, instead of a long list of possible improvements. At the same time, they highlight the importance of historical and cultural context in framing the framework to embed useful PMIIs, elucidating links between individuals and their social worlds – links often obscured by more positivistic approaches.

A social constructionism orientation likewise has consequences for how we approach our research study. First we need approaches that elucidate the socially and culturally incorporated nature of PM, and that facilitate greater understanding of the relationship between individual agency and social context. Second, given the notion of constructed/ contested versions of reality discussed, the study needed methods that bring contradictions and struggles over meaning and surface. Finally, cognisant of Burr's first point about maintain a critical stance, we must be aware of the frames of meaning that researchers bring to the research process, recognising that these assumptions and values are themselves only versions of reality, echoing, competing, and colliding with the versions presented by the research participants.

Adopting social constructionism for this particular Ph.D. study is not to deny the strengths of other philosophical stances, such as positivism. Rather, the flexible view point of social constructionism makes it more suitable for this particular study which intends to explore the perception of individuals on a particular social reality (improving and embedding PM practice in organisations). Social constructionism philosophical stances have been also used for other PM researchers (e.g. Jackson & Klobas, 2008; Sense 2011). For example, Jackson and Klobas (2008) developed a knowledge creation and sharing process model based upon social constructivist theory and the integration into the model of heuristics for effective knowledge construction in projects.

5.3 Choices of Research Design

The choice of a research design is obviously a crucial decision to the success and effectiveness of a research study. The relationship between the research philosophy under which the research is carried out, and the research methods that are used to carry out the research activities is a complex decision, which can make the choice of both elements difficult (Creswell, 2009).

In social science methodology typically there are clusters around (1) deductive approaches using quantitative methods (quantitative research), or (2) inductive approaches using qualitative methods (qualitative research). However, contributions can also be made when (3) quantitative methods have laid the ground for inductive theory building or (4) qualitative methods are used in deductive theory testing (Bitekhtine, 2008).

Mixing of methods is other alternative, which can be controversial. Some researchers believe that the assumptions underlying qualitative and quantitative approaches are inherently opposed, and therefore that the two cannot be meaningfully combined. Others believe that the two approaches are best used in combination only by alternating between methods – typically using qualitative research for theory generation and quantitative methods for theory testing. Some researchers, such as Tashakkori and Teddlie (2003), Olsen (2004), and Bryman (2006) think that both qualitative and quantitative methods can be used simultaneously to answer a research question. However,

when using mixed-methods, it is important to take into consideration that the integration of data from both methods is difficult to complete successfully (Bryman, 2007).

One popular classical method of performing research in management is to carryout quantitative investigations (Ottosson, 2003). However, quantitative research is affected by several limitations when applied to management research such as there are no similar processes in industry since each process is unique (Creswell, 2009). Several authors contest the usefulness of such methods, arguing that quantitative analysis is mostly retrospective. The call for a more intensive use of interpretive methods in management research is not new, but has been increasing in the last decade, pushed by eminent academics and leading journals.

PM research in the past has been very practitioner initiated, i.e. it has been practitioners who set the researcher agenda and style (Turner, 2010). This resulted in research with lack of rigour, because it was not based on sound methodologies with the aim of giving guidance to practitioners rather than developing theory (Turner, 2010). However, over the past 20 years there has been an improvement in quality and rigour of PM research. An indication of a growing concern for rigour is the number of papers that overtly have a section describing the methodology. Turner (2010) made a survey in papers from the International Project Management Journal and identified that in 1987 there was just one paper, in 1997 there were 13 papers (29%), and in 2007 61 (72%). In addition, Turner (2010) argues that the research on which the articles are based use much more rigorous methodologies which themselves can contribute to theory development.

The general tendency within PM research is to focus on the use of surveys (Crawford et al. 2006a). Topics related to this study have been studied using survey based research (e.g. White & Fortune, 2002; Besner & Hobbs, 2006, 2008, 2012, 2013; Isik et al. 2009; Qureshi et al. 2009). For example, Besner and Hobbs (2006), from a survey questionnaire, have identified the most valued PM practices. However, there is also work supported by case studies using the research method interviews (e.g. Bresnen et al. 2004; Andersen & Vaagaasar, 2009; Eskerod & Riis, 2009; Shi 2011). For example, Andersen and Vaagaasar (2009) conducted three case studies on Norwegian enterprises to study how organisations improve PM and the reasons behind improvement

efforts. The important part of the data collection for the case studies consisted of interviews with senior managers, project managers, sponsors, and HR management.

The complementarities of different research methods have been increasingly employed by PM researchers in recent articles (e.g. Milosevic & Patanakul, 2005; Müller & Turner, 2007; Thomas & Mullaly, 2008; Shehu & Akintoye, 2010). For example, Shehu and Akintoye (2010) conducted both a pragmatic and theoretical study by triangulation literature, industrial questionnaire and semi-structured interviews to study the major challenges to the successful implementation and practice of programme management in the construction environment. Milosevic and Patanakul (2005) using also case study research, started with qualitative methods (semi-structured interviews, review of documents and observations) to identify the major factors in standardising PM effort at the organisational level. Then the authors developed a survey questionnaire to test the factors identified, and finally they conducted follow-up interviews to enrich and refine the findings.

Table 5.1 summarises the advantages/disadvantages of the two main data collection methods used (Kvale, 1996; Hussey & Hussey, 1997; Saunders et al. 2009).

Table 5.1: Data collection methods: advantages and disadvantages

Data collection methods	Advantages	Disadvantages/ limitations
Interviews	• Useful in qualitative research to get insights. • Probing opportunity for deeper, additional data than surveys. Useful to validate and enrich data that was previously collected through survey methods. • Good sources of information and knowledge to correct and adapt initial theoretical assumptions	• It is an extremely time consuming research method. • It requires interviewers to have effective interviewing skills (e.g. good interpersonal relationships and listening skills). • The usefulness of the data collected depends on the ability of respondents to express their ideas, which is something that the researcher cannot control. • Comparability of data from different respondents may not be possible. • Interviewer bias (questions should be free of bias, clear, and precise). • Interviewing is less feasible than sending questionnaires to a large number of people, particularly when interviewees are on different sites and/ or distant from the researcher's site. Nevertheless, in such cases alternative techniques can be used, like phone interviewing, video-conferencing and Skype interviewing.
Survey/ Questio-nnaire	• If the questionnaire has an appropriate sample size and a correct structure, the findings obtained can be generalised. • It is time and cost-efficient. • Structured, uniform presentation. • Less bias than interviews. • Might be useful in qualitative research to draw conclusions.	• Reliability and validity of results dependent on respondents' candour. • Results are dependent on quality of the questions. • Rigid structure might impede on potential research findings.

5.4 Research Design

There is no single theory existing today that comprehensively explains how to improve and embed PM practice (Cranefield & Yoong, 2009; Shi, 2011). In fact, how to improve PM is very dependent on the organisational context (Besner & Hobbs, 2008, 2013; Cooke-Davies et al. 2009; Mullaly & Thomas, 2009). As a result, this research cannot simply be about conclusively testing a single theory, but instead must emphasise the generation of theory based upon

actual findings and data. Therefore, an exploratory research was undertaken, which aimed to identify key PMIIs and key factors for embedding PMIIs, based upon the circumstances encountered in different organisations. The analysis was guided primarily by an inductive perspective, whereby the collection, examination and process of continual re-examination of data determine the research findings (Hussey & Hussey, 1997; Robson, 2002). The first attempt at framework conceptualisation from a literature review was used as a skeleton support for the exploratory study.

The research methodology chosen for this research was a mixed methodology approach, involving both semi-structured interviews (qualitative method) and questionnaires (quantitative method). It was expected that the complementary strengths of semi-structured interviews and a questionnaire, namely the capability to get insights and opportunity for deeper additional data from the interviews (Kvale, 1996), and the objectivity and potential for generalizable findings of the questionnaire (Field, 2009), would help to answer the research questions. Furthermore, by following a research methodology supported by two research methods this research study meets recent calls for the use of triangulation between different research methods. Additionally, the triangulation of data would facilitate the validation of information (Halldorsson & Aastrup, 2003; Olsen, 2004; Jack & Raturi, 2006; Yin, 2009).

Figure 5.3 summarises the decisions made.

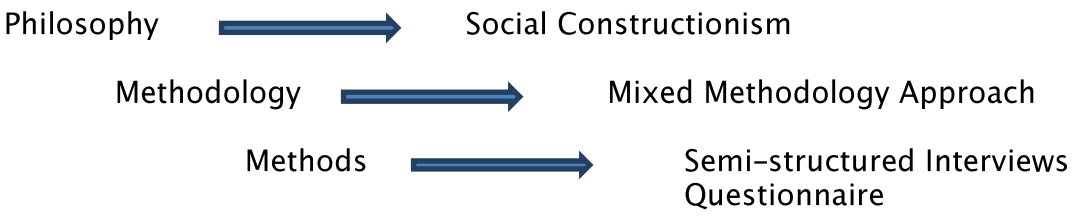


Figure 5.3: Research approach and methods

The preferred choice of social constructionism as the main philosophical stance does not negate the contribution of positivist research methods (e.g. survey questionnaire). The adaptation of such elements of positivism in order to maximise rigour denotes pragmatism. An important strength of social constructionism is that provides a paradigm that philosophically embraces the use of mixed methods and mixed model designs. It enables the shift from extreme conservative qualitative research methods to a mixed methodology approach (qualitative and quantitative research).

Figure 5.4 shows the link between the research methods proposed and each research question (RQ). Firstly, it is proposed to develop semi-structured interviews to answer the first three research questions (qualitative analysis). Secondly, to design, pilot and administer a questionnaire, in order to explore and test the findings from the interviews on the first three research questions; and to identify the main inter-relationships between the key PMIIs and key embedding factors (RQ4), and find if the PMIIs and embedding factors are dependent on the organisational contexts and on demographics (RQ5) (quantitative analysis).

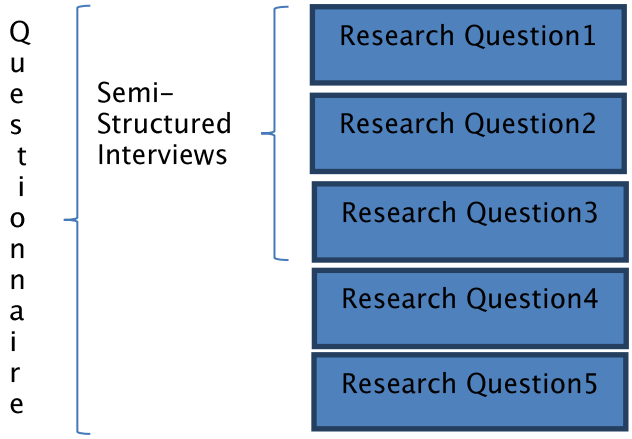


Figure 5.4: Link between research methods and research questions

The research plan presented in Table 5.2 gives the general overview of how the researcher will answer each research question, the main literature references, how the researcher intends to collect data, and how will analyse the data.

Table 5.2: Research plan

Objectives	Research Questions	Question Type	Main References	Research Method	Data Analysis
Main: To develop a framework to help organisations to improve and embed PM practice.	How can organisations improve and embed PM practice?	-	-	-	-
RO1: to identify the priorities of organisations when they choose to invest in PM practice improvement, for organisations not waste money on wrong PMIIs, but to create and preserve value and effectiveness.	RQ1: What are the most useful PM practices? RQ2: What PMIIs have the higher impact on the improvement of PM practice?	Descriptive	Andersen & Vaagaasar, (2009); Besner & Hobbs (2006); Cooke-Davies (2001); Loo (2002); Shi (2011); Thomas & Mullaly (2008)	Semi-structured Interviews Questionnaire	Thematic Analysis (Nvivo) and Statistical Analysis (SPSS)
RO2: the identification of factors that influence the embedding process of PMIIs into organisations, in order to organisations be aware of what could influence the extent of embeddedness of a PMII.	RQ3: How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance (i.e. key embedding factors)?	Descriptive	Greenhalgh et al. (2004); Venkatesh & Bala (2008); Rogers (2003); Szulanski (1996, 2000); Cranefield & Yoong (2009)	Semi-structured Interviews Questionnaire	Thematic Analysis (Nvivo) and Statistical Analysis (SPSS)
RO3: the identification of the inter-relationships between the key PMIIs and key embedding factors.	RQ4: How are the identified key PMIIs and key factors to facilitate embedment related?	Relational		Questionnaire	Statistical Analysis (SPSS)
RO4: to find if the identified key PMIIs and key embedding factors are dependent on the organisational context and demographics.	RQ5: How does the set of key PMIIs and key factors to facilitate PMIIs embedment vary in different organisational contexts (industry, size, geographic location, project type and strategy and in demographics (primary role, PM experience, level of education, gender and age)?	Relational		Questionnaire	Statistical Analysis (SPSS)

5.5 Interviews Research Phase

This section describes the interviews method, how the participants in the interviews research phase were selected, and the process of collecting and analysing the qualitative data.

5.5.1 Interviews Method

Interviews may be highly formalised and structured using standardised questions for each research participant, or they may be informal and unstructured interviews. In between there are intermediate positions, which are usually called the semi-structured interviews (Saunders et al. 2009), that are used in this research study.

Semi-structured interviewing may start with general questions or topics and further questions which arise during the interview itself. This allows respondents to answer in their own words and express their viewpoints.

Semi-structured interviewing should be designed and developed with the following aspects in mind. The researcher cannot decide when to set the beginning of the research work. Delays and changes to the initial scheduling of the interviews may occur. The initial conditions may change or the organisation's perception of the research may evolve during the research project. The researcher should understand these changes and he/she must be able to adapt the research work in order to maintain its scientific validity and respond to the research questions. The researcher should be able to avoid influencing the answers (interviewer bias) and control his/ her anxiety. A tactic that can be used to diminish anxiety and increase the control of the situation by the researcher is, for example, begin the interview with an "innocuous question", such as the interviewee's career history. Furthermore, the researcher should not disclose information previously obtained from one interview to another, he/ she should guarantee that individual information will not be disclosed, and promise that any reproduction of answers he/ she will ask for previous authorisation. Finally, it is important to show confidence and knowledge of the research subject, both in scientific and practical terms. The researcher should avoid the use of 'academic language' which might be understood by practitioners as a lack of knowledge about the 'real world'.

Therefore, the researcher must carefully balance academic concepts with day-to-day language (Oppenheim, 1992; Gubrium & Holstein, 2001).

5.5.2 Interviews Population and Sample

Due to budget and time restrictions and personal privileged access, only Portuguese organisations were selected for interviews.

A new PM practice is unlikely to deliver desired results if it does not 'fit' with the organisation or its strategic or competitive environment (Cooke-Davies et al. 2009). In order to address this issue, this research study intended to collect data from professionals covering different organisational contexts in terms of: industry, size, types of projects and strategy.

In order to study the different strategic organisational contexts, an approach recently used by Cooke-Davies et al. (2009) during the study '*Project management systems: Moving project management from an operational to a strategic discipline'* was adopted. Cooke-Davies et al. (2009) followed a recognised author in the strategic area, Porter. As a result, for the strategic context analysis Cooke-Davies et al. (2009) chose two variables to study organisation strategy: the degree of product differentiation, and the degree of process economics (efficiency).

The rationale for this choice is that certain organisations seeking to compete in their markets through product differentiation are likely to derive strategic value predominantly through successful innovation of new products and services, whereas organisations seeking to compete through offering lower-cost solutions will derive value predominantly through improvement of the economics of process. This is not to suggest that any organisation can compete if it ignores one or the other, clearly, every competitive organisations must offer desirable products for a price that consumers are willing to pay. The point being made is that organisations competing through a product differentiation strategy need to develop systems for maximising the value that they derive from investments in product or service innovation, whereas organisations competing on the basis of cost must derive maximum value from the efficiency of their manufacturing chain. By connecting these two general

strategic positions Cooke-Davies et al. (2009) in a matrix, differentiate four strategic value driver contexts:

- context 1: low process economics driver, low differentiation driver;
- context 2: high process economics driver, low differentiation driver;
- context 3: low process economics driver, high differentiation driver;
- context 4: high process economics driver, high differentiation driver.

With this approach it was initially intended to find if different organisations in terms of strategic position in this research study may identify different key PMIIs and key embedding factors that respondents perceived as relevant for improving and embedding PM practice. The researcher was aware of the need to pay attention to the complexity involved in identifying the strategic context of organisations, so this line of research may show non conclusive results.

As the study intends to understand how the set of key PMIIs and key factors to embed PMIIs vary in different organisational contexts: industry, size, project type, and namely in relation to the four strategic contexts referred above, the identification of the potential companies to participate on the semi-structured interviews phase, was based on four criteria:

1. the previous work contacts that the researcher had with some organisations.
2. the type of industry;
3. the size of the companies (the research adopted the classification of companies size from the European Commission[19]); and
4. the strategic context.

Table 5.3 lists the twenty one organisations identified as potential firms to participate in the semi-structured interviews research phase, and that the researcher tried to gain access. Table 5.3 gives also a brief description of each organisation by industry, size and strategic context. The classification of each

[19] On the 6th of May 2003, the European Commission adopted a recommendation concerning the definition of the size of companies. The definitions use the following criteria: 1) the maximum number of employees, and 2) the maximum turnover (in million Euros); or 3) the maximum balance-sheet total. In this context, Large-size companies are those with more than 250 workers, with a turnover higher than 50 million Euros or balance sheet more than 43 million Euros. Medium size companies are those which have between 50 and 250 employees, and turnover between 10 and 50 million Euros or a balance sheet total between 10 and 43 million Euros. Small size companies are those which have between 10 and 50 employees, and turnover between 2 and 10 million Euros or a balance sheet total between 2 and 10 million Euros.

organisation by the four different strategic contexts was a subjective evaluation made by the researcher, based on previous knowledge acquired during past professional relationships.

Table 5.3: Description of the potential organisations to participate in the research interviews phase

Organisation	Industry	Size	Context
Organisation 1	Research Centre (I&D)	Small	Context 3
Organisation 2	Information & Technology	Medium	Context 4
Organisation 3	Engineering & Construction	Large	Context 4
Organisation 4	Engineering & Construction	Medium	Context 2
Organisation 5	Telecommunications	Large	Context 3
Organisation 6	Information &Technology	Small	Context 4
Organisation 7	Business Services	Small	Context 4
Organisation 8	Pharmacy	Large	Context 3
Organisation 9	Pharmacy	Large	Context 3
Organisation 10	Banking	Large	Context 3
Organisation 11	Insurance	Large	Context 3
Organisation 12	Information & Technology	Medium	Context 4
Organisation 13	Information & Technology	Small	Context 4
Organisation 14	Information & Technology	Medium	Context 4
Organisation 15	Transportation	Large	Context 2
Organisation 16	Construction	Large	Context 2
Organisation 17	Telecommunications	Large	Context 2
Organisation 18	Information & Technology	Large	Context 2
Organisation 19	Automotive industry	Large	Context 2
Organisation 20	Business Services	Small	Context 2
Organisation 21	Business Services	Medium	Context 2

The participants selected for the semi-structure interviews and invited to participate in the questionnaire are members involved in projects environment, in different levels of the organisational hierarchy (directors, portfolio, programme and project managers and team members). Team members are involved, since they are active participants in the project (Milosevic & Srivannaboon, 2006, Shi, 2011). However, the study did not seek to gather data from executives and project sponsors (external clients), because of the limited role and influence that such stakeholders may have on the problem of improving and embedding PM practice (Bresnen et al. 2004).

In the collection of qualitative data the researcher planned to make about twenty semi-structured interviews. If after the twentieth interview the researcher is no longer receiving new information, this means that the researcher has nearly heard the full range of ideas and reached saturation (Saunders et al. 2009), so will stop collecting data through interviews.

5.5.3 Interviews Data Collection

The data produced by semi-structured interviews can be collected by using tape recordings or by taking notes. Many researchers find it essential to tape-record such interviews (Kvale, 1996). However, permission to tape the interview is needed and there are situations where the use of a tape recorder may not be the best choice. For example, in some cases noise or the technical conditions do not permit its use satisfactorily. Sociologically-based research asks for careful interpretation of meanings, words, expressions, and even silences. In these cases, tape recording cannot be avoided. However, when only factual data is important, hand-written notes may be enough. Furthermore, the researcher must always be able to capture the information in a systematised way. For example, simulations of the interviews may be carried out in order to improve the process of note-taking.

Regarding the advantages/ disadvantages of the interviewing data collection process, the researcher decided to take notes and to tape record the interviews, in order to revisit again the interviews data the necessary times. For more detail see the interview protocol/ process in Appendix A.

Section 6.2 describes the processes of conducting the interviews in detail.

5.5.4 Interviews Data Analysis

Operating within a social constructionist philosophy data are not viewed as given by nature but as stemming from an interaction between the interviewer and the data sources. The data are *"the constructions offered by or in the sources"* (Lincoln & Guba, 1985, p 332).

The analysis of the semi-structured interviews data is based on the thematic analysis technique as thematic analysis represents a formal approach to qualitative data analysis (Miles & Huberman, 1994). It is an appropriate technique for exploratory research and theory building purposes (Easterby-Smith et al. 2008).

Thematic analysis determines the presence of themes emerging from the verbal data and deeper meaning embedded in data. Existing categories and relations can be searched for, quantified, and analysed to identify existing themes. Thematic analysis measures the presence and frequency of themes or concepts. Thematic analysis can be supported by commercial available software packages (e.g. Leximancer, Nvivo, Atllas.ti). In this study Nvivo software is used. Computer-assisted counting, weighing, and theme identification processes also substantially increase scoring reliability and reduce coding inconsistences. The process results in conceptual maps presenting relevant themes, their relevance within the text, and their relationship towards each other. These maps are created using the absolute and relative count of words, categories, and terms as by the (computer-assisted) coding processes. Furthermore, the resulting data can be fed into further (computer assisted) statistical analysis processes.

During the analysis of interview responses the researcher performed thematic analysis, forming ideas, concepts, and insights to the inner working of improving and embedding PM practice in organisations.

Section 6.3 in the interview analysis chapter described in detail the process of analysing interview responses.

Validity of qualitative data

Internal validity in qualitative research is concerned with the accuracy of the information and whether it matches reality (Gray, 2004). From this perspective, relying on a single interviewer's coding is highly problematic and creates significant problems for assessing the reliability and validity of the data. One way to enhance the internal validity of qualitative study is to invite another researcher to examine the audit trail of the key decisions made during the research process. This is to enable the researcher to validate the data and the research approach from the lens of the external observer. Thus, decisions about data analysis were reviewed with two Ph.D. colleagues, one from the

University Institute of Lisbon and other from the University of Minho. The reliability of the factors/ themes developed in data analysis was further measured by having another colleague read the interview notes to see if he would classify them in the same way. Given this process, and the fact that all interviewees were asked to approve the interview notes produced, the qualitative results are considered reliable.

5.6 Questionnaire Survey Research Phase

5.6.1 Questionnaire Survey Method

Questionnaires are usually based on data collected electronically and analysed by statistical techniques. Questionnaires and structured interviews share some general features. For example, both structured interviews and questionnaires permit statistical analysis, however surveys are more efficient because they allow a large quantity of data to be obtained at a lower cost (Saunders et al. 2009).

This research study used electronic questionnaires which are surveys that can be displayed on the WWW (the case of this research) or through another electronic interface.

The design of this type of questionnaire has some issues that are common to traditional paper-based surveys (e.g. the ordering and wording of questions) but also include new features such as screen layouts and navigational issues (Spitz et al. 2006). Nevertheless, the design of survey instruments (electronic or not) remains a researcher-based work, that cannot be substituted by an IT expert or a web designer. E-questionnaires can be embedded in the body of an email message sent in an attached file or made accessible through a hyperlink. The respondent completes the survey and sends it back through the same methods or, alternatively, he/ she can print it and send the completed version by post to an address provided by the sender. In this study, this second alternative was not offered, attending to the target respondents that are familiar with on-line surveys and returning questionnaires by post is a slower process.

The use of electronic questionnaires through the web has a number of important advantages, namely low cost; the collection of a wider sample which might for example be unreachable if the respondents are in remote areas; the speed with which answers are received and the possibility of using the data collected as a straight input for statistical software packages. At the same time, it has visual advantages which cannot be underestimated. A good visual impact and friendly answer formats may increase response rates. This approach has several advantages when compared to questionnaires presented in paper versions, but it does not solve all the problems related to the use of questionnaires in research projects (Saunders et al. 2009).

In general, there are some weaknesses with this kind of approach, particularly its potential limited coverage and incorrect sampling of the population. However, the potential limited coverage has been strongly mitigated by the rapid increase in the use of the internet. Nowadays a company, regardless of its size and industry, has to be connected to the internet (Spitz et al. 2006). Thus, in this particular research project, coverage does not constitute a problem, as there is almost 100% certainty that target participants (directors, portfolio, programme and project managers and team members) have an internet connection.

There are two additional issues that are often neglected in this kind of questionnaire, namely the measurement error and the non-response error. Measurement errors occur when the meaning of responses is not correctly reflected in the measure adopted. Non-response errors occur when measurement is not performed on all units of the survey sample (Groves, 1989). The first problem arises as a result of poor questionnaire design. Often electronic questionnaire are (partly) designed by people who do not have consistent knowledge of survey design (e.g. IT specialists who develop the application). The second question is related to the possibility of premature abandonment of the questionnaire by the respondent which can happen at the first stage (when the invitation email is received), during completion of the questionnaire or during the transmission of the responses to a database.

In this research, actions were conducted to reduce these potential problems. The electronic questionnaire was iteratively revised. The email message was as short as possible, and emphasised the purpose of this study, focusing on the

practical contribution of the research results, and giving also participants the opportunity to receive a summary of the survey results.

The electronic questionnaire was developed using the platform iSurvey from the University of Southampton. There are several commercial Web survey software packages. However, such software offers specific solutions for customer, employee and marketing surveys but not for academic surveys. The design of the questionnaire was not very time-consuming when compared with developments where the researcher does not use existing templates as the ones available in the iSurvey platform.

5.6.2 Questionnaire Data Collection

In summary, for the implementation of the questionnaire, it was necessary to develop the questions, to design and produce the questionnaire, including an electronic version, to gather the email contacts and finally, to test the web data gathering system (Spitz et al. 2006).

The questions were designed to provide structured means of triangulation and validating the information gained through interviews. Appendix B presents the questionnaire. The web-based questionnaire structure was divided in four parts:

- **Part A – Key PMIIs for Improving Project Management Practice**

Part A gathers information relevant to the second research question: *What PMIIs have the higher impact on the improvement of PM practice?*

Each inquiry is formulated from a PMII in the 'revised framework', identified from interviews data analysis (see Table 6.5, 6.6, 6.7 and 6.8). At least one query per each PMII was made. Respondents were asked to identify the degree of influence measured on a 5-point Likert scale from "very high" (5) to "very low" (1), of several activities (PMIIs) for improving PM practice in their organisations. Respondents were given the opportunity to select the option "No opinion". This was to allow for cases where respondents had a low level of expertise and experience in the field, and should not feel forced to "guess" a degree of influence based on limited experience.

During the research, namely during the interviews and questionnaire survey phases, the designation 'key improving factors' was used to specify key PMIIs. After the submission of papers, it was noticed that 'improving factors' could be confusing to the reader, because possible initiatives are not real 'factors' but different forms of activity that can be chosen or not. Usually the term 'factors' is used meaning features of a process or situation, as it happens in 'embedding factors' – factors that affect the ability to achieve embedment. Therefore, the designation 'improving factors' was dropped and the term PMIIs has been exclusively used along the thesis.

- **Part B – Key factors for Embedding Project Management Practices**

Part B gathers information relating to the third research question: *How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance?* Each inquiry relates to a particular embedding factor, and at least one query per each embedding factor was made. Therefore, respondents were asked to identify their view of potential effect against each of the possible factors listed, measured in the same way as Part A.

To help respondents to see the related themes, the key PMIIs and key embedding factors were sorted by themes, used in the 'revised framework'.

- **Part C – Project Management Practices**

Part C is a series of questions designed to investigate which are the most useful PM practices (research question 1). Note that PM practices in this study are seen as those tools and techniques that practitioners use to "execute a PM process". These questions measure the level of benefit that respondents obtain using each PM practice on project management performance. Respondents were asked to answer only if they use or had used the PM practices, if not, they should just tick the box 'not used'. In this way the study was gathering meaningful data, considering information from only respondents that have experience on it. Each PM practice is measured on a 5-point Likert scale from 'very high' (5) to 'very low' (1). The researcher had considered the use of a scale 1 to 4, in order to, not give the respondent opportunity to choose the middle number in scale (3) and not take a position. However, since most people would expect one level at least separating points (2) – "low" and (3)– "high" of such a scale, the 5-point Likert scale was adopted.

- **Part D – Some characteristics of the respondent and respondent's organisation**

Part D gathers first organisational context information on the respondent's, such as: business activity, size and projects characteristics, in order to answer the research question number five: *How does the set of key PMIIs and the key factors to facilitate PMIIs embedment vary in different organisational contexts?* And then information on demographics: primary role, PM experience, age, gender and education level, in order to characterise the sample.

Data were gathered on both the sector of activity of the respondent's organisation and the type of deliverable produced by the respondent's typical project. For example, an individual working on engineering and construction or business services, maybe working on information technology projects.

As this questionnaire is used not just as a confirmatory instrument but also exploratory, at the end of part A, B and C, there is an open question, for example:

"Please specify any other project management practices not listed above that you use or have used and that you believe bring very high (5) or high (4) benefits to project management performance".

They allow the respondent to give his/her feedback on, for example, other PM practices that they understand useful and not specified in the questionnaire.

The total number of sub questions is high. However, the questionnaire was built with a consistent structure that would facilitate responses. For simplicity and ease completion, the same scale was used for all sub questions.

For more detail on the questionnaire data collection instrument follow the section 7.2 in the chapter questionnaire survey research phase.

The Design of the Electronic Version

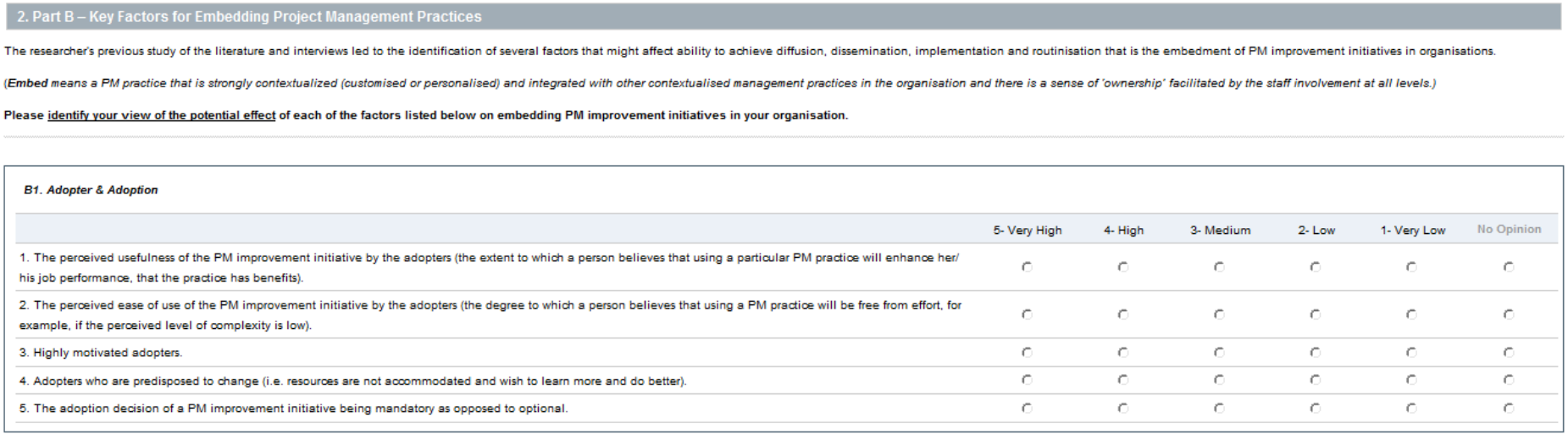
A good first impression is a determinant factor in the success of an electronic questionnaire and may increase the response rate (Oppenheim, 1992). In fact, the electronic version should be designed in order to be visually appealing. The question and answer buttons should be correctly aligned and important buttons such as 'save and continue', 'back a page' and 'submit' should be clearly visible. Respondents need to understand clearly how they can proceed to the next screen or to the next page. Finally, these procedures need to be

kept the same throughout the questionnaire in order to avoid misleading interpretations. Using the platform iSurvey to develop the questionnaire, all these aspects were automatically taken into account.

Additionally, the use of colours and different fonts and font sizes was carefully managed in order to enhance the survey's attractiveness and to avoid distracting respondents. Figure 5.5 illustrates the format used.

'Radio buttons' were used for the majority of the questions. In the last set of questions 'drop-down boxes' and 'text input boxes' were also used. 'Drop-down boxes' should be used when choice is considerable, and radio buttons when there are only few possible answers (Oppenheim, 1992). However, the design of 'drop-down boxes' can be very hard if there is too much choice, or if the possibilities remain open. The use of 'drop-down boxes' is one of the advantages of electronic questionnaires because it is possible to list a long set of alternatives in a simple way that does not take much space. However, if typing is quicker than choosing from a 'drop-down box', the best option is to ask respondents to insert the answer in an 'input box'. Such 'text input boxes' should have just the necessary space for the amount of the information required, for excessive space can lead respondents to erroneous interpretations.

The use of a multi-window questionnaire, as used in this research study, is useful to ensure the validation of the answers in the data collection process. Control of non-response is much easier than in the case of a one-page questionnaire. Multi-page e-questionnaires permit validation of the responses before final submission of the questionnaire results in the database.



2. Part B – Key Factors for Embedding Project Management Practices

The researcher's previous study of the literature and interviews led to the identification of several factors that might affect ability to achieve diffusion, dissemination, implementation and routinisation that is the embedment of PM improvement initiatives in organisations.

(***Embed*** *means a PM practice that is strongly contextualized (customised or personalised) and integrated with other contextualised management practices in the organisation and there is a sense of 'ownership' facilitated by the staff involvement at all levels.)*

Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.

B1. Adopter & Adoption

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The perceived usefulness of the PM improvement initiative by the adopters (the extent to which a person believes that using a particular PM practice will enhance her/ his job performance, that the practice has benefits).	○	○	○	○	○	○
2. The perceived ease of use of the PM improvement initiative by the adopters (the degree to which a person believes that using a PM practice will be free from effort, for example, if the perceived level of complexity is low).	○	○	○	○	○	○
3. Highly motivated adopters.	○	○	○	○	○	○
4. Adopters who are predisposed to change (i.e. resources are not accommodated and wish to learn more and do better).	○	○	○	○	○	○
5. The adoption decision of a PM improvement initiative being mandatory as opposed to optional.	○	○	○	○	○	○

Figure 5.5: Electronic questionnaire – a question view

In this questionnaire, there was one type of validation condition. Although, the system not requiring that all the questions in the current screen were answered before moving to the next window, when the respondent clicked the button 'save and continue' a message indicating which questions have not been answered appeared and asked if the respondent wanted to save and continue anyway. Figure 5.6 shows the validation condition.

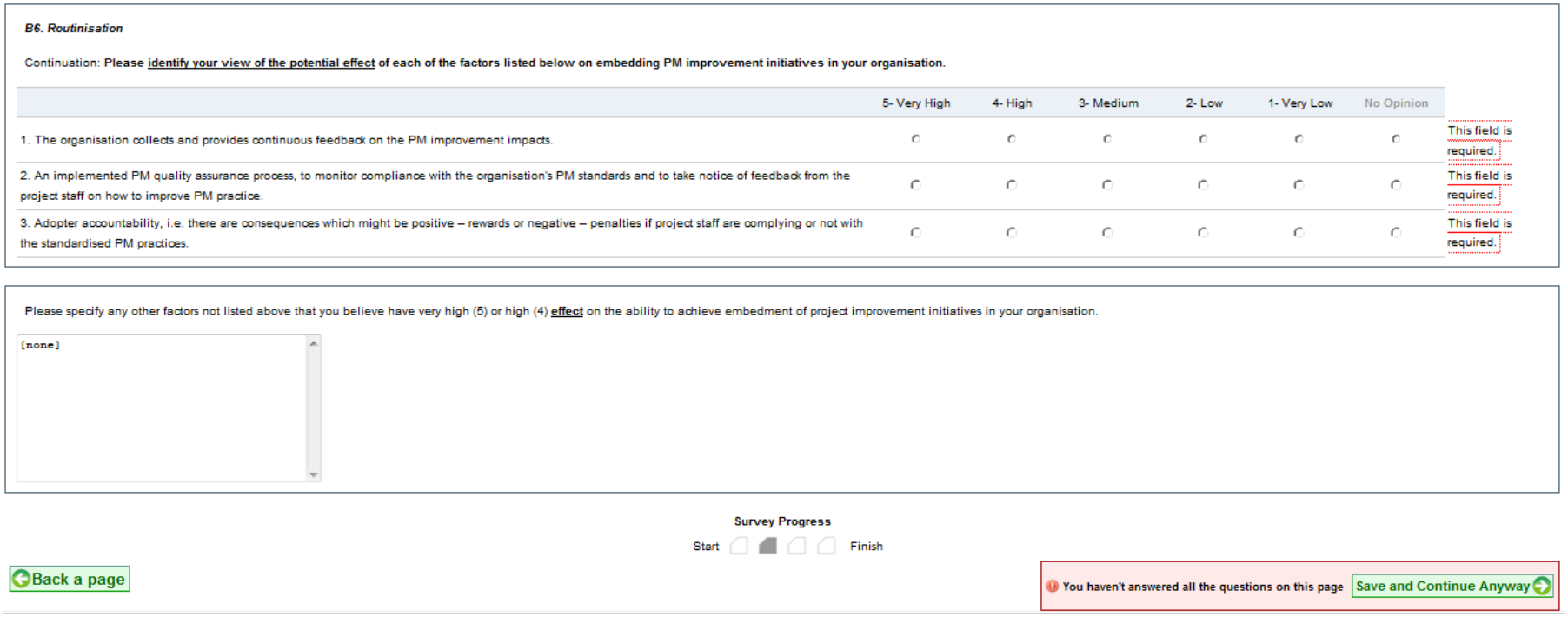


Figure 5.6: Questionnaire validation condition

Figure 5.6 also shows an example of 'text input box' and also a button showing the 'survey progress'. The respondents also had the opportunity to interrupt the questionnaire completion, by clicking a button, at the top of each window, that allowed saving and finishing later the questionnaire. A password was automatically created on a new window, and the respondent even had the possibility to insert his/her email and the password will be kept in their email records. This option might be useful, for example, in cases respondents have an urgent issue and need to stop and do another work.

Connecting the electronic questionnaire to a database is a crucial and very demanding task. Using the iSurvey platform simplified very much this task. The iSurvey platform gives the possibility to the user, at any time during the period of data collection: 1) to download all the data or 2) to download only complete data sets to a 'csv' file that can be easily imported to all statistics packages, including SPSS (Statistical Package for the Social Sciences).

The web-based questionnaire was pretested with colleagues, friends and family, namely to evaluate ease of understanding and time required to complete. Only minor revisions were required; for example, minor re-wordings to questions to remove ambiguities and slight changes to the layout of the questionnaire to improve readability.

Section 7.3 describes in detail the process of conducting the questionnaire survey.

5.6.3 Questionnaire Population and Sample

In academic research, any sample should be representative of the population and the sample size should take into account statistical significance and the anticipated response rate (Oppenheim, 1992). However, this research study used a non-probabilistic technique for sampling, the 'snowball' technique. Therefore, there was no possibility of a predetermination of size of sample (Saunders et al. 2009). It was intended to cover PM practitioners over the world and the 'snowball' sampling technique seems to be a suitable technique to pursue this objective.

When a non-probabilistic technique for sampling is used in research, generalisations are made in relation to the theory and not in relation to the population (Saunders et al. 2009).

In order to use the 'snowball' technique it is necessary to have an initial list of contacts. About 3.000 email contacts were gathered and used to advertise the questionnaire to the PM professional community. The contacts were from over one hundred different countries. Potential respondents were individually invited to complete the questionnaire sent out by email.

The database of contacts included:

- personal contacts that the researcher had been gathering through her professional career, namely in training courses; national and international conferences; and LinkedIn contacts;
- contacts from the VI Conference from PMI Portugal Chapter (June 2012). The researcher, during her conference presentation of this research study, asked delegates to indicate their interest in participating in the study, through a questionnaire leaving their email contacts;
- interviewee contacts, since all agreed also to participate on the questionnaire.
- contacts from PM associations, including the US based Project Management Institute (PMI) with a large number of Chapters dispersed around the world, and the International Project Management Association (IPMA), collected via the PM association websites.

Additionally, PM associations were asked (over 300) to advertise the survey to their members and invite them to consider taking part (see email content in Appendix C).

Moreover, the researcher also went through the process of the Global PMI Research Programme in order to post the survey link (https://www.isurvey.soton.ac.uk/6516) directly on the website pmi.org. This was a demanding task. The researcher had to send:

- the 'PMI® survey link application filled
- A copy of the survey
- A signed copy of the survey link agreement from PMI
- Proof of required ethics clearance from University of Southampton

The researcher had to wait about 40 days to get a positive answer from PMI and to see the survey link posted on the website.

5.6.4 Questionnaire Data Analysis

The analysis of the data from the questionnaire was undertaken using the software SPSS. The SPSS software was used to perform several types of analyses and tests, namely the descriptive statistics of the different variables

surveyed; the conduction of Factor Analysis (FA) for the validation of the conceptual 'revised framework', Pearson's correlation coefficients to analyse the inter-relationship between the PMIIs and embedding themes in the framework, and ANOVA to analyse the dependencies of the PMIIs and embedding themes in different organisational contexts.

Descriptive Statistics

The numerical measures of descriptive statistics were computed to summarise and describe the data collected. The most relevant descriptive statistics used included the mean, median, mode and standard deviation. For a given variable the mean is the average score assigned by respondents (the sum of undertaken responses/ scores divided by the number of responses) which can be affected by extremely high and low values. Thus, in general, it is complemented by other measures of central tendency such as the median. The median is not sensitive to outlying or abnormal values and represents the score for a variable above and below which half of the responses fall. The mode represents the score for a variable most frequently occurring score (if there is multiple modes, the SPSS software package only reports the smallest mode). Analysis of the data is enriched if all three measures are used. Finally, the standard deviation is a measure of dispersion around the mean.

Construct Validity

Construct validity refers to the accuracy of the measurement tool to measure what it intends to measure. FA was conducted to verify the construct validity of the conceptual 'revised framework' surveyed. FA is a collection of methods used to study the inter-relationships among variables (Fabrigar et al. 1999). FA can be used to simplify complex sets of data by using relatively fewer underlying 'latent variables' (i.e. non-observable variables) (Bollen, 1989; Kline, 1994). In this way it helps in exploring the underlying theme structure of the constructs in a model (Kim & Mueller, 1978). FA examines the correlations between the variables surveyed and can indicate if there is a significant 'overlap' amongst various subgroups of variables. As a result, a small number of 'latent variables' that explain most of the variance observed in a specific phenomenon are computed. If the correlation between variables is not significant, it is unlikely that the variables will present common 'latent variables' or factors. In summary, FA infers the existence of a smaller number of 'latent variables/ factors' - called themes in this research - which explain

the behaviour of the original variables. FA reduces a data set to a more manageable size while retaining as much of the original information as possible (Field, 2009).

FA has been used in PM research (e.g. Shehu & Akintoye, 2010; Besner & Hobbs, 2012). In the present research, as there is a large number of PMIIs and embedding factors ('variables' in FA), FA allowed these PMIIs and embedding factors to be grouped into a smaller number of themes ('latent variables/ factors' in FA).

There are two types of FA: exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) (Fabrigar et al. 1999). The use of one method over the other is often debated among researchers (Hurley et al. 1997). There are only general guiding principles in the literature about choosing EFA or CFA. Both types of FAs have their place in research, depending on the criteria and foundations used to substantiate their use in data analysis (Hurley et al. 1997). After examining the various issues associated with EFA and CFA, and the pros and cons of each analysis, this research used EFA for each of the improving and embedding constructs in the conceptual framework to explore the various themes ('latent variables/ factors' in FA) underlying these constructs. The criteria and arguments used for making the decision on using EFA instead of CFA in this research are listed in Table 5.4 based on literature reviews from Kim and Mueller, 1978, Hurley et al. 1997, and Fabrigar et al. 1999.

The following steps were followed when conducting the exploratory FA (Kim & Mueller, 1978; Field, 2009):

1. **Compute correlation matrix of the variables to ensure the 'factorability' of the data**. The following question should be answered: is the collinearity (common variance) among the variables sufficient to justify FA, i.e., do they measure the same thing? Is the data suitable for FA?
   So, it is needed to check:
   - The correlation coefficients between variables: there should be a sizeable number of correlation coefficients higher than 0.3 to indicate that the data is suitable for FA (Kim & Mueller, 1978; Field, 2009).

Table 5.4: Comparison of EFA and CFA

	EFA	CFA	This Research
Purpose, suitable application, Factor assumption	• To simplify interrelated measures, to explore underlying factor structure of a set of observed variables • To describe, summarise or reduce data to make them more easily understood • To build new theory	• To examine causal relationships between variables based on priori hypothesis/ loadings, to confirm such relationships between factors and constructs • To test hypotheses about population data based on sample data. • To confirm existing theory	• Because this research use a newly conceptualised framework EFA will be used • CFA could be used in the future to confirm the factor structure theorised in this research using other sample data.
Limitations	• EFA yielded factor structure dependent on the mechanisms of extraction and rotation procedures. • Researcher's accurate judgement of the constructs and their underlying factors	• Still little theoretical foundation. Only recently have researchers started to use CFA • Researcher must possess large amount of knowledge on the research subject	• This research will follow generally-accepted EFA procedures.
Scale/ Survey development	• Can be more appropriate due to factor loads on all factors • Maybe suitable for research-inherit surveys where researchers have little control over the design or administration of the survey	• Maybe more suitable for researcher-control surveys where researchers have control over development and administration of the survey instruments, although CFA will probably not fit the data (too restrictive)	• Although this research has developed the survey questions, this research will use EFA due to the factor load aspect for the survey.

- The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy: this test measures the percentage of common variance among the variables for a specific construct. Values of KMO close to 1 indicate that the FA is significant; excellent if it is higher than 0.9 and good for values between 0.8 and 0.9. For values lower than 0.5, the FA is not significant, because there is not a strong correlation between the variables. Furthermore, and in general, FA is assumed to be

appropriate if KMO is higher than 0.6, although 0.7 and above is a better indicator of 'factorability' (Kim & Mueller, 1978; Field, 2009).

- The Barlett's test of sphericity: this test (chi-square) is designed to test if the correlation matrix for the variables is an 'identity matrix' (the null hypotheses), i.e. that all variables correlate only with themselves. The goal of the test is to reject the null hypothesis, with the results of the test indicating that the intercorrelation matrix does not come from a population with an intercorrelation 'identity matrix'.

2. **Identify the initial solution.** Once the 'factorability' of the data is established, an initial grouping of variables into themes is generated using the Principal Component Analysis method. The SPSS software package offers seven methods of factor extraction namely: weighted least squares, generalised least squares, maximum likelihood, principal axis factoring, alpha factoring, image factoring and principal component analysis. But, Principal Component Analysis is the most commonly used method.

Principle Components Analysis is a statistical multivariate method that makes it possible to transform a group of initial variables correlated between themselves (x1, x2, …, xp) into a new group with a reduced number of uncorrelated 'latent variables' and designated by principle components (y1, y2, …., yp). These 'latent variables' reduce the initial complexity of data and enhance its interpretation. By making uncorrelated linear combinations of the observed variables, this method forms successive 'factors/ components' which progressively explain smaller portions of the variance. Thus, the first component/factor has the maximum variance. The principal components analysis can be described as follows. Coefficients a_{ij} (i=1, ..., p; j=1, ….,p) define each of new variables and ensure that principal components explain the maximum variation in the original data.

$$y_1 = a_{11} X_1 + a_{12} X_2 + \ldots + a_{1p} x_p$$

$$y_2 = a_{21} X_1 + a_{22} X_2 + \ldots + a_{2p} x_p$$

$$\ldots$$

$$Y_p = a_{p1} X_1 + a_{p2} X_2 + \ldots + a_{pp} x_p \qquad (2)$$

So first, 'communalities' were determined for each variable. These are the percentage of variance in the given variable explained by all the 'latent variables/factors'. The number of themes ('factors' in FA) is determined by:

- Kaiser or K1 rule: only variables with an eigenvalue greater than 1 should be considered, as they explain more variance than a single variable. Eigenvalues represent the unit/proportion of total variance of all the variables accounted by a factor.
- Cattells's scree plot is another way to determine the number of underlying themes ('factors' in FA) in a construct. It represents each eigenvalue associated with each extracted factor. At the point the plot starts to level off in a linear manner often indicates the number of factors (themes in this research) to select for a specific construct.

3. **Execute 'factor' rotation,** for more satisfactory results, and if one or more variables 'loads' about the same (the a_{ij} coefficient is about the same) on more than one 'factor/ component' (see next bullet), additional steps must be taken to clarify the factor structure (or the theme structure in this research). Factor rotation, using SPSS was used to clarify these patterns. Different methods of rotation which enhance the meaning of the extracted factors (themes in this research) can be used. These methods of rotation by reducing intermediate values, transform high coefficients into higher coefficients and low coefficients into lower coefficients. The chosen rotation method was the *varimax* method because it minimises the incidence of variables that have high loadings on each given factor, simplifying the interpretation of results. In general, coefficients higher than 0.5 are considered significant. SPSS software offers other four different methods of rotation, namely, *direct oblimin*, quartimax, *equamax*, and *promax.*

4. **Compute factor loadings**. Once the most satisfactory set of 'factors/components' (called themes in this research) is found, this research assessed if the factor loading for each variable was significant, greater than 0.5, in sample size less than 100 (Kim & Mueller, 1978; Field, 2009). Factor loadings are the correlation coefficient between the variables and the factors, obtained in SPSS from the 'component matrix'.

5. **Compute factor scores.** Using Principle Component Analysis (in SPSS factor scores matrix), the present research calculated the 'factor scores' to be used later in the inter-relationships analysis between the PMIIs and embedding themes ('factors' in FA) (answering research question 4), and to identify the interdependencies of these themes in different organisational contexts (answering research question 5).

In the present research three FAs were conducted:

- FA#1 for the improving construct;
- FA#2 for the embedding construct;
- FA#3 where all the variables are included in the analysis, in order to test that the two concepts improving and embedding are distinctive concepts.

Reliability Analysis

Once a final theme structure of the framework is established, it was necessary to test the reliability of the themes ('factors/components' in FA) by analysing the Cronbach's α (alpha) of each theme.

Cronbach's α is one of the most used measures to verify internal consistency within a group of variables. Cronbach's α is a measure which assesses the extent to which a set of variables can be treated as measuring a single unobservable or 'latent variable'. Cronbach's α is defined as the mean correlation across the variables that comprises an extracted theme. It can take values between 0 and 1. The higher the score, the more reliable is the survey data collection instrument. The formula for the standardised Cronbach's α is presented below. The number of variables is represented by N and the average inter-variable correlation amongst the variables is presented by r.

$$\alpha = \frac{N \cdot \bar{r}}{(1 + (N-1) \cdot \bar{r})} \quad (3)$$

Nunnally (1978) indicated that 0.7 was an acceptable reliability coefficient, although lower thresholds (0.5), especially for newly developed concepts, are sometimes used in the literature. Values higher that 0.9 mean that the factor's internal consistency is very good. Analysis of the Cronbach's α can also be used to identify variables that should be eliminated in order to improve internal consistency of 'factors' (themes in this research).

Once each FA was conducted and developed the underlying structure for the improving and embedding constructs, a reliability analysis using SPSS's Cronbach's α was performed for each theme found in the FA. For example, assuming that the researcher found six themes ('factors/ components' in FA) for the embedding construct, then the researcher would conduct six reliability analyses, one for each of the six themes.

5.7 Language Issues

The semi-structured interviews were conducted in Portuguese language, since all the interviewees were Portuguese, and the data analysis was conducted in English. This raised an issue of translation since a language is not merely a collection of conventional signs that signify an interior world of universal or common ideas, which might be partially true, but, additionally, a worldview can be embedded in a language. The more we understand a language, the more we understand the worldview embedded in it. For example, some statements only make sense in some languages.

Therefore, a translation needs to capture not only the literal meaning of words, but also how words relate conceptually in the context (Gee, 2012). The context may be the sentence itself, or the place where the person speaks it. Poorly translated phrases or concepts could change what themes emerge from the analysis and may not reflect sufficiently what the research participant actually said. This threatens, for example, the credibility and reliability of a cross-language study (Squires, 2009). Consequently, if the researcher has a limited grasp of the languages in which the research is being conducted, this can adversely affect the rigour and validity of the research.

The translation issue in this research study was minimised for several reasons. Firstly, the researcher is Portuguese, lives in Portugal, and is fluent in English language. Secondly, where the researcher had doubts about a correct interpretation, she consulted with her British supervisor and with her Portuguese adviser and colleagues also skilled in English. Thirdly, the Portuguese language is not dramatically different from the English language. Finally, one particular issue in translation is when interviewees use common expressions from their language, and when translated the sentence loses the

sense. However, during the interviews these common expressions have never been used.

The questionnaire was designed in English, since it was a worldwide questionnaire. Because English might not be the first language of respondents, the questions were designed in order to be as short as possible, also because the questionnaire was lengthy. Special care was taken with the words chosen to keep the message as simple as possible. The language issue was also minimised here because PM professionals are commonly skilled in English, as this is an important skill for their own profession.

5.8 Statement on Ethical Considerations

The conduction of research today places a very high emphasis on ethics. In line with research policies of the University of Southampton, the researcher sought to ensure that strict procedures relating to ethics and ethics approval were observed. This related specifically to the issue of anonymity and confidentiality.

In order to ensure that this was observed, the following process was adopted:

- In all cases, anonymity of all participants in the research was guaranteed.
- All respondents in the research (semi-structured interview or questionnaire) had their consent sought prior to the commencement of their participation.
- All participants in the research were informed that all responses will remain confidential and will be reported only in anonymous, summary form in the Ph.D. thesis and any subsequent research articles.
- All participants in the research were also informed that they could withdraw from the interview or questionnaire survey at any point of time, without giving reason and without implications for them.

In addition, in both cases, semi-structured interviews and questionnaires, participants were informed about the purpose of the study and have had opportunity to ask questions about the study.

Before the researcher was able to start the data collection, the research required ERGO[20] (Ethics and Research Governance Online) approval. The ERGO process was a crucial and very demanding task.

Firstly, the researcher had to submit the proposed research to the ERGO process, in order to be able to collect data to the interviews research phase (June to September 2012). The approval was obtained without difficulties.

Secondly, an amendment to the ERGO process, asking for the approval of the questionnaire data collection phase (January to April 2013), was required because, the final version of the questionnaire was developed based on the interview results (first phase of the research). At this stage the researcher had more difficulties to get the final approval. More committees needed to approve the research process, because the research study was categorised - research type A, as the study was collecting data worldwide.

See in Appendix D for the two approval emails from ERGO to the interviews research phase and questionnaire research phase, as well as, all the documentation support sent through the ERGO System.

5.9 Summary

This chapter outlined the research philosophy and research strategy adopted in addressing the objectives and research questions of this study. The chapter presented justification for the qualitative and quantitative approaches adopted for the study and gives an explanation for the selection of the two methods used: semi-structured interviews and questionnaire. Additionally, the chapter outlined the interviews process and the protocol which was implemented. The interviews were tape recorded and complemented by hand-written notes. The chapter also presented the structure of the questionnaire used in this research project and how it was designed to test the conceptual 'revised framework' developed from the interview analysis. Furthermore, it explained the process followed in the design of the electronic questionnaire, as well as the strategies

[20] ERGO is a centralised on-line system designed to facilitate the process of gaining ethical, governance and insurance approval for research studies that has now been rolled out to all faculties in the University of Southampton.

and options made during its conception. Finally, it highlights that the qualitative data, from the semi-structured interviews, are analysed through thematic analysis, using the Nvivo software; whereas quantitative data, from the questionnaire, is analysed through several statistical methods, namely FA to validate the 'revised framework', using the SPSS software. The following two chapters present the analysis obtained from the data collected. Chapter 6 presents the semi-structured interviews research phase and Chapter 7 presents the questionnaire survey research phase.

6. Interviews Research Phase

6.1 Introduction

The interview analysis allowed the researcher: (a) to identify new key PMIIs and key factors to embed PMIIs that emerged and others that achieved more significance; (b) to confirm the PMIIs and embedding factors in the 'initial framework' identified from literature review; and (c) to reduce the number of PMIIs and factors identified, and build a framework with a 'manageable' number of key items, as wide range will disperse the attention of organisations from what they should concentrate their awareness.

One objective of this study was to cover different organisational contexts (industry, size, types of projects and strategic context). Therefore, the researcher from her professional contacts in Portugal, identified twenty one potential companies that might be willing to participate on the study (see Table 5.3). Although there was some difficulty in getting their acceptance (several contacts before starting to get some positive answers were made), semi-structured interviews were carried out in seven different organisations as indicated in Table 6.1. The companies are presented in the order in which the interviews took place.

Table 6.1: Interviewed organisation characterisation

Organisation	Industry	Size	Strategic Context*	Interviews Number
Organisation 1	Research Centre/ Industrial Services (I&D)	Small	HD / LE	5
Organisation 2	Information Technology	Medium	HD / HE	3
Organisation 3	Engineering and Construction	Large	HD / HE	4
Organisation 4	Engineering and Construction	Medium	LD / HE	5
Organisation 5	Telecommunications	Large	HD / LE	5
Organisation 6	Information Technology	Small	HD / HE	4
Organisation 7	Business Services	Small	HD / HE	4

*HD – High Differentiation /HE– High Economics / LD – Low Differentiation / LE – Low Economics

Organisations were contacted via personal contacts, by phone and email. The researcher explained the scope of the research study and interviews to her contacts and asked them to identify possible participants from the organisation.

A total of thirty interviews were conducted, in order to ensure that the researcher has heard the full range of ideas and nearly reached saturation.

In order to summarise the interview research phase, this chapter presents a:

1. description of the process of conducting and analysing the interviews;
2. brief characterisation of the interviewees;
3. summary of the findings, presenting the responses by the three interview's objectives; and
4. discussion of the findings, concluding with the 'revised framework' for improving and embedding PM practice in organisations.

6.2 Conducting the Interviews

The interviews were conducted between July and September 2012. The interviews were conducted in-person at the interviewee's organisation headquarters, except one that was conducted by video conference and five others by Skype call, because the interviewees spent most of their time at clients' sites.

Before the interview all participants had received by email a document named 'Introducing a study on improving and embedding project management practices in organisations' (see Appendix A). Each interview started with an introduction about the researcher's personal background, with an outline of the research objectives and the definition of some terms used in the study. The researcher asked for authorisation to take notes and tape-record and assured the interviewee of confidentiality and that data obtained would only be used for academic purposes. Interviewees were asked to sign a consent form (in Appendix A).

Each interview lasted between one and three hours, the average was one hour and half. The interviews focused on exploring and identifying the interviewee's perspectives on the most important PMIIs to improve PM practice (research question 2), the key factors to embed PMIIs (research question 3), and the specifically most useful PM practices (research question 1).

The interview protocol consisted of the following requests to interviewees:

- Outline your experience in PM to date

- Characterise your organisation in terms of business strategy and type of projects
- Tell stories of your organisation initiatives to improve PM
- Identify the most useful PM practices that you use or have used
- Identify the most useful PMIIs, in terms of improving PM practice
- Identify the factors that might make it easier or more difficult to achieve the diffusion, dissemination, implementation and routinisation, i.e. the embedment process, of PMIIs in your organisation

When appropriate, supplementary questions were used to prompt more detailed responses to the above questions. This happened more frequently in the question 'identify the factors that might make it easier or more difficult to achieve the embedding of PMIIs in your organisation. Some interviewees answered with just two or three factors. However, the researcher wanted to be sure if it was their complete answer or was just their first thought and more factors were important to embed PMIIs in their organisations. Therefore, the researcher picked, from the 'initial framework' developed from literature review, factors which, in some way, were related to their firstly mentioned factors, and asked them if they considered such factors a key to embedding PMIIs. These supplementary questions helped interviewees to think further on embedding factors and answers were enriched. In order, to reduce the interviewer bias questions were clear and precise.

Overall these interview questions worked well. The first two questions had the objective to characterise the interviewee. The third question was made in order to relax the interviewee while recording his/her past, checking in addition if the interviewee had an understanding of the key terms adopted by the study, which were sent previously in the interview document.

The order of questions was changed. After few interviews, it was perceived that after the question three, "*tell stories of the organisation initiatives to improve PM*", it was easier to ask interviewees if they felt that all the past initiatives were useful to improve PM performance, and what other kind of PMIIs they felt would be the most useful for the organisation to invest on. Therefore, the fourth question was put last of all.

During the interviewing process the researcher gradually gained experience and improved her level of interaction with interviewees. For example, after the

first five interviews, the researcher noticed that she had a tendency to interrupt when the interviewee made a pause. However, she understood that when interviewees were making a pause, they were carefully thinking about how to complete and enrich the answer and not necessarily waiting for the next question. The researcher had to learn to manage better the silence moments.

At the end of each interview, the interviewee was informed that they would receive by email a resume of the hand notes for validation and possible additional comments, and that they would receive a summary of the main findings from the interviews during November 2012. Lastly, in order to make some groundwork to build the questionnaire participants' data base, the researcher asked interviewees if they were willing to answer a questionnaire in the same topic. A positive answer was received from all interviewees.

6.3 Analysing Interviews Data

Interviews data were analysed through thematic analysis (Miles & Huberman, 1994) and application of Nvivo software.

Firstly, the data coding process was conducted using the audio function from the Nvivo software, in order to avoid the long hours necessary to make transcriptions. However, after applying this process to the first five interviews, the researcher realised that a more effective alternative was to enrich the notes taken during the interviews, after carefully listening the audio recording, and ask interviewees to validate and possibly add to these notes if they were willing to do so. In some cases, the researcher highlighted parts of the notes that she would particularly like interviewees to check or expand upon. In the event, only 10% of interviewees made any additions to the notes.

The researcher identified two major difficulties with the audio coding process. Firstly, to select the particular part of the audio to code, she had to go back several times to the beginning of the code, and at the end she was spending too much time, the time that she wanted to save when choosing this method. Secondly, to analyse the data by audio was an odd experience. The researcher had more difficulty in identifying the PMIIs and embedding factors implicit in the interviewee responses. Maybe this difficulty is related to past experience.

Usually, when the researcher tried to solve something it was always writing down, and not by sound. Resulting notes were used in the coding process (see notes examples in Appendix A).

The coding process used as a basis the key PMIIs and key embedding factors identified in the 'initial framework'. However, new PMIIs and embedding factors emerged and others achieved more significance. The coding process was revisited several times to ensure that PMIIs and embedding factors identified from the literature and not identified in the interviewee responses were not implicit in the responses. The interviews data analysis was a laborious process, because it was performed with a high number of key PMIIs and embedding factors.

The use of Nvivo software was extremely helpful in the process of analysing responses. Namely, to revisit the PMIIs and embedding factors coded and analyse if there was other related PMIIs and embedding factors implicit in the response. Without the support of software, this process of revisiting the codes would have been more laborious and would have increased the probability of missing PMIIs and embedding factors in the responses.

The flexibility of Nvivo permitted the researcher easily to rename the codes, move them from different themes, code answers in several PMIIs and embedding factors and uncode answers to specific PMIIs and embedding factors. Finally, Nvivo was very useful in the process of identifying the list of PMIIs and embedding factors more frequently identified, which gave a good indication of the potentially most useful PMIIs and the key factors to embed these PMIIs.

In the coding process the PMIIs and embedding factors directly identified by interviewees and PMIIs and embedding factors prompted by the researcher to get more complete responses to the interview questions were distinguished. For the development of the framework, only PMIIs and embedding factors directly identified by the interviewee were considered. The PMIIs and embedding factors introduced by the researcher during the supplementary questions, even when the interviewee had answered that agreed that is a key PMIIs and embedding factor, in the data analysis were not counted, in order to reduce the interviewer bias introduced in these particular supplementary questions.

6.4 Interviewees Characterisation

This section makes a brief interviewees characterisation, by business activity, organisation size, organisation strategic position, primary role, gender, education level and PM experience. Additionally, categorisation is presented, by the typical projects in which interviewees are involved, project scope, technical innovation, duration and cost. Appendix E shows a Table with all these detailed information by interviewee.

Interviewees were from different industries as indicated in Figure 6.1.

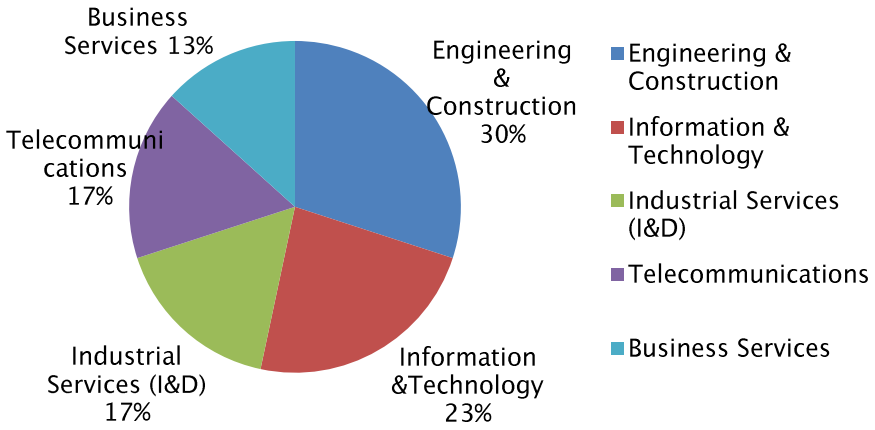


Figure 6.1: Interviewees by business activity

The interviews involved participants from different organisation sizes and strategic contexts (see Table 6.1). The researcher showed to interviewees Figure 6.2 and asked them to identify their strategic position, if their focus is in the need for differentiation of their products/ services or in the need to improve economics of process. Most interviewees had difficulties to identify the strategic context that the organisation was positioned on. This may have happened because: 1) this is a very complex issue, especially when the participants are more familiar with the organisation operational level than with the strategic level; or 2) the four categories were ambiguous and not fully understood by interviewees. Even so, most interviewees have pointed the organisation's strategic position as high differentiation and high economics.

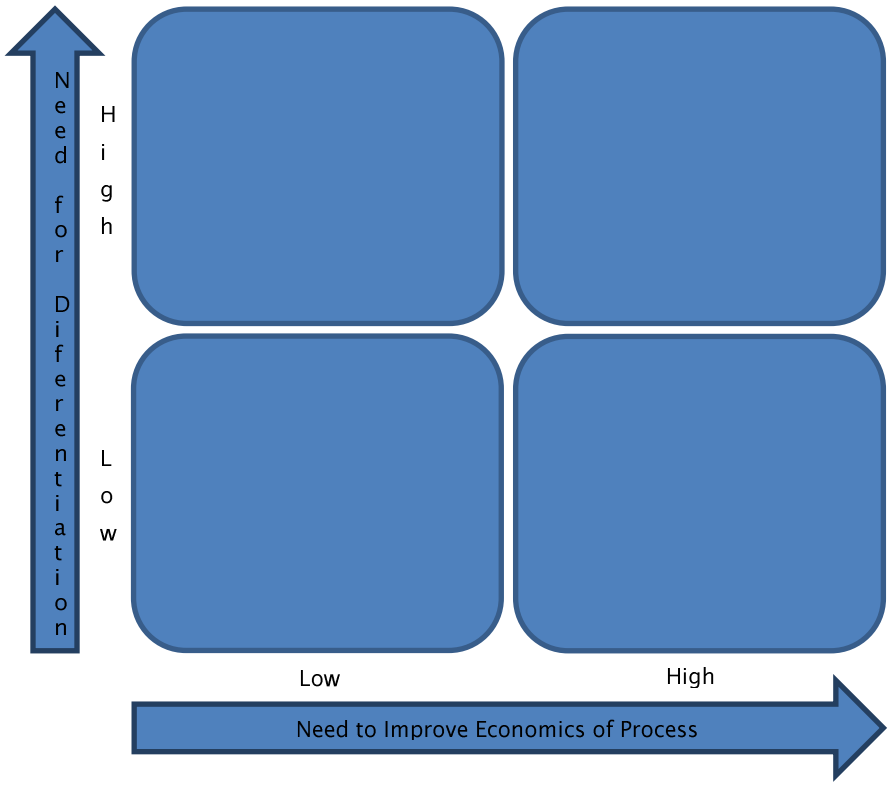


Figure 6.2: Interviewees' organisation strategic position identification adapted from Cooke-Davies et al. (2009)

The subjects had different roles in the organisation – directors (17%), portfolio, programme managers (23%), project managers (53%) and team members (7%). In general, team members are not so familiar with PM issues, and their responses were not as rich as interviewees from other roles. In other words, team members provided short responses, identifying few key PMIIs and embedding factors.

The interviewees had a high level of education (see Figure 6.3), 53% of the interviewees held a graduate certification and 10% of them had doctorates. All had at least an undergraduate certificate. Most of the participants were male (80%), which perhaps gives an idea of the female presence in PM area in Portugal.

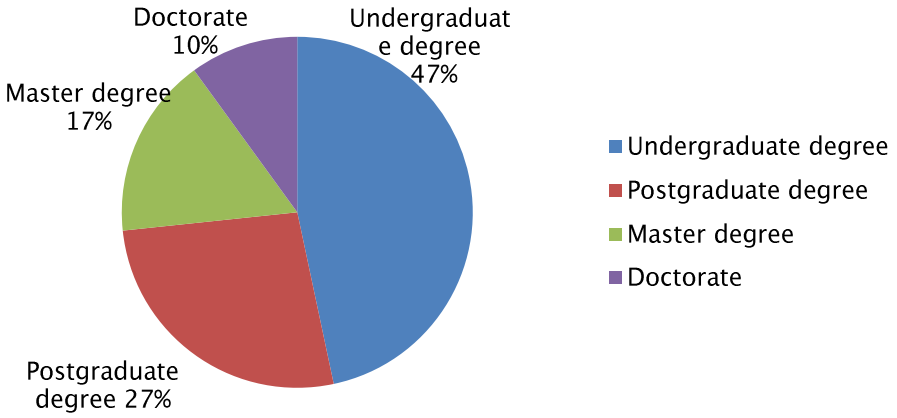


Figure 6.3: Interviewees by education level

The interviewees had a high PM experience (see Figure 6.4), 57% had more than 7 years of PM experience.

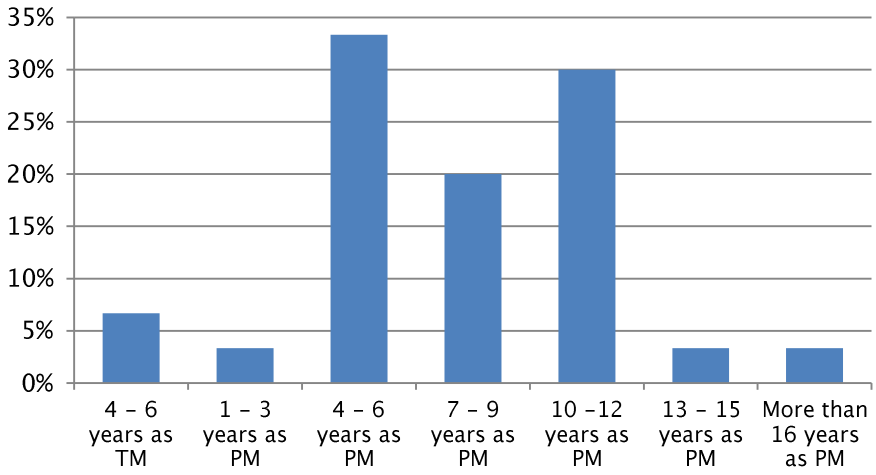


Figure 6.4: Interviewees by PM experience

Two thirds of interviewees worked on projects which vary in scope while one third worked on projects which were fairly similar in scope. Most of the interviewees, 80%, were involved in projects with a high level of technical innovation, while 20% worked on projects with low level of technical innovation. The interviews covered, in a balanced way, different project typical durations. Figure 6.5 shows that most interviewees had experience of projects with durations between 3 months and 2 years.

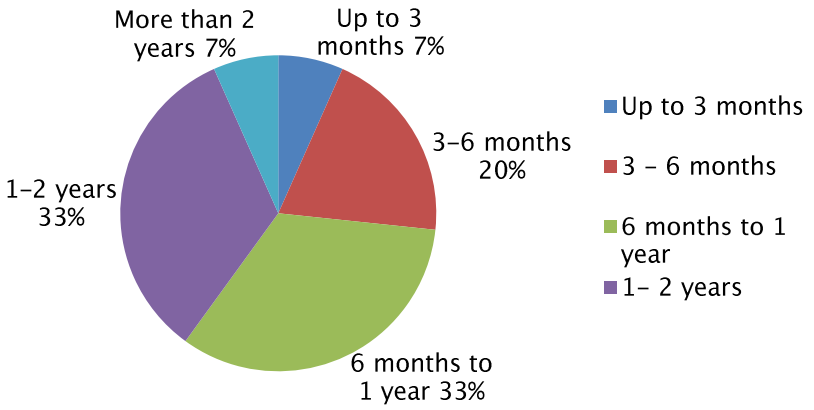


Figure 6.5: Interviewees experience by typical project duration

Interviewees had experience on projects covering a wide range of costs, as indicates Figure 6.6. However, the most common range varied between 50.000 and 250.000€, for 43% of the interviewees. Curiously, 10% of the interviewees did not have an idea of the projects' typical cost. This happened in two organisations where the project managers did not control the project cost, their focus was on scope, quality and time. From the researcher's professional experience, this is common in organisations with lower levels of PM maturity.

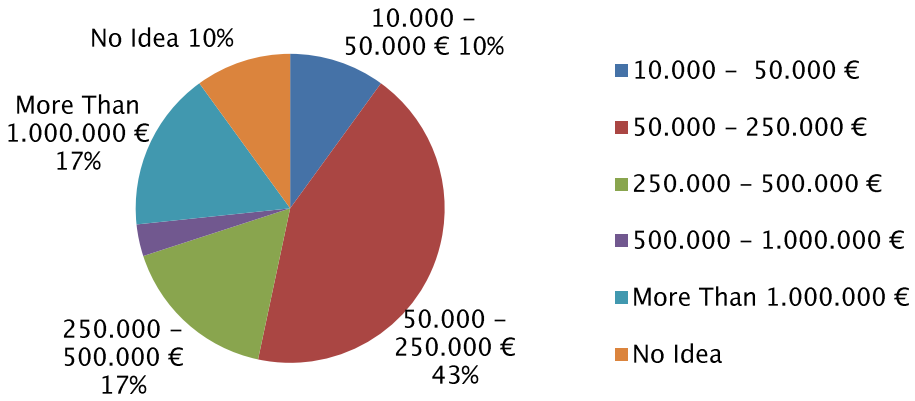


Figure 6.6: Interviewees experience by typical project cost

6.5 Interview Findings

The three next subsections present the main body of the interviews, which are the answers from interview questions 4, 5 and 6, as noted above in section 6.2.

6.5.1 RQ1: Most Useful PM Practices

The interview question number four (IQ4): *identify the most useful PM practices that you use or have used,* was a straightforward question. The researcher simply defined PM practices as those tools and techniques that practitioners use to "execute a PM process".

Table 6.2 presents, in descending order, the PM practices most frequently identified by the interviewees as the most useful, with illustrative interviewee responses associated.

Table 6.2: Interviewee responses to the most useful PM practices

Most useful PM practices	Some interviewee responses
Baseline plan	*"Project baselines for the control of scope, time, cost and quality."* – (interviewee 1) *"Detailed project plan. We make a little investment in planning, it is a cultural issue."* – (interviewee 28)
Progress meetings	*"Weekly progress meetings with the project team."– (interviewee 2)* *"Periodic progress meetings with the client and with the team, in order to communicate the difficulties and make decisions about the work in progress."* – (interviewee 14) *"Weekly progress meetings with the key project stakeholders in the organisation."* – (interviewee 19)
Re-baselining	*"Continuous planning. Many times organisations make a big effort for the initial planning, but after don't make re-planning!"* – (interviewee 11) *"Keeping the plan updated. Making an initial plan and then do not update it, doesn't serve for anything."* – (interviewee 14)
Earned value management	"*Earned Value Management is fundamental for my role. I can have the information of the project state with objective measures, without having to get involved in the project."* – (interviewee 6)
PM software for resources scheduling	*"Software for the management of human resources allocation, namely the % allocation of resources in different projects."* – (interviewee 1) *"Managing through software the allocation of shared resources."*– (interviewee 23)
Progress report	*"Progress reports, which includes the status report of each team member."* – (interviewee 24)
Kick-off meeting	*"Kick-off meeting for the analysis of the project's vicissitudes"* – (interviewee 12) *"Kick-off meeting with the team"* – (interviewee 13)

Most useful PM practices	Some interviewee responses
Lessons Learned	*"Registration of lessons learned throughout the project life cycle, not just at technological level, which is what has been happening, but more at a strategic level…."* – (interviewee 23)
Risk identification	*"Risk management. The project manager is 'bipolar', on one hand, he has to motivate the team, showing that they are capable of achieving the project's objectives, and on the other hand, he has to think and analyse everything that might run less well in the project. What are the project's risks?"* –(interviewee 7)
PM software to monitoring cost	*"Filling the timesheets."* – (interviewee 22)
Project scope statement	*"The detailed definition of the project scope. There would be always, or almost always, grey areas, but if at least we known them and we can anticipate them. This will solve many future problems."* – (interviewee 10)
Work breakdown structure	*"Scope definition using the* Work breakdown structure.*"* – (interviewee 29)
Project closure documentation	*"Close reporting with variance analysis. "*– (interviewee 25)
Change request	*"Change requests."* – (interviewee 30)
Project charter	*"Project charter. A document to formalise the project start."* – (interviewee 26)
Stakeholder analysis	*"Identification of the expectations of each involved in the project, named as stakeholders. Not only the customer, suppliers, the boss or the boss's boss…, but all those who, voluntarily or involuntarily, have or might have an influence during the project."* – (interviewee 10)
Milestone planning	*"Planning the major project milestones."* – (interviewee 12)
Requirement analysis	*"Clarification of the detailed requirements with the project stakeholders…."* – (interviewee 14) *"A template for gathering project requirements."* – (interviewee 25)
Handover from the proposal team to the project team	*"The 'transfer' of the proposal accepted by the customer to the project execution team, i.e., the transition of responsibility from the commercial manager to the project manager."* – (interviewee 9)
Communication plan	*"The development of the communication management plan."* – (interviewee 11)
Responsibility assignment matrix	*"RACI Matrix."* – (interviewee 30)
Risk response plan	*"Risk management, which involves both risk identification and planning responses. This practice must grow with the development of PM maturity level."* – (interviewee 19)
Configuration review	*"Documentation management, particularly for the control of documents changes and versions."* – (interviewee 16)

All the PM practices listed in Table 6.2 were stated by at least three or more interviewees (10% of the total interviewees). Other PM practices identified less often were: client acceptance form; customer satisfaction surveys; risk re-assessment; qualitative risk analysis; quantitative risk analysis; project issue log; work authorisation; PM software to monitoring schedule; quality inspection; critical path method analysis; database of historical data; design of experiments; PM software to task scheduling; requirements traceability matrix; and project web site.

The Nvivo software provides a facility for showing each items coded (PM practices) in terms of relative frequency of mentions by interviewees. The Nvivo 'map' (Figure 6.7) presents the most useful PM practices identified as those more frequently suggested by interviewees. This rectangle presentation is automatically produced by Nvivo, which means for example the PM practice 'baseline plan' presented at the top left of the rectangle is the most mentioned and in the bottom right the least mentioned. In some rectangles of Nvivo 'map' the full text is not displayed – unfortunately, Nvivo 'map' facility does not allow users to format the text inside each rectangle.

6.5.2 RQ2: Key PMIIs

When faced with the question about the most useful PMIIs, i.e. activities that would help to improve PM practice and consequently improve PM performance, a large number of PMIIs were identified by interviewees. This is not surprising, as there can be several different types of PM investments made by organisations, depending for example on the type of projects undertaken, industry, size or strategic orientation (Thomas & Mullaly, 2008; Cooke-Davies et al. 2009). The most frequent answers are listed in Table 6.3, by descending order. The following text explains in more detail each of them and the section ends with the Nvivo 'map' as in previous section.

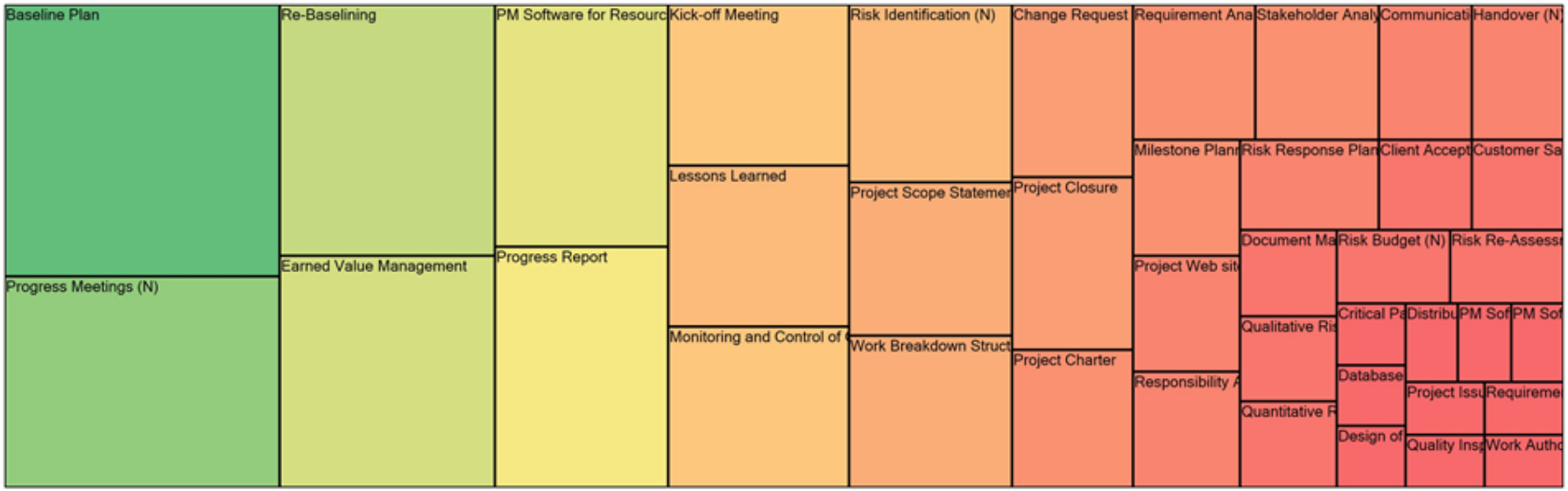


Figure 6.7: Most useful PM practices compared by number of items coded

Table 6.3: Interviewee responses to the key PMIIs

1. Corporate standardisation and tailoring of PM processes	2. Provide PM training
3. Corporate standardisation and tailoring of PM tools & techniques	4. Develop a supported infrastructure
5. Manage PM competences	6. Integrate the PM system with the general management system
7. PM Professionalisation	8. Develop a culture of learning
9. Develop a project sympathetic organisation structure	10. Develop of PM value among all staff awareness
11. Establish PM career path for all PM roles	12. Develop a basic understanding of organisational PM practices among all project stakeholders
13. Establish PM practices as internal Standards	14. Benchmarking to PM assess and continuous improvement

- **Corporate standardisation and tailoring of PM processes**

Almost all interviewees (93%) mentioned the importance of PM processes standardisation to improve PM performance. Interviewees emphasised the significance of continuous improvement of the standardised processes, adjusting them continually to the needs of project stakeholders.

"Focus on continuous improvement, organisation should not see the PM processes as 'crystallised'." – (interviewee 3)

Some interviewees were of the opinion that for continuous improvement, benchmarking of PM practice with companies in the same sector of activity and/ or with market PM standards plays an important role.

Beyond continuous improvement, when interviewees talked about processes, they referred to tailored processes, i.e. to the project needs. For example, interview 12 stated, that in their case *"…projects are categorised based on risk, and the PM processes are tailored based on the types of risk."*

- **Provide PM training**

PM training was the second most mentioned PMII, by 90% of the interviewees. Training to inform the PM team of the processes, tools and techniques standardised in the organisation, such as on the PM software implemented, and training on PM 'soft' skills. PM training was identified as very important to create a common language among all project stakeholders, and an important initiative to develop a PM culture in the organisation.

Contradictorily, two interviewees from the same organisation affirmed that from past experience, training does not have a big impact on improving PM practice in their organisation. Perhaps, they just had bad experiences with PM trainers. One of them emphasised "*Room training is not enough to produce changes in PM practice. It is necessary to have a strong self-education and strong commitment of people. People have to feel a need to improve…*" – (interviewee 14). With this assertion the interviewee is linking the PMII with the embedding process, the factors that would facilitate embedment, for example the 'predisposition for change', discussed in the following section.

One interviewee spoke about the way to deliver training, and he was of the opinion that *"We should increase training by coaching, although classroom training is more economic."* – (interviewee 24)

Several interviewees, associated PM training with the relevance of PM certification, such as the PMP® certification by PMI.

- **Corporate standardisation and tailoring of PM tools and techniques**

PM tools and techniques standardisation was also one of the most identified PMIIs. It was several times referred in the same sentence as PM processes standardisation, as stated by interviewee 28 *"the standardisation of PM processes and templates…"* Implying that associated with PM processes there is the need to implement tools and techniques to support PM processes. Other interviewees stated the importance of specific PM tools, such as the creation of Work breakdown structure (WBS) templates. Some interviewees referred how important it is to start a project in their workspace and automatically a group of templates are created, such as the project charter, project plan, change requests, etc.

The most emphasised PM tool was the PM software, mentioned by 80% of the interviewees. For example, one interviewee affirmed *"It was crucial the implementation of the SGP software (project management system), which allows online control of resource allocation to projects, hours automatically converted into costs, control of scope and time."*– (interviewee 16)

All interviewed organisations used PM software to plan and control their projects. Two of the seven companies had self-developed software, as the company from the interviewee above, which they call *SGP - project*

management system. Four out of the other five companies use Enterprise Project management (EPM) from Microsoft and the other uses Project Portfolio Management (PPM) from Planview. This sample is a good representation of the strong presence of EPM from Microsoft in Portuguese organisations.

- **Develop a supported infrastructure**

More than half interviewees (63%) affirmed the importance of the organisation having a PM support office (PMO) or a similar structure. As one interviewee asserted *"It is important to create a PMO department, responsible for processes continuous improvement and to support project managers on the PM tools use."* – (interviewee 22)

The relevance of a PMO or a similar structure is evident, as only one of the interviewed organisations – organisation 4 has not implemented a PMO. But even in this organisation, the interviewed director recognised the value of such structure to his organisation.

- **Manage PM competences**

Several interviewees (63%) stated the importance of managing PM competences, emphasising, for example, the relevance of investing in PM staff, in developing their PM competences. As asserted by one interviewee *"it is important the assessment of people's PM competences, in order to identify the competences gaps and define the training plan to boost the organisation's resources and consequently PM performance."* – (interviewee 29). Other interviewee affirmed the importance of the existence of an employees' portfolio PM competences updated in the organisation.

Some interviewees affirmed that people's competences assessment should be directly linked to their projects' project management performance assessment, which should be appreciated as an input to PM resources' career progression. Interviewee 30 gave the example of his organisation *"We make, monthly, a qualitative and quantitative performance assessment of people, and the information on the projects' KPIs in which we are involved are used as an input for the assessment. Then, this assessment is used as an input for our career progression."*

Finally, one interviewee asserted the importance of establishing internal PM communities: *"create a spirit of clan. Show that the project manager is not alone. The difficulties he has are shared by others, and that he can interact with them to find solutions, for example, through an internal blog*."– (interviewee 9)

- **Integrate the PM system with the general management system**

Interviewees (37%) also asserted the significance of integrating PM processes with organisation's strategic, operational and tactical processes, as well as, the PM information system with other information systems in the organisation. Interviewee 20 gave the example of the processes "*product management, quality management, innovation, operational and commercial processes, which are fully integrated with the PM process in our case."* Interviewee 5 affirmed "*It is important to integrate the PM software with ERP (Enterprise Resource Planning), in order to guarantee an integrated project costs control, namely human resources and equipment costs. Unfortunately, in our organisation the PM software controls the human resources costs and the ERP all the other project costs, without an integration of all project costs."* Another interviewee even referred the integration of the PM processes with the organisational culture.

- **PM Professionalisation**

Oddly, some interviewees affirmed that project managers do not see the value of PM! Perhaps this reflects the common situation where so-called project managers are in fact just senior technical managers that in the past had the responsibility for managing technical teams. When top management has seen the value of PM and decided to implement it in the organisation, to the senior technical managers were simply given the project manager role. Because of their past roles, they were not fully aware of the value of PM to the success of their projects. As interviewee 4 asserted: "*our project managers still focus their work in the technical area of projects. We have a lack of PM culture*." These 'project managers' cannot see how PM could help them, as they continue to perceive their main concerns as still being technical, and PM does not solve technical issues, but management issues. Consequently, PM practices are seen

by this type of 'project manager' as something bureaucratic that management requires them to do to control their work.
Interview 30 observed *"the 'one man show' that makes everything in the organisation, PM and a high variety of technical activities, should become extinct and a person that dedicates her/ his time to PM should appear."*
Organisations need competent project managers in the PM sense. Therefore, PM professionalisation (i.e. project managers who dedicate almost 100% of his/her work to PM activities) seems to be an important initiative to improve PM practice.

PM professionalisation might imply, at least temporarily, a separation of the PM role from the technical management role, until the development of awareness of the value of PM amongst all staff in the organisation. Ideally, these two functions should be together, as their separation has some disadvantages, such as:

- increasing costs. In a 'small' project where the project manager might 'easily' play the PM role and the technical management role, two different persons need to occupy these two positions, which mean at least the presence of two persons in all important project meetings;
- potential conflicts between these two roles. In one hand, often the technical interests impact on the time and cost project objectives protected by project manager. On the other hand, the PM role is culturally seen as a prestigious position in the organisation, the exclusion of this role from senior technical managers could be critical.

- **Develop a culture of learning**

Some interviewees (30%) mentioned the importance of capturing and sharing project lessons learned and that this intellectual capital should be stored and revised in a sound knowledge management system. An interesting knowledge sharing activity was suggested by interviewee 26 *"When a project ends, it is important to conduct a workshop to share what ran well and less well during the project life cycle."*

- **Develop a project sympathetic organisation structure**

Interviewees also affirmed the importance of having a project sympathetic organisation structure, a projectised structure or a strong matrix structure,

and that human resource allocation should be project oriented. One interviewee was of the opinion that *"It is important to recognise the type of organisational structure to adjust the PM processes to the structure that effectively exists."* – (interviewee 11) Another affirmed the significance of *"an adequate organisational structure to support effective PM practices. For example, the person responsible for the project proposal should be responsible for project execution. In the past, we had a salesperson that was responsible for the project proposal; when the proposal was accepted by the client, a project manager, who hadn't had any involvement in the proposal, was assigned. Consequently, as a first obstacle in the project's success, it was the danger that the project manager didn't feel the responsibility to execute the project within the proposal's established objectives.*" – (interviewee 14)

Interviewees also pointed out the value of increasing the authority of project managers in the process of managing projects, for example, through the resource's performance appraisal. Interviewee 20 observed *"Unfortunately, in our organisation, resources performance assessment is uniquely made by functional managers. However, project managers should give their assessment input on the performance of team members at the engaged projects"*. Last but not least, one interviewee affirmed the importance of the recognition by the organisation of the importance of the project manager. It is essential to win the respect from all departments in the organisation for the project manager role.

- **Develop awareness of PM value among all staff**

Some interviewees (27%) asserted the significance of developing a PM culture, through the development of awareness of PM value among all staff in the organisation. For example interviewee 25 stated *"It is essential the development of a PM culture, through for example, the explanation of the importance of PM, the impact that it has in the organisation and even in the economy and at the social level."*

One interviewee specifically emphasised the importance of top management awareness of PM benefits, in order to get sponsorship to PMIIs.

This initiative is deeply linked to a key embedding factor. One of the most frequent responses about key embedding factors was 'demonstrating the PMII

value'. This demonstration would be facilitated if there is a general awareness of PM value in the organisation.

- **Establish PM career path for all PM roles**

Interviewees (17%) also observed the importance of establishing a PM career path for all PM roles. Interviewee 27 asserted *"It is important to integrate the PM competences assessment and development, namely aiming at obtaining specific certifications with the progression in the career path.*"

One interviewee suggested that *"only firms with some maturity in PM recognise the importance of implementing career plans."* – (interviewee 28)

- **Develop a basic understanding of organisational PM practices among all project stakeholders**

Few interviewees (10%) stated the significance of developing a PM culture in the organisation. When the researcher specifically asked, how they might develop their organisation PM culture one interviewee affirmed *"through training to make known the standardised tools and techniques."* – (interviewee 26) Emphasising, the significance of developing a basic understanding of organisations' PM practices among all project stakeholders. Others emphasised the topic below.

- **Establish PM practices as internal standards**

Interviewees (10%) also referred to 'establish PM practices as internal standards', they emphasised that it is only when the same processes, tools and techniques and language are shared and used on an on-going basis that 'best practices' become part of the organisation culture. Importantly, it is the establishment of the use of PM practices as standard requirement that would allow the use of common language across the organisation.

- **Benchmarking to PM assess and continuous improvement**

Continuous improvement of PM processes, tools and techniques was mentioned few times by interviewees. A way of continuing improving is performing internal and/ or external benchmarking or even benchmarking PM

practices against PM standards. Interviewee 29 suggested *"Benchmarking the PM processes with companies from the same sector of activity and with the standards: OPM3, PMBoK, PMCDF from PMI."*

Although benchmarking is in the bottom of the most identified PMIIs, when directly prompted by the researcher, during the supplementary questions, all interviewees agreed that is an important initiative. One interviewee observed *"External benchmarking would help, but we have difficulty in doing it. Internal benchmarking does not make sense for us, because all departments have already more or less the same practices."* – (interviewee 13)

The Nvivo 'map' (Figure 6.8) presents the relevant themes/ PMIIs by their relevance within the text, which means the PMIIs which were most coded, i.e., more frequently suggested by interviewees. But, unlike the previous 'map' it presents also the PMIIs under the four themes identified during interview analysis: 'processes, tools & techniques'; ' people & organisational learning'; 'general management system' and 'PM culture', which are coincident with the themes identified in PM literature. The 'map' should be read similarly to the previous one, which means that the PMIIs less frequently identified by the interviewees were related to the theme 'PM culture' (smaller rectangle) and the most frequently identified were related to the theme 'processes, tools & techniques' (bigger rectangle). Additionally, the 'map' shows rectangles inside other rectangles, which is already the result of interviews data analysis. This represents PMIIs that were merged in the more general PMII (outside rectangle). For example, as a result of the interviews data analysis the identified PMII 'assessment of PM performance' from literature review was merged in the initiative 'manage PM competences'. Further discussion can be seen in section 6.6.1 – Modifying the Framework for Improving PM practice.

6.5.3 RQ3: Key Embedding Factors

The invitation to identify the factors that might make it easier or more difficult to achieve the diffusion, dissemination, implementation and routinisation, of PMIIs in their organisation (i.e. key embedding factors) prompted interviewees to mention a large number of factors. Table 6.4 summarises the most frequently identified in descending order of frequency. The following text explains each in more detail and the section ends with the Nvivo 'map', similarly to previous sections.

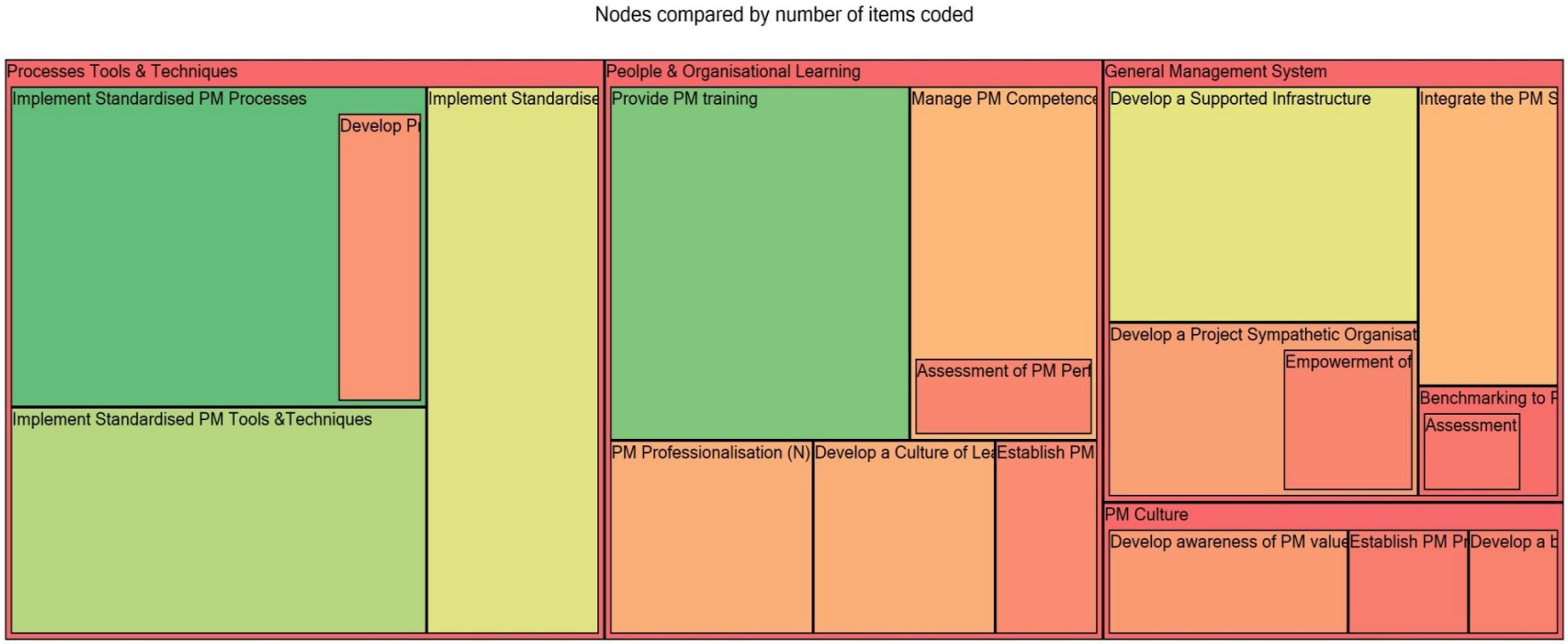


Figure 6.8: Key PMIIs compared by number of items coded

Table 6.4: Interviewee responses to the key embedding factors

1. Demonstrating PMII value	2. Resources to support change
3. Specific training	4. Perceived usefulness
5. Feedback on the PMII impacts	6. Piloting
7. Sponsorship	8. Perceived ease of use
9. Gradual implementation	10. Predisposition for change
11. Adaptation/ re-invention	12. Opinion leaders and key facilitators support
13. PM quality assurance process	14. Adopter accountability
15. Stakeholders involvement	16. Tension for change
17. Quick use	18. External stakeholder requirement
19. Adopter motivation	20. PM maturity
21. Nature of adoption decision – mandatory	22. External collaboration
23. Integration with the existent practices	24. Absorptive capacity for new knowledge
25. Environmental culture	26. Unstable economic environment
27. Interorganisational PM practices	28. Gender differences
29. Source of the knowledge credibility	30. Homophily
31. Interpersonal channels	32. Frequency of use

- **Demonstrating PMII value**

The most frequently identified factor for facilitating embedding was the demonstration of PMII value, i.e. the effective communication of the value of a PMII across structural boundaries within the organisation. Most of the interviewees identified this factor more than once during the interview, emphasising its relevance. Interviewee 15 affirmed *"The demonstration of the PM practice value, its advantages, it is what will motivate people to its use."*

Interviewees specified that the demonstration of PMII value should be prior to its implementation. Interviewee 20 even observed that during the demonstration process of the PM practice value, it is important to *"…eliminate or reduce the number of voices stating that this PM practice doesn't serve for anything.*"

- **Resources to support change**

More than half of the interviewees (60%) identified the desirability of adequate resources to support change (the embedment of the PMII).

"It is essential the availability of resources, in terms of human resources and tools, to implement a new PM practice. These are pillars that must exist; otherwise all will immediately 'fall to the ground'." – (interviewee 28)

Interviewees specified the necessity of having sufficient resources to support the project manager in the application of the new PM practices, as some of the PM practices can be complex and time consuming and support is needed.

Some interviewees noted that it is often the case that resources are very limited and project teams are frequently overloaded, with the likely effect that they disregard PM activities. As for example, the formal project progress control, through written progress reports or even simple progress meetings, because the overall focus of the team is in the project technical execution (product deliverable).

- **Specific training**

Half of the interviewees have stated the significance of 'specific training', as affirmed by one interviewee *"to embed a new PM practice we must first learn how to use that practice through training."* – (interviewee 5)

It is essential that people acknowledge the new PM practice for its embeddedness. Training might be delivered through coaching during the practice implementation as emphasised by some interviewees. Organisations should not simply assume that people know how to use a PM practice and the associated concepts. This might result in wrong usages and therefore loose of the potential benefits of the PM practice use. Training was also often stressed as a PMII. However, when suggested as a PMII, interviewees were talking about PM in general. Here, it was prompted by 'specific training', in order to provide people with the competences necessary for the embedding of a specific PMII.

With some embedding factors, such as *'specific training'*, we can see how close the concepts of improving and embedding are. Sometimes it is difficult to see it as different constructions, since improving and embedding concepts are strongly correlated.

- **Perceived usefulness**

Several interviewees (47%) emphasised the factor 'perceived usefulness' of the new practice for the user, as for example some PM practices might just be useful for top management and not for the project team. However, one interviewee observed *"We should always seek to realise how useful will the practice be for each person. For example, records of hours in the timesheet would enable the organisation to better budget their projects, and team members would no longer be pressed with unrealistic estimates to carry out the project activities."* – (interviewee 5)

Interviewees often linked 'perceived usefulness' with the demonstration of the PMII value. Organisations need to demonstrate the value of the PMII, i.e., the direct and indirect benefits to users, for them to get the perception of usefulness. However, even when organisations demonstrate the value, this does not directly imply that users will perceive usefulness.

- **Feedback on the PMII impacts**

About half of the interviewees (53%) stated the importance of giving systematic feedback on the PMII impacts during its use. As one interviewee observed *"We should give visibility to stakeholders of the positive impacts of the PM practices implementation."* – (interviewee 28) People need to see the results of the efforts that are being made.

- **Piloting**

47% of the interviewees stated the importance of making a pilot during the implementation process of the PMII. Interviewee 6 even affirmed *"…piloting a PMII is a prerequisite for any implementation*".

Interviewees stated the importance of piloting to a better customisation of PMIIs to the organisation's needs. One interviewee even observed that when there is asymmetry between departments is important to always adapt the practices to each department and make a pilot in each of them. Otherwise, people will be more resistant to its embedment.

Interviewees when prompted piloting, most of the times, linked to the factor *'demonstrating the PMII value'*. For example, interviewee 18 stated *"Use of pilot*

projects to demonstrate the benefits of the new PM practice carried to those projects, compared with others which didn't follow the practice." – (interviewee 18)

- **Sponsorship**

Almost half of the interviewees (40%) stated sponsorship as key factor to embed PMIIs. Interviewee 10 affirmed *"The person responsible for implementation must be the administration's 'face'. The administration must be conniving with the change."*

Interviewees affirmed that top management should have the perception of what involve the systematic use of certain PM practices, the efforts necessary, in order to support with the necessary resources. Top management should value if the project team follow the established PM practices in the organisation. Top management should indeed make benefit, or use from the information generated by the established PM practices, as affirmed by one interviewee.

Interestingly, one interviewee observed 'local sponsorship', i.e. the managers responsible for the people that will use the practice must agree that this is the 'way' and support the change.

- **Perceived ease of use**

40% of the interviewees stated the importance of 'perceived ease' of use by adopters.

> *"The PM practice use must be intuitive. The person responsible for its implementation should be open to simplify the practice, in order to make it simpler and quicker to use."* – (interviewee 10)

Some interviewees even stated that the new PM practice should follow the KISS philosophy (keep it simple and stupid) and with as little bureaucracy as possible. Curiously, some interviewees associated PM practice with bureaucracy. However, these interviewees had a more technical role in the project – were team members.

Moreover, one interviewee observed *"If a PM practice is easy to use and useful it is great, but if it is difficult to use and it has great utility, we will not stop*

using it. So, we can say that usefulness has a higher weight than the degree of difficulty in its use." – (interviewee 16)

- **Gradual implementation**

Some interviewees (33%) considered that many PMIIs had been implemented in their organisations at same time, but that would be better if they made more gradual implementations. The organisation just should give the next step, when the previous implemented new practices are effectively embedded. One interviewee interestingly stated that gradual implementations help to develop a PM culture, *"'Organisation 3' has been making improvements in the PM processes and tools every year. These gradual improvements helped to develop a PM culture and to acquire a common PM language."* – (interviewee 11)

One interviewee affirmed *"The problem is that often consultants tried to impose PM as a 'bomb'."* – (interviewee 28), in other words, too many PMIIs are implemented at the same time.

- **Predisposition for change**

A third of the interviewees stated the importance of adopter's predisposition for change. There is a natural resistance of people to change, which cannot be ignored. Interviewee 2 affirmed *"If people are in what we call the comfort zone, the resistance to change is bigger. Being comfortable is bad."* It is important that organisation's resources are not feeling accommodated to their daily work, and wish to learn more and do better. Interestingly, interviewee 9 affirmed *"We should focus on people who want the change."* i.e., giving them prominence, in order that individuals resistant to change are encouraged to follow them. Additionally, in order to reduce resistance, another Interviewee suggested *"We should identify who support and who are against the improvement of PM practice, and understand why people are against to better respond to their issues."* – (interviewee 29)

- **Adaptation/ re-invention**

Interviewees (33%) claimed that during implementation, it is very important that a practice be adapted to specific necessities of projects. One interviewee

explicitly asserted *"Tailoring the PM practices to the needs of the project's type, otherwise it will create too much resistance."* – (interviewee 28)

- **Opinion leaders and key facilitators support**

Interviewees (27%) stated the importance of the new PM practice being used by some persons who have particular influence on the beliefs and actions of their colleagues. Interviewee 8 specifically affirmed *"It is essential to find the right people to support the implementation of a PM practice; the ones that have the ability to influence colleagues."*

For example, organisation 5 clearly used the strategy of having facilitators, which they call PM officers, in order to encourage embedment of their PMIIs. Interviewee 18 stated *"PM officers are chosen, because they are technically good, i.e., they must be knowledgeable of the PM practices (hard skills), but also they are good with people relations (soft skills)".*

- **PM quality assurance process**

Interviewees (27%) mentioned the importance of a PM quality assurance process. For example, making regular audits to the project's metrics, KPIs, and checking if project managers are complying with the organisation established PM practices. As one interviewee affirmed "*It is important to have a policy that ensures that PM processes are performed."* – (interviewee 8) Additionally, as another interviewee have affirmed *"It is important to give visibility to the project manager if it is or not complying with the institutionalised PM practices, through for example, a sheet of quality assurance."* – (interviewee 25)

The PM quality assurance process should be also used as another interviewee observed *"…to receive feedback from project managers on how we can improve PM practice, and actual make use of these information to continually improve."* – (interviewee 15)

- **Adopter accountability**

Interviewees (23%) also emphasised the significance of ensuring that all PM resources are accomplishing the institutionalised PM practices. Interviewee 25

asserted *"The problem is that usually if project managers do not use the institutionalised PM practices nothing happens."*

Two interviewees had strongly emphasised this factor; one of them even asserted *"The decision for the implementation of a new PM practice, such as the POE, should be mandatory and not optional. Coercion actions should be implemented if project managers do not make use of the PM practice. For example, if the project manager does not fill in the POE the estimation of resources' needs, by different technical areas, it shouldn't be allocated to the project a chief of each technical area, as well as, the technical team."* – (interviewee 14)

Therefore, for this accountability to be possible it is necessary that the nature of adoption decision of the new PM practice should be mandatory and not just optional, and, ideally, that the organisation might have an implemented process of PM quality assurance, that will guarantee the control if the project team is complying or not with the established PM practices.

Moreover, the PM resources' performance assessment and career progression should be taking into account if the resources are accomplishing or not with the institutionalised PM practices. As one interviewee observed *"There must be consequences if project managers use or not use a corporate PM practice. These consequences might be negative – penalties or positive – rewards."* – (interviewee 20)

- **Stakeholders involvement**

Interviewees (20%) had also emphasised that before and during the implementation process, the key persons should be involved, as it is impossible to involve all. As mentioned by interviewee 8 *"It is essential the stakeholders involvement, namely people who have knowledge and past experience in the PM practice use, not necessarily people who are at the organisation top."* Interviewee 30 even intensely emphasised that "*The end user should actively participate in solutions definition."*

- **Tension for change**

Interviewees (27%) affirmed the significance of a tension for change in the organisation. One interviewee stated *"The existence of a tension to be more competitive, resultant from the difficult economic situation. We feel that if we work as we worked 10 years ago, we couldn't be competitive. We must have had to change the way we manage projects."* – (interviewee15) Other interviewee asserted *"The existence of negative experiences in managing projects. It is necessary to demonstrate to people that the way we were managing projects doesn't work. Emphasising that in past projects which didn't run well, due to not applying the 'best' management practices, because they were not institutionalised."* – (interviewee 6)

Interestingly, interviewee 9 strongly emphasised *"It is necessary to create discomfort of the current situation. Create a need for change. Nobody changes if their situation is comfortable. Organisations should create a mechanism to make people 'move'".*

- **Quick use**

Interviewees (23%) identified the importance of quick use, i.e., the time necessary to implement the new PM practice should be short. Interviewee 12 gives an example "*we record the hours spent on paper and not directly in the BAAN software as we should, because the tool is too slow."* Curiously, this factor was pointed out not just by project managers and team members, but also by directors concerned with efficiency.

- **External stakeholder requirement**

Some interviewees (23%) emphasised that their organisations would not have the opportunity to execute some of their client's projects, if they do not performed certain PM activities required by the client. For example, one interviewee observed *"We implemented the PM processes aligned with the PMI standards, because our customers were requesting PMP® certified project managers*." – (interviewee 9)

- **Adopter motivation**

Interviewees (17%) also affirmed the importance of 'adopter motivation'. Adopters need to be convinced that PM practice will help them to meet their objectives in a cost effective manner, both directly and indirectly through enhanced project and organisational performance. As one interviewee stated *"If the project manager is not motivated, enthusiastic by his PM activities, and the director asks him to implement a new PM practice, he would not be very interested in doing it."* – (interviewee 24) Therefore, it would be more difficult the embedment of a new PM practice.

- **PM maturity**

Interviewees (20%) highlighted the importance of the organisation PM maturity. One strongly and specifically emphasised *"A high organisational PM maturity is important for the embedment of new PM processes."* – (interviewee 6) However, others, observed the lack of a PM culture in the organisation, meaning that the organisation does not have institutionalised PM practices, which introduces difficulty in the embedment of any PMII.

- **Nature of adoption decision – mandatory**

Some interviewees (20%) underlined that the decision to adopt a new PM practice needed to be mandatory as opposed to optional. If it is optional, people will simply not use the new practice. As one interviewee strongly affirmed *"If not 'imposed', people will always find a reason to simply not use it. For example, it takes too much time or it is too complicated. However, something is always time consuming and complicated until we make systematic use of it."* – (interviewee 15)

At least in the initial implementation, the nature of adoption decision might be mandatory as opposed to optional. Because, as interviewee 25 affirmed "*Usually, we only see the value of PM practice after its use."*

- **External collaboration**

Interviewees (13%) emphasised the importance of external collaboration. One interviewee stated "*It is important to involve some consultancy, in order to define necessary improvements and to enforce a pace in the implementation of*

new PM practices, by imposing time limits and definition of effective action plans." – (interviewee 1)

Another observed *"It is important to have the participation of someone with relevant practical experience in the application of the particular PM technique. Someone who can speak in the first person of the benefits of the particular technique, and usually this person is not in the organisation."* – (interviewee 6)

- **Integration with the existent practices**

Interviewees (17%) emphasised that during the implementation process there should be made an effective integration of the PMII with existent practices in the organisation. One interviewee even affirmed *"The practices of managing projects must be aligned with the organisation's culture."* – (interviewee 21)

This is a vague statement, but it does suggest that something like 'organisation culture' is seen as relevant to effective management of projects. However, organisation culture is a vague concept.

- **Absorptive capacity for new knowledge**

A few interviewees (13%), stated the importance of the organisation having capacity to absorb new PM knowledge (i.e. ability to find, interpret, re-codify and integrate new knowledge). Prerequisites for absorptive capacity include the organisation's existing knowledge and skills base. One interviewee affirmed *"Our difficulty in embedding PM practice is the lack of PM experience and knowledge of our people. On one hand, our project managers (researchers) have a core knowledge which is technical. On the other hand, initially we hired people with more experience and now we are hiring mostly people without any previous work experience."* – (interviewee 4)

Another interviewee affirmed the importance of supporting technologies, such as a knowledge management system, and the creation of internal blogs, where project managers are able to share knowledge and interact with others to find solutions to improve the management of their projects.

- **Environmental culture**

Three interviewees (10%) suggested the importance of 'environmental culture'. Meaning cultural characteristics in each the organisation/ adopter is placed. One of them gave an example *"I worked with Chinese people and they never said that they didn't understood something, they would feel bad with themselves."* – (interviewee 8) Another interviewee observed *"In Portugal, we do not have a culture of planning, time management, and this is something that we should impress during childhood to facilitate the use of PM in future professionals."* – (interviewee 2)

- **Unstable economic environment**

Few interviewees (10%) also emphasised that the fact that Portugal is under economic difficulties facilitates the incorporation of PM practice in organisations. Many organisations see PM as a vehicle to enhance competitiveness. As affirmed by interviewee 2 *"The economic situation of Portugal presses organisations to become more productive and, to improve their PM practice."*

- **Interorganisational PM practices**

Only one interviewee identified the importance of industry PM practices, which might influence their use by organisations: *"Some organisations make the implementation of PM offices without knowing well the concept. They implement, because everyone says is relevant, competitors have already implemented or are implementing. It's a buzz word."* – (interviewee 29)

- **Age differences**

Only two interviewees observed that young people have more predispositions to change and consequently to embed new PM practices. None identified the factor 'gender'. When 'gender and age differences' was prompted by the interviewer to three interviewees, all of them affirmed that they did not see differences in the position of male and female in the embedding process of PM practice, or from people of different age. Nevertheless, it is important to note that in most interviewee's organisations the human resources were quite young. So, they might not be sensitive to the age issue.

- **Source of the knowledge credibility**

Credible and trusted change agents was only incited by interviewee 30 observing *"The person responsible for the practice implementation should be credible in technical terms".*

- **Homophily**

Only one interviewee suggested that the adoption of a PMII by individuals is more likely if they are homophilous. *"The person who will adopt the PM practice must identify with the person responsible for its implementation and the person who will give support its usage. In our organisation, most of our PMO officers are or were project managers."* – (interviewee 18)

When the interviewer prompted 'homophily', nobody refuted its influence, however they also stated that it is not a significant embedding factor.

- **Interpersonal channels**

Only one interviewee suggested the influence of 'interpersonal channels', i.e. the subjective evaluations of near-peers who have adopted the PMII.

> *"Unfortunately, we use a lot of non-direct communication, ex.: email, cooperative* television, *and platforms to communicate the changes in our PM methodology. However, from my experience, people do not assimilate the information with this type of communication. It's much more effective the interpersonal communication."* – (interviewee 20)

- **Frequency of use**

Only two interviewees, from the same organisation, mentioned 'frequency of use'. Maybe, it is an indication of a particular issue in their organisation. However, it was strongly emphasised by one of the interviewees *"Practices that are punctual are more difficult to incorporate than practices that are done every day, routinely."* – (interviewee 23)

The Nvivo 'map' (Figure 6.9), similarly to the previous map, presents the relevant themes/ factors for embedding PM practice by their relevance within the text, which means the factors for embedding which were most coded, i.e., more suggested by interviewees.

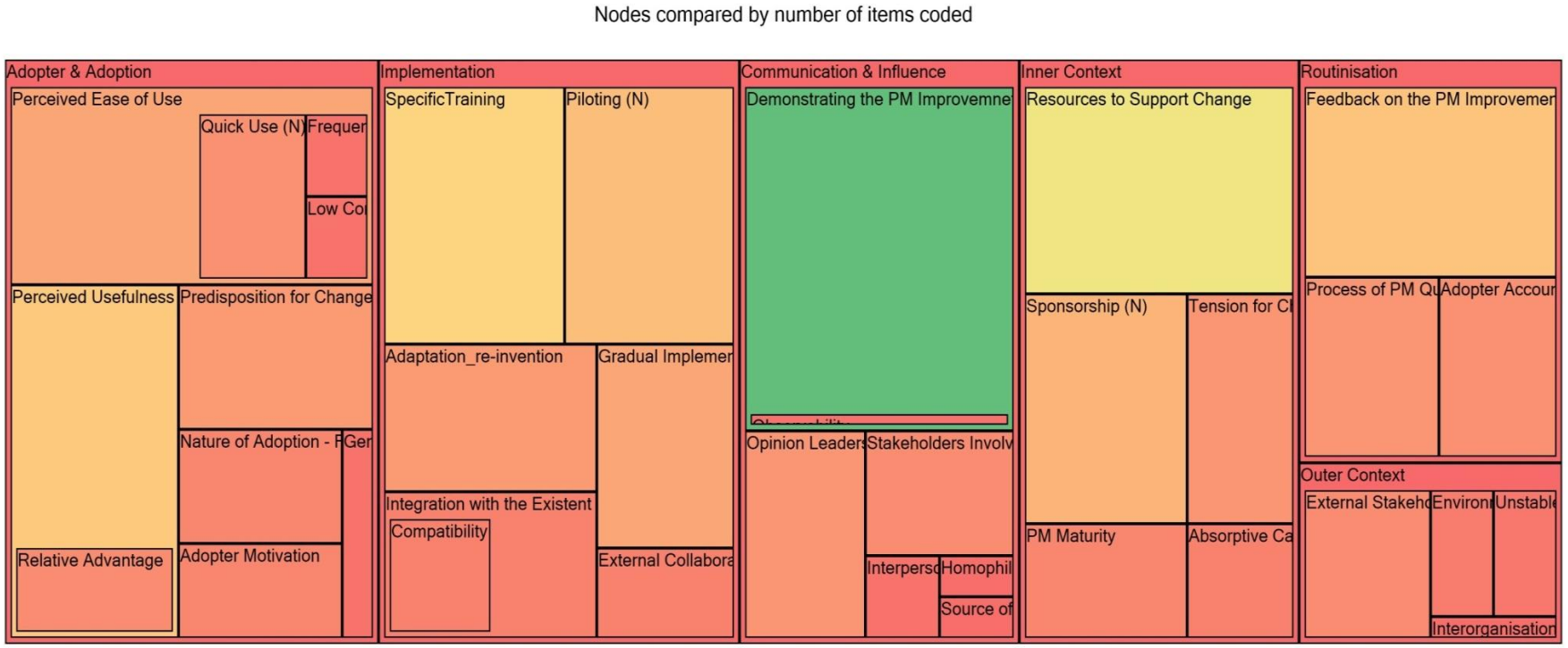


Figure 6.9: Key embedding factors compared by number of items coded

6.6 Interviews Discussion

6.6.1 Modifying the Framework for Improving PM Practice

After analysing the responses about the most useful PMIIs, the initiatives identified (Table 6.3) were compared with those initially identified from the literature review ('initial framework' – Table 3.7). The set of initiatives in the 'initial framework' were then modified to reflect:

- **new** identified PMIIs that emerged and others that achieved more significance merged initially in other more general PMIIs;
- **confirmed** PMIIs identified from literature, although in some cases prompting some slight rephrasing to the initiative, and
- **merged** some PMIIs into other PMIIs because interviewees did not distinguish between them. Develop Tables 6.5, 6.6, 6.7 and 6.8 summarise the results by the PMIIs relating to each of the four improving themes identified. Most of the PMIIs were confirmed and none of the PMIIs identified from literature were **discredited**, however some have been merged in other PMIIs.

Table 6.5: Key PMIIs in the 'revised framework' relating to PM processes, techniques and tools

'Initial framework'	%	'Revised framework'
1. 'Standardisation of PM processes'	93%	**Confirmed**. It was the most stated PMII. This PMII was slightly rephrased to include: 1) the word 'corporate', which means the use of PM practices are not just for a specific department or activity area, but are used across the organisation; and 2) the word 'tailoring'. With respect to the standardisation of processes, interviewees also emphasised that PM processes should be tailored to the different types of projects. This implies the development of a project categorisation system in the organisation. One interviewee gives his example *"We classified your projects on type one, two, three and four and the PM processes are adjusted to each project type."* – (interviewee 9). Therefore, the factor was slightly rephrased to – 'corporate standardisation and tailoring of PM processes'. Besner and Hobbs (2008) argue that one of the primary reasons that organisations create systems for categorising projects into different types is to adapt their PM methodologies (processes, tools and techniques) to the specific requirements of each type of project.
2. 'Standardisation of PM tools & techniques'	80%	**Confirmed**. It was slightly rephrased in the same way of the previous PMII. The organisation should select a core set of tools and techniques, such as project templates established for use across the organisation, which should adapt and evolve over time. The organisation should also tailor these tools and techniques to the specific needs of each project type.
— 'Corporate standardisation and tailoring of project management information system (PMIS)'	80%	**New**. The strong emphasis put by almost all interviewees, on a mechanism for storage, retrieval, dissemination, and reporting of PM information led to the separation of this PMII from the general PMII 'corporate standardisation and tailoring of PM tools and techniques'.

Table 6.6: Key PMIIs in the 'revised framework' relating to people and organisational learning

'Initial framework'	%	'Revised framework'
3. 'Manage PM competences'	63%	**Confirmed**.
4. 'Establish PM career path for all PM roles'	17%	**Confirmed**.
5. 'Develop a culture of learning'	30%	**Confirmed.**
— ***'Provide PM training'***	90%	**New** emerged PMII. It was the second most stated PMII. Similarly it was separated from the more general PMII of 'manage PM competences'.
— ***'PM professionalisation'***	33%	**New**. Interviewees affirmed the relevance of the professionalisation of the project manager's role, i.e., the project managers who dedicate almost 100% of his/her work to PM activities. Because as experienced by interviewees, when the project manager accumulates to its role, a high percentage of technical work, he/ she tend to focus on the technical activities, and disregard the PM activities. PM professionalisation would be itself an interesting issue for future studies.

Table 6.7: Key PMIIs in the 'revised framework' relating to general management system

'Initial framework'	%	'Revised framework'
6. 'Integration of the PM system with the general management system'	37%	**Confirmed**.
7. 'Develop a supported infrastructure'	63%	**Confirmed**.
8. 'Develop a project sympathetic organisation structure'	57%	**Confirmed**.
9. 'Empowerment of project managers'	20%	**Merged**. 'Empowerment of project managers' was merged into 'develop a project sympathetic organisation structure', because this PMII is related to the organisation structure and it was highlighted by few interviewees and with minor emphasis. When empowerment was mentioned by the interviewer, some interviewees responded that this is important, but not one of the most important PMIIs.
10. 'Develop project categorisation'	30%	**Merged**. It was merged with the PMIIs 'Corporate standardisation and tailoring of: i) PM processes, ii) tools & techniques, and iii) the project management information system (PMIS)'. During the interview analysis, the researcher realised that the interviewees' concern was not the projects' categorisation per se, but with the tailoring of PM process tools and techniques to different projects that categorisation may facilitate. For example, one interviewee affirmed *"It is important to adjust the processes to the project type, particularly in terms of reporting."* – (interviewee 10)
11. 'Benchmarking to PM assess and continuous improvement'	13%	**Confirmed**.
12. 'Assessment of PM performance'	13%	**Merged**. During literature review the researcher identified as important to define, collect, use, verify, analyse and improve PM performance criteria, and improve its visibility to the project team (Bryde, 2003; Qureshi et al. 2009). However, PM performance assessment was mentioned by only four interviewees, and where mentioned, it was cited in order to encourage project managers to improve their PM competence. One interviewee asserted *"The problem is that the projects' KPIs are not used as input for the employee's performance assessment and career progression."* – (interviewee 30) Therefore, this PMII was merged in the more general PMII 'manage PM competences'.

Table 6.8: Key PMIIs in the 'revised framework' relating to PM culture

'Initial framework'	%	'Revised framework'
13. 'Development of awareness of PM value amongst all staff'	27%	**Confirmed.**
14. 'Development of a basic understanding of organisational PM practices among all project stakeholders'	10%	**Confirmed**.
15. Establish PM practices as internal standard'	10%	**Confirmed**.

6.6.2 Modifying the Framework for Embedding PM Practice

After analysing the responses about key embedding factors, the results (Table 6.4) were compared with those initially identified on literature review ('initial framework' – Table 4.1). Using the same process of the improving construct, the set of the key embedding factors in the 'initial framework' were then modified to reflect:

- **new** identified factors that emerged and others that achieved more significance merged initially in other more general factors;
- **confirmed** factors identified from literature, although some warranted slight rephrasing;
- **discredited** some factors because interviewees put slight emphasis on them; and
- **merged** of some factors as part of other factors because interviewees did not distinguish between them.

"Discredited" does not mean that the factor does not have influence on the embedding process, but just that the influence might be relatively minor. In Tables below some of the discredited factors are marked with one asterisk (*), which means factors just briefly mentioned, even when supplementary questions were asked, and which were identified by less than 10% of the interviewees, were removed. Other discredited factors are marked with two asterisk (**), which means that although careful scrutiny of responses from the interviewees, no explicit or implicit responses were found connecting with the factors identified from literature. Consequently, these factors were removed

from the ‘revised framework’ of key embedding factors. These factors were not even prompted by the interviewer. The idea of the interviewer was always to prompt factors to enrich the answers of interviewees, but always related with other factors previously identified by them.

Tables 6.9, 6.10, 6.11, 6.12, 6.13, 6.14 and 6.15 summarise the results by the embedding factors relating to each of the embedding themes identified.

The interview analysis led to the understanding that the following first five embedding factors from Table 6.9, related to the theme PMII attributes identified in diffusion literature (Rogers, 2003; Greenhalgh et al. 2004), can be regarded as an aid to explain other factors identified by interviewees. These attributes belong to a different level of factors’ discrimination. As mentioned in Chapter 1, from the beginning of this study, a reasonably high level of factor description was adopted. This is not only a limitation of this research study, but can also arise in most areas of management analysis (Chapman & Ward, 2011).

Therefore, in the ‘revised framework’ the theme ‘PMII attributes’ (Table 6.9) was removed, because it was just composed by five factors merged in other factors, two not prompted by any interviewee: ‘causal ambiguity or uncertainty’ and ‘unproven knowledge’ and one factor slightly rephrased to ‘adaptation/ re-invention’ re-categorised under the theme ‘implementation’.

Table 6.9: Key embedding factors in the 'revised framework' relating to PMII attributes'

'Initial framework'	%	'Revised framework'
1.'Relative advantage'	3%	**Merged** in the factor 'perceived usefulness'. The interviewees concern is if the 'relative advantage' is perceived by the adopter, the initiative may have benefits, but if it is not perceived there is no worth. 'Relative advantage' is *sine qua non* for adoption (Greenhalgh et al. 2004). For example, interviewee 30 affirmed *"If after implementation, project managers do not experience the benefits of its use, they end up abandoning the practice use."*
2.'Compatibility'	3%	**Merged** in the new factor 'integration with the existent practices'. A practice might be compatible with organisational norms values and ways of working, but if there is no effort to an effective integration, this attribute does not have any advantage. However, to integrate with the existent practices the PMII must have the attribute 'compatibility'.
3.'Complexity'	6%	**Merged** in a more general factor 'perceived ease of use'. 'Complexity' was just directly prompted by two interviewees. Interview 14 has affirmed the importance of *"…low complexity, simplicity, i.e., easy to use, objective, intuitive and appealing."* Therefore, it was merged in a more general factor 'perceived ease of use'. Besides, complexity, as suggested by Venkatesh and Bala (2008), is one of the explicative variables of 'perceived ease of use'.
4.'Trialability'	0%	**Merged** in the factor 'piloting'. Again interviewees were not concerned if the new PM practice could be experimented on a limited basis, but, if in the implementation process the practice is piloted in order to be customised to the specific user needs and also to demonstrate the PM practice benefits. Nevertheless, to pilot a new PM practice it must have the attribute 'trialability'.
5.'Observability'	3%	**Merged** in the factor 'demonstrating the PMII value'. Demonstration of a PMII value would be facilitated if the benefits of an initiative are visible to adopters. Interviewee 2 asserted *"The benefits need to be easily assimilated, and for that they need to be visible, self-evident, and self-explanatory."*
6.'Re-invention'	33%	**Confirmed**. But, it was slightly rephrased to 'adaptation/ re-invention'. Interviewees have emphasised that during the implementation process is important to adapt the PMIIs to suit their specific needs, this is more than a PMII attribute (capable of adaptation, refinement or modification), is something that during the implementation process must happen. Therefore, it was re-categorised under the theme 'implementation'. For example, Milosevic and Patanakul (2005) argue that organisations engaged in standardising PM tools should start off adapt the templates for use in a specific project.
7.'Causal ambiguity or uncertainty'	0%	**Discredited**** Although, Szulanski (1996) identified 'causal ambiguity' as one major barrier to the transfer of practice, this factor was not prompted by nay interviewee.
8.'Unproven track record'	0%	**Discredited**** This factor might not have been identified by interviewees, because almost all PM practices have a proven record of usefulness in mind of interviewees. Therefore, interviewees perhaps ignored this factor as it may not be an issue for PM discipline.

Table 6.10: Key embedding factors in the 'revised framework' relating to adopter and adoption

'Initial framework'	%	'Revised framework'
9. 'Adopter motivation'	17%	**Confirmed**. In line with Szulanski (1996) findings, contrary to conventional wisdom that places primary blame on motivational factors, adopter motivation it was only raised by five interviewees.
10. 'Perceived usefulness'	47%	**Confirmed**.
11. 'Perceived ease of use'	40%	**Confirmed**. Two new factors identified from interviewees: 'frequency of use' and 'quick use' of PM practices, after careful analysis were seen as explicative variables for the more general factor 'perceived ease of use'.
12. 'Beliefs of similarity or difference from other adopters'	0%	**Discredited****
13. 'Gender and age differences'	6%	**Discredited***
14. 'Nature of adoption decision – mandatory'	20%	**Confirmed**. Although, Greenhalgh et al. (2004) argued that generally, authoritative (mandatory) decisions for adoption may reduce in long term the chance that the innovation is successfully implemented and routinised. Interviewees asserted the importance of the 'imposition' for the use of the new practice. However, when mentioned this factor, some interviewees followed with some assertions about the importance of demonstrating the benefits of the new PM practice to adopters. Important to note, that if the nature of adoption decision of a PMII is mandatory as opposed to optional, it demonstrates sponsorship.
— **'Predisposition for change'**	33%	**New**. Two interviewees strongly emphasised 'predisposition for change', stressing the importance of people's attitude to change, that unfortunately, there are many professionals who are simply averse to change. This is largely caused by individuals wishing to retain their own identity and do things 'their way' rather than conform to an imposed standard (Wang & Liu, 2007). As argued by Ward (2004) the parochial self-interest of individuals in maintaining the status quo. Ward (2004) points other individual issues (also related to resistance to change), such as: the inability to perceive a need for change; concerns that they will be unable to carry out the new practices (lack of skills); and the uncertainty and suspicion about the nature of the change. As argued by Loo (2002) some managers and staff are simply not prepared to change or not seeing a need to change. The individualism can be managed and its effects harnessed, namely, through the encouragement of employee participation, and the development of an understanding of organisational PM practices among all project stakeholders (Clarke, 1999).

Table 6.11: Key embedding factors in the 'revised framework' relating to communication and influence

'Initial framework'	%	'Revised framework'
15. 'Demonstrating the PMII value'	97%	**Confirmed**. It was the most stated factor.
16. 'Homophily'	3%	**Discredited***
17. 'Interpersonal channels'	3%	**Discredited***
18. 'Opinion leaders'	27%	**Confirmed**. However, it was slightly rephrased to 'opinion leaders and key support facilitators', including 'key support facilitators' which would help on the routine use of new PM practices.
19. 'Use of rhetoric theory'	0%	**Discredited****. The idea of use of rhetoric is to give a strong compelling and sustained motive for embedding a PMII (Green, 2004). However, none interviewee mentioned this factor.
20. 'Adopter involvement'	20%	**Confirmed**. Initially named as 'adopter involvement'. However, after careful interview analysis, the early involvement in the implementation process should not be only of by adopter, but by all relevant stakeholders. Consequently, it was slightly rephrased to 'stakeholders involvement'.
21. 'Motivation of knowledge holders'	0%	**Discredited****
22. 'Credibility of the source of the knowledge'	3%	**Discredited***. When the interviewer prompted the factor 'source of the knowledge credibility' interviewees agreed with its importance, but did not consider it as a key factor.
23. 'Relationship between the source of the knowledge and the adopter'	0%	**Discredited****. Although, Szulanski (1996) identified 'arduous relationship between the source and the recipient' as one major barrier to the transfer of new practice, this factor it was not prompted by any interviewee.
24. 'Feedback on the PMII impacts'	53%	**Confirmed**. Giving the 'feedback on the PMII impacts' the organisation is 'demonstrating the PMII value' after its implementation. These two factors are so strongly correlated, that the researcher have doubts in the construction of the 'revised framework', if the factor 'feedback on the PMII impacts' should be merged. However, she decided not to do it, as the two factors were intensely emphasised by interviewees and they occur in two distinct phases of the embedding process. Interviewees affirmed that 'demonstrating the PMII value' should take place before the new PM practice implementation and the 'feedback on the PMII impacts' should be given systematically during its use. However, the factor 'feedback on the PMII impacts' was re-categorised under the new theme created 'routinisation'.

Table 6.12: Key embedding factors in the 'revised framework' relating to inner context

'Initial framework'	%	'Revised framework'
25. 'Structure of organisation and resources to support change'	60%	**Confirmed/ Discredited.** Part of the factor was confirmed 'resources to support change' by 60% of interviewees, but the part 'structure of the organisation' was discredited. 'Structure of the organisation' includes several characteristics of the structure of the organisation such as: large (size); mature (organisation with a history of successful change, e.g. an organisation with a high PM maturity level); functionally differentiated (i.e. divided into semi-autonomous departments); and specialised (with foci of professional knowledge); if it has decentralised decision making structures (not formal structure), which were identified in literature as facilitators to embed new PM practices (NHS Modernisation Agency, 2003; Greenhalgh et al. 2004). However, from all these characteristics interviewees only mentioned the importance of the organisation's 'PM maturity', prompting that an organisation with the high level of PM maturity would more easily embed a new PM practice. Therefore, 'structure of the organisation' was discredited and a new factor emerged from this factor 'PM maturity' described below.
26. 'Absorptive capacity for new knowledge'	13%	**Confirmed.**
27. 'Receptive context for change'	0%	**Discredited****. This broad factor includes several characteristics which defined a 'receptive context for change', as sponsorship, clear strategic vision, good managerial relations, visionary staff in key positions, a climate conducive to experimentation and risk-taking, and effective monitoring and feedback systems (Greenhalgh et al. 2004; Englund & Bucero, 2006; Kerzner 2009). However, from all these characteristics only 'sponsorship' was strongly emphasised by the interviewees. Therefore, 'sponsorship' was highlighted and 'receptive context for change' was removed.
28. 'Readiness for change'	27%	**Confirmed.** 'Readiness for change' was recognised as a more general factor. However, the aspect interviewees emphasised was just 'tension for change'. Therefore, it was slightly rephrased to 'tension for change'.
— 'Sponsorship'	40%	**New.** It was emphasised by almost half of the interviewees. Therefore, it was separated from the more general factor 'receptive context for change' described in literature by several characteristics. Other variables inside of 'receptive context for change' were not identified by interviewees. Therefore, interview analysis led to the understanding that the factor 'receptive context for change' has lower relevance than one of their explanatory characteristic. As such, the original key factor was removed from the framework and replaced by the relevant characteristic 'sponsorship' emphasised by the interviewees.
— 'PM maturity'	20%	**New.** 'PM maturity' was emphasised by some interviewees and so it was separated from the more general factor 'structure and resources to support change'. The embedment of the new PM practice is more likely if the organisation already has a high level of PM maturity.

Table 6.13: Key embedding factors in the 'revised framework' relating to outer context

'Initial framework'	%	'Revised framework'
29. 'Interorganisational PM practices'	3%	**Confirmed**. An important influence on an organisation's decision to adopt is whether a threshold proportion of comparable (homophilous) organisations have implemented or plan to implement improvement initiatives (Greenhalgh et al. 2004; Carayon, 2010). Although only identified by one interviewee, when 'interorganisational PM practices' were mentioned by the interviewer, 54% of the interviewees agreed with its significance. Interviewee 15 observed *"If there are many people using, all people talk about it because it works. At least, it will stimulate people's curiosity to their use."* However, as one interviewee asserted, this is a factor that facilitates implementation, but does not facilitate routinisation. If after implementation, the adopter does not experience the benefits of its use, sooner or later he/she abandon the practice use. Most of the interviewees that did not agree that *'interorganisational PM practices'* was a key embedding factor affirmed that what is really important are the PM practice benefits, rather than whether it is used by other organisations.
30. 'External mandates'	23%	**Confirmed**. Usually interviewees stated specifically a client's requirement and therefore the researcher narrow the factor and slightly rephrased to 'external stakeholder requirement', commonly linked to client but could be an external sponsor, associate or supplier.
— 'Environmental culture'	10%	**New**. During the literature review environmental variables did not stand out as important factors. Nevertheless, 10% of the interviewees emphasised that if the organisation is inserted in an external environment where there is a PM culture, for example, this would facilitate organisations to embed PMIIs in the future.
—'Unstable economic environment'	10%	**New**. Although 'unstable economic environment' was not identified as a key factor from literature review, 10% of the interviewees mentioned it. An unstable economic environment provokes a tension for change, in order to make the organisation more competitive. As such, an 'unstable economic environment' increases the likelihood of embedding new PM practices.

Table 6.14: Key embedding factors in the 'revised framework' relating to implementation

'Initial framework'	%	'Revised framework'
31. 'Effective change agents'	13%	**Confirmed**. It was rephrased to 'external collaboration'. Literature review indicated that if a *'change agent'* is part of the PMII, the likelihood of a successful PMII embedment increases (Greenhalgh et al. 2004). Controversially, when interviewees mentioned about 'change agents', they stated the importance of an external collaboration, as one interviewee affirmed *"The participation in the implementation process of someone outside the organisation is crucial. However, it does not dismiss an internal sponsorship, of someone internally responsible for the practice dissemination, for the change management, who knows well the organisation."* – (interviewee 6). In fact, Menon and Pfeffer (2003) found that organisational members are more likely to value knowledge from external than from internal sources.
32. 'Specific training'	50%	**Confirmed**. Training associated to new PM tasks and new working methods. This embedding factor is closely related to the PMII 'provide PM training'. However, as a PMII, in the framework, is indicating the necessity for organisations to provide PM training, in order to guarantee the PM competences necessary to manage their projects, whereas an embedding factor, in the framework, is indicating that when organisations are implementing a new PM practice should give the necessary specific training to resources to become able to its effective use.
— 'Piloting'	47%	**New**. It is closely related to the factor 'trialability' identified in the 'initial framework'. However, interviewees were not worried if the PM practice has the 'trialability' attribute, i.e. if the practice could be trial on a limited basis, but if in fact the organisation made part of the implementation process, piloting the new PM practice. 'Piloting' is one of the six-stage approach from (Shehu & Akintoye, 2010) to implement and practice programme management. The stages include: awareness; understanding; planning; piloting; implementation; and consolidation and customisation.
—'Gradual implementation'	33%	**New** factor mentioned by a third of interviewees, who recognised that making change takes time and needs to be implemented in the 'right time'. For example, interviewee 27 observed*: "Gradual implementation [is necessary] in order to better manage the expectations and benefits of implementation."* Additionally, the knowledge required under different PMIIs is diverse. This diversity in PMIIs knowledge base might hinder the embedment of PMIIs (Greenhalgh et al. 2004), since the individuals' absorptive capacity for new knowledge is limited.
— 'Integration with the existent practices'	17%	**New**. 'Integration with the existent practices' is closely related to the factor 'compatibility', a PMII attribute previously identified from literature. Interviewees were not worried if the practice has the 'compatibility' characteristic, but if in fact the organisation makes the integration of the PMII with the existent practices. This embedding factor is closely related to the PMII 'integrate the PM system with the general management system', showing how closes the concepts of improving and embedding are. However, as a PMII, in the framework, it is indicating to organisations the necessity to embrace a PMII guaranteeing that the entire PM system is integrated with the general management system, whereas an embedding factor, in the framework, is indicating that when organisations are implementing a new PM practice they should integrate it with the other existent practices in the organisation.

A new theme was created named 'routinisation'. Two new strongly emphasised factors were raised by interviewees: 'PM quality assurance process' and 'adopter accountability'. These two factors fit in the embedding process subsequent to the implementation process, which guarantees that a PM practice will be routinely used by adopters. In the 'routinisation' theme was added the factor 'feedback on improvement impacts', identified initially under the theme 'communication & influence'.

Table 6.15: Key embedding factors in the 'revised framework' relating to routinisation

'Initial framework'	%	'Revised framework'
—'PM quality assurance process'	27%	**New**. In spite of the researcher's professional experience in applying this kind of PM quality assurance processes in organisations, this factor had not been included in the 'initial framework'. However, as interviewee 27 affirmed: *"It is essential to support the use of PM practices, through coaching and also quality assurance, to guarantee that people are using the institutionalised practices."*
—'Adopter accountability'	23%	**New**. Interviewees emphasised that if the project team does not use the institutionalised PM practices, they should suffer some penalty.

Figure 6.10 presents the 'revised framework' of pertinent PMIIs and embedding factors, which incorporates the initial factors identified from literature (Tables 3.7 and 4.1), modified to reflect alterations suggested from the programme of interviews. The factors are categorised into themes identified from the literature and incorporating the researcher's expertise during the interviewee responses analysis. Figure 6.10 highlights, in blue, the three new key PMIIs and the ten new embedding factors and the new embedding theme 'routinisation'.

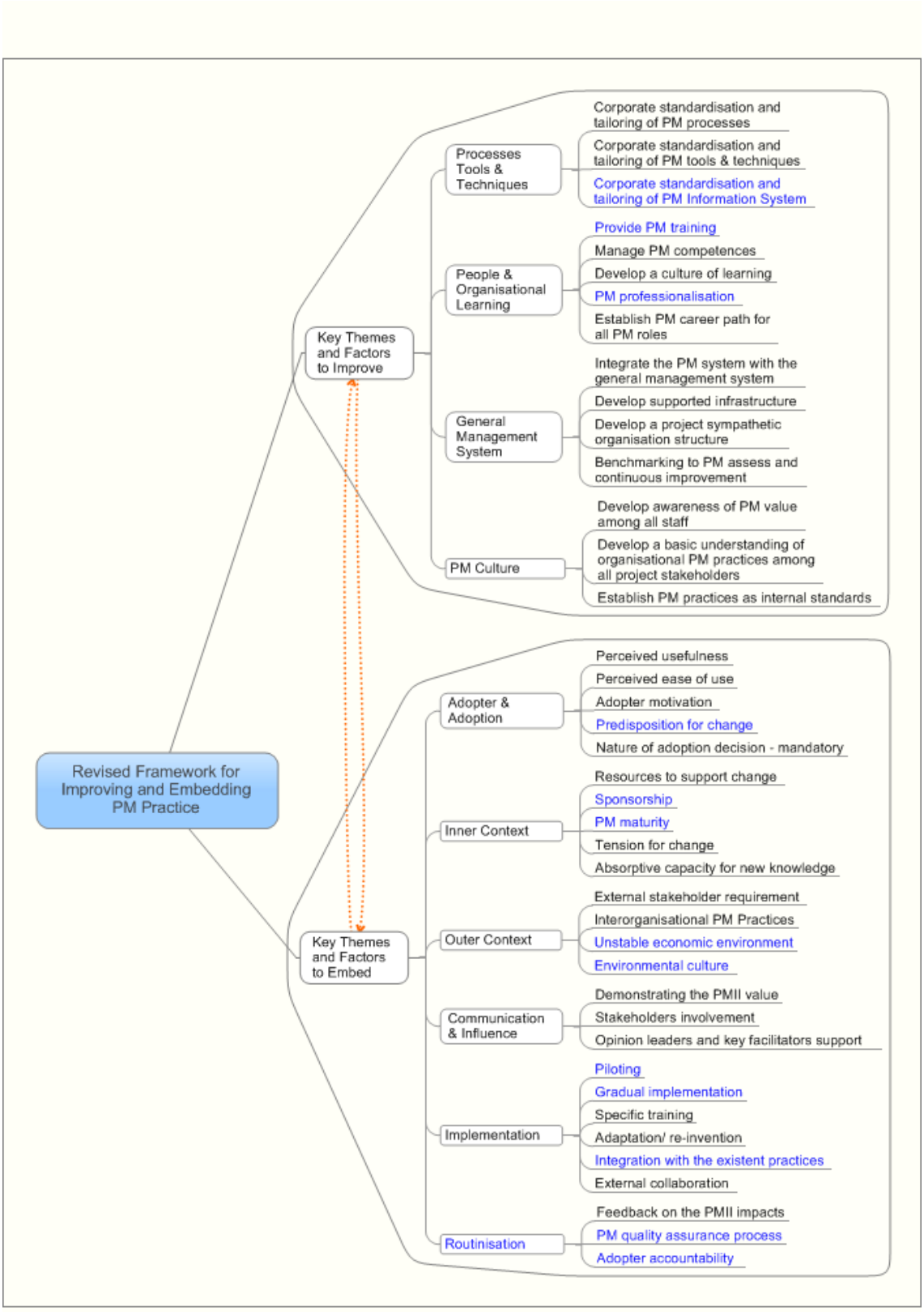


Figure 6.10: 'Revised framework' for improving and embedding PM practice

6.6.3 Linkage between the PMIIs and Embedding Factors

Since the beginning of this research, improvement via PMIIs and embedding were seen as related concepts, and this relationship was clearly seen and discussed during interview analysis. The key PMIIs and embedding factors interact in a complex way with one another. Some potential linkages were identified between:

- the key PMIIs (Table 6.16);
- the key embedding factors (Table 6.17);
- the key PMIIs and embedding factors (Table 6.18).

Tables 6.16, 6.17 and 6.18 only show some potential interrelationships between PMIIs and embedding factors. Although, the interviews research phase did not have the objective of identifying the main linkages between the key PMIIs and embedding factors, at the end of the analysis, it was easy to identify some of these potential relationships.

The inter-relationships between the themes/ factors (RQ4) are further explored in the following empirical research phase, using the questionnaire survey, and its subsequent analysis.

Table 6.16: Potential relationships between the key PMIIs

PMII	Effect/ Influence	PMII
• Provide PM training • Manage PM competences	Increases	• Develop a basic understanding of organisational PM practices among all project stakeholders • Develop awareness of PM value among all staff
• Establish PM career path for all PM roles	Increases	• PM Professionalisation
• Develop supported infrastructure	Increases	• Develop a project sympathetic organisation structure
• Corporate standardisation and tailoring of PM processes • Corporate standardisation and tailoring of PM tools & techniques • Corporate standardisation and tailoring of PM information system	Increases	• Establish PM practices as internal standards

Table 6.17: Potential relationships between the key embedding factors

Embedding Factor	Effect/ Influence	Embedding Factor
• Demonstrating the PMII value • Stakeholders involvement • Adopter motivation • Piloting • Integration with the existent practices • Adaptation/ re-invention • Perceived ease of use • Feedback on the PMII impacts	Increases	• Perceived usefulness
• Gradual implementation • Stakeholders involvement • Opinion leaders and key facilitators support • Specific training	Increases	• Perceived ease of use
• Opinion leaders and key facilitators support • Piloting • Feedback on the PMII impacts	Increases	• Demonstrating the PMII value
• Stakeholders involvement	Increases	• Adopter motivation
• Stakeholders involvement • Adopter motivation	Increases	• Predisposition for change
• Sponsorship	Increases	• Resources to support change • Nature of adoption decision- mandatory
• Unstable economic environment	Increases	• Tension for change
• Nature of adoption decision - mandatory • PM quality assurance process	Increases	• Adopter accountability

Table 6.18: Potential relationships between the key PMIIs and embedding factors

PMII	Effect/ Influence	Embedding Factor
• Develop awareness of PM value among all staff • Develop a basic understanding of organisational PM practices among all project stakeholders	Increases	• Predisposition for change • Demonstrating the PMII value • Sponsorship
• Establish PM practices as internal standards	Increases	• Nature of adoption decision- mandatory
• Integrate the PM system with the general management system	Increases	• Integration with the existent practices
• Manage PM competences • Provide PM training • Develop a culture of learning • Corporate standardisation and tailoring of PM information system	Increases	• Absorptive capacity for new knowledge

6.7 Summary

The 'initial framework' to improve and embed PM practice, derived from literature and the researcher's professional experience, identified fifteen key PMIIs and thirty two key embedding factors. The 'revised framework' constructed following the data interview analysis:

- identified three new PMIIs and ten embedding factors;
- confirmed twelve PMIIs and sixteen embedding factors;
- merged three PMIIs and five embedding factors in other more general items, and discredited eleven embedding factors.

This resulted in a modified total of fifteen PMIIs and twenty six embedding factors. For clarity, PMIIs and embedding factors are categorised into themes based on interviewee responses analysis.

The three new PMIIs highlighted, and included in the 'revised framework' were:

- Corporate standardisation and tailoring of PMIS as part of the theme 'processes, tools & techniques'
- Provide PM training, as part of the theme 'people & organisational learning', and
- PM professionalisation as part of the theme 'people & organisational learning'

The following PMIIs identified in the 'initial framework' were merged with other PMIIs in the 'revised framework', because interviewees related them to other identified PMIIs (i.e. the interviewees' concern was not the PMII *per se*, but the impact of the PMII in other more general PMIIs identified) and additionally they were highlighted by few interviewees and with minor emphasis:

- Develop project categorisation
- Empowerment of project managers, and
- Project management performance assessment

None of the PMIIs identified from literature review were discredited as a result of the interview analysis. However, eleven embedding factors identified from literature were discredited:

- Receptive context for change
- Beliefs of similarity or difference from others industries

- Rhetorical theory use
- Gender and age differences
- Homophily
- Interpersonal channels
- Source of the knowledge credibility
- Source of the knowledge and adopter relationship
- Source of the knowledge motivation
- Causal ambiguity or uncertainty
- Unproven knowledge

The last five embedding factors, in the above list, derived from the work of Szulanski (1996), who identified eight variables relating to 'stickiness' of transfer knowledge within an organisation. Only two of the variables were confirmed in the interviews: 'adopter motivation' and 'absorptive capacity for new knowledge'. However, these two were also identified in the conceptual model from Greenhalgh et al. (2004). This might indicate that 'stickiness' of transfer knowledge is maybe only partially related with embedment of PM practice process.

Five embedding factors identified as attributes of a PMII (an innovation) were merged in other factors. The following attributes can be regarded as an aid to explain other factors identified by interviewees, i.e., these attributes belong to a different level of discrimination of the factors, they are:

- Relative advantage
- Observability
- Compatibility
- Trialability
- Complexity

The interview analysis led to the understanding that two other new factors identified from interview analysis: 'quick use' and 'frequency of use' can also be regarded as an aid to explain the factor 'perceived ease of use'.

Finally, ten new embedding factors were identified, which are:

- Piloting
- Sponsorship
- Gradual implementation
- Predisposition for change

Interviews Research Phase

- PM quality assurance process
- Adopter accountability
- PM maturity
- Integration with the existent practices
- Environmental culture
- Unstable economic environment

The interviews also explored the interviewees' perceptions of the most useful PM practices (tools and techniques) to improve project management performance. The results showed an extensive, very well-known and widely used, list of PM practices. The five most frequently identified tools and techniques by interviewees were: baseline plan; progress meetings; EVM; re-baselining; and PM software for resources scheduling.

7. Questionnaire Survey Research Phase

7.1 Introduction

In the second phase of the empirical study, a web-based questionnaire was conducted. Completed questionnaires were received from 793 practitioners worldwide, covering 75 different countries. While a higher number of responses is desirable, it is appreciated that PM professionals are themselves under great time pressures, and as such, many of them, although having manifested the interest in participating in this study, were unable to find the time to complete the questionnaire. It was a lengthy questionnaire, which took around 15 to 20 minutes to complete.

Using a non-probabilistic technique for sampling the calculation of a traditional response rate cannot be done. However, the number of responses is substantially larger than the minimum sample size required for generalisation for 'infinite' population sizes (377 responses at a confidence level of 95 percent at margin of error ±5 percent) (Raosoft, 2013).

The data collected through the questionnaire survey was analysed using the SPSS software package. The questionnaire analysis was undertaken to:

- identify the most useful PM practices (RQ1)
- confirm the conceptual 'revised framework', developed through the interviews data analysis (RQ2 and RQ3);
- identify the most significant correlations between the key themes for improving and embedding PM practice (RQ4), and
- identify if the improving and embedding themes are dependent on the organisational contexts (industry, size, type of projects) and on demographics (primary role, PM experience, level of education, gender and age) (RQ5).

In summary, this chapter presents:

- A description of the questionnaire data collection instrument and description of the process of conducting the questionnaire (section 7.2 and 7.3);
- descriptive statistics of the survey, including: a brief characterisation of the respondents and the presentation of the mean, mode, median and

standard deviation of each PM practice surveyed, and for each key PMII and key embedding factor identified in the 'revised framework' (section 7.4);

- the construct validity of the conceptual 'revised framework' using Factor Analysis (FA) to identify the themes under the improving and embedding construct and the reliability analysis using Cronbach's alpha (section 7.5). Consequently, a discussion of the findings, concluding with the 'draft proposed framework' for improving and embedding PM practice in organisations (section 7.6);
- the most significant correlations between the themes for improving and embedding, using the Pearson coefficient, addressing the research question 4 (section 7.7);
- finally, through the use of ANOVA, identification of the themes that vary significantly between different organisational contexts, namely sectors of activity, organisation size, types of projects, and geographic location. Additionally, it presents the dependency of the improving and embedding themes on PM role, PM experience, level of education, age and gender, addressing the research question 5 (section 7.8).

7.2 The Questionnaire Data Collection Instrument

The formulation of the questionnaire was described in research methodology chapter. The questionnaire was divided into four parts, A-D as follows:

- **Part A – key PMIIs for improving PM practice**

For the improving construct specifically, 25 survey variables corresponding to 15 PMIIs and 4 themes were identified from interview analysis as showing Table 7.1. Using a 5-point Likert scale, respondents were asked to:
Please **identify the degree of influence** of the following activities (PMIIs) on improving PM practice in your organisation.

- **Part B – key factors for embedding PMIIs**

For the embedding construct, 27 survey variables corresponding to 26 embedding factors and 6 themes were identified from the earlier interview analysis as showing Table 7.2.

Respondents were introduced to the theme:
The researcher's previous study led to the identification of several factors that might affect ability to achieve diffusion, dissemination, implementation and routinisation that is the embedment, of PMIIs in organisations.
and asked to: ***Please identify your view of the potential effect of each of the factors listed below in your organisation.***

Table 7.1: Questionnaire structure: Improving construct

Theme ('factor' in FA)	PMII	Description	Survey/ variable
Process Tools and Techniques	Corporate standardisation and tailoring of PM processes	Corporate standardisation of PM processes.	V1
		Tailoring PM processes to particular projects.	V4
	Corporate standardisation and tailoring of PM tools & techniques	Corporate standardisation of PM tools & techniques.	V2
		Tailoring PM tools & techniques to particular projects.	V5
	Corporate standardisation and tailoring of PM Information System	Corporate standardisation of PM information system.	V3
		Tailoring PM information system to particular projects.	V6
People and Organisational Learning	Provide PM training	The development of PM training among all project stakeholders in the organisation.	V7
	Manage PM competences	The organisation establishes a process to ensure project stakeholders in the organisation have sufficient PM knowledge and experience.	V8
		The assessment of the PM competency of staff in various roles within the organisation, including executives, project managers and team members.	V9
		The assessment of project management performance in terms of scope, time, cost and quality during the project's life cycle, in order to inform the assessment of PM staff.	V10
		The existence of an internal project stakeholders' PM competences portfolio which is updated.	V11
		The establishment of internal PM communities.	V12
	Develop a culture of learning	The development of a culture of learning (through the development of a knowledge management system or a proactive leadership directed toward sharing knowledge).	V13
	PM professionalisation	The professionalisation of the project manager's role, i.e., the project manager dedicates almost 100% of his/her work to PM activities.	V14
	Establish PM career path for all PM roles	The development of a PM career path for project managers (in order to ensure that the organisation has enough people with the right level of expertise to deliver project work and that PM staff is motivated to enhance their PM competences).	V15
General Management System	Integrate the PM system with the general management system	The alignment of PM activities with the whole organisation's activities (for example, the strategic planning of the organisation should be tightly coupled with the project identification and prioritisation).	V16
	Develop supported infrastructure	The creation of a project management office or a similar structure.	V17
	Develop a project sympathetic organisation structure	The development of an organisation structure sympathetic to PM practices (for example, a projectised structure or a strong matrix structure, in order that resource allocation is project oriented).	V18
		Increasing the authority of project managers in the process of managing projects, for example, by the reward or penalty of team members' performance.	V19
		Winning the respect from all departments in the organisation for the project manager role.	V20
	Benchmarking to PM assess and continuous improvement	Internal benchmarking to assess PM and continuous improvement.	V21
		Benchmarking to assess PM and continuous improvement using market PM standards , i.e., using a model from literature to assess your current capability to undertake PM, and to define what may be needed to make your organisation more capable in PM terms (for example, OPM3 from PMI).	V22
PM Culture	Develop awareness of PM value among all staff	The development of awareness of the importance of PM among all staff.	V23
	Develop a basic understanding of organisational PM practices among all project stakeholders	The development of a basic understanding of PM practices, its purposes, and its benefits among all employees involved in project activities.	V24
	Establish PM practices as internal standards	The establishment of PM practices as a standard requirement for projects.	V25

Table 7.2: Questionnaire structure: Embedding construct

Theme (factor in FA)	Factor	Description	Survey/ variable
Adopter and Adoption	Perceived usefulness	The perceived usefulness of the PMII by the adopters (i.e., the extent to which a person believes that using a particular PM practice will enhance her/ his job performance, that the practice has benefits).	V26
	Perceived ease of use	The perceived ease of use of the PMII by the adopters (i.e., the degree to which a person believes that using a PM practice will be free from effort, for example, if the perceived level of complexity is low).	V27
	Adopter motivation	Highly motivated adopters.	V28
	Predisposition for change	Adopters who are predisposed to change (i.e. resources are not accommodated and wish to learn more and do better).	V29
	Nature of adoption decision- mandatory	The adoption decision of a PMII being mandatory as opposed to optional.	V30
Communica-tion and Influence	Demonstrating the PMII value	The demonstration of the value of the PMII to the adopter and the organisation, i.e. the direct and indirect benefits.	V31
	Stakeholders involvement	Stakeholders' involvement in the design and implementation process of the PMII.	V32
	Opinion leaders and key facilitators support	The existence of individuals who are able to influence informally new adopters towards the use of PM practices (opinion leaders).	V33
		The existence of key facilitators to support the change, namely to provide some coaching during the implementation and routinisation process.	V34
Inner Context	Resources to support change	The organisation has resources available to be channelled to support PMIIs.	V35
	Sponsorship	The organisation has strong sponsorship for the use of PM practices.	V36
	PM maturity	The PM maturity level of the organisation (i.e. if the organisation's PM maturity level is high is easier to embed PMIIs).	V37
	Tension for change	The organisation perceives that the current situation is intolerable and that a change is needed (tension for change).	V38
	Absorptive capacity for new knowledge	The ability of the organisation (people) systematically to identify, capture, interprete, share and re-codify new knowledge to operationalise/ implement and use it effectively (absorptive capacity for new knowledge).	V39
Outer Context	Interorganisational PM Practices	The awareness of other similar organisations that have done or plan to do the same PMII (interorganisational PM practices).	V40
	External stakeholder requirement	Pressure from customers or suppliers to adopt a new PM practice (external stakeholder requirement).	V41
	Unstable economic environment	A turbulent economic environment which presses organisations to become more competitive and embed improved PM practices.	V42
	Environmental culture	Culture in which the organisation is contextualised.	V43
Implementa-tion	Piloting	The PMII is piloted on a limited basis, in order to demonstrate the benefits of PM practices and to a better customise and tailor PM practices.	V44
	Gradual implementation	The gradual implementation of PMIIs.	V45
	Specific training	The existence of appropriate and specific training for the operationalisation of the PMII.	V46
	Adaptation/ re-invention	The PMII is adapted and modified in order to suit the organisations' needs (adaptation/ re-invention).	V47
	Integration with the existent practices	The integration of the PMII with the existent practices.	V48
	External collaboration	The involvement of parties external to the organisation, who have lived hard experience of the benefits of PM.	V49
Routinisa-tion	Feedback on PMII impacts	The organisation collects and provides continuous feedback on the PMII impacts.	V50
	PM quality assurance process	An implemented PM quality assurance process, to monitor compliance with the organisation's PM standards and to take notice of feedback from the project staff on how to improve the PM practice use.	V51
	Adopter accountability	Adopter accountability, i.e. there are consequences which might be positive – rewards or negative – penalties if project staff are complying or not with the standardised PM practices.	V52

- **Part C – the most useful PM practices**

In order to answer the research question 1, a total of 68 PM practices were surveyed. Respondents were asked:

If you use or have used the following PM practices, please **specify the level of benefit** that you obtain on PM performance. If you never used it, please just tick the box 'not used'.

The list of tools and techniques surveyed is the result from the interview analysis and complemented with the subset of 55 tools from 70 with the highest 'intrinsic value' (present extent of use + potential contribution to project performance if more or better used) from Besner and Hobbs (2006). Almost half (47%) of the 55 tools and techniques from the Besner and Hobbs study were not identified by the interviewees, although, only two tools and techniques: Gantt charts and activity list, in the top twenty of the highest 'intrinsic value', were not mentioned during the interviews. The tools were sorted to approximately reflect their likely use in the project life cycle. In order to help respondents make clear distinctions, tools with similar names or related meanings were placed next to each other in the list.

Only one of the tools from the 55 tools with the highest 'intrinsic value' in Besner and Hobbs (2006) study, was not included - PM software for multiproject scheduling/levelling, because this research study is focused on tools to manage an 'individual project' (discussed in section 2.2.4).

The interview analysis only identified seven PM practices beyond the listed PM practices from Besner and Hobbs (2006):

- progress meetings (the second most mentioned PM practice)
- risk-reassessment
- project closure documentation
- handover (the proposal team to the project team)
- requirements traceability matrix
- project management issue log
- design of experiments

The questionnaire also included five of the 15 tools and techniques "discredited" by Besner and Hobbs (2006). This selection included those which had been "discredited" due to their limited extent of use, but which had been identified with potential contribution to project performance. As such they may

be useful PM practices, which is what this study wants to find. Additionally, from the researcher's professional experience, these are tools that bring high benefits to PM performance. They are:

- PM software for simulation
- Critical chain method and analysis
- Parametric estimating

The other two "discredited" tools: Monte Carlo analysis and probabilistic duration estimate (PERT) analysis included in the questionnaire, although their limited extent of use and identified with limited potential contribution to project performance, the researcher's professional experience and literature analysed pointed to the importance of these PM practices in a particular area of PM which is risk management (Rezaie et al. 2007; Trietsch & Baker, 2012; Yang & Tian, 2012). The researcher understood that these tools are not extensively used, maybe because the knowledge required is high, thus inhibiting its use. However, this does not mean that they could not be useful PM practices.

Taking into account the responses obtained during the interviews, two tools: risk management documents and ranking of risk, from the Besner and Hobbs' study were rephrased for a better understanding from respondents. They were rephrased to risk identification (one of the most identified PM practices by interviewees), qualitative risk analysis and quantitative risk analysis. With these three PM practices perhaps there is a better understanding of what risk management documents mean, and from the qualitative and quantitative risk analysis some risk ranking can be derived.

This research study has followed the distinction made by Besner and Hobbs (2006) on the different functionalities of PM software, because, as Besner and Hobbs (2006) found, the use of the different functionalities varies enormously. It is, therefore, inappropriate to consider PM software as a single tool with homogenous use. The decision to embed a PM software should take an approach that discriminates these varied uses.

Finally, two other PM practices, 'quality plan' and 'close contracts', were included in the questionnaire attending to the researcher's professional experience and literature review (Caupin et al. 2006; Murray et al. 2009; Project Management Institute, 2013a), in order to understand from the practitioners' perspective if they are or not useful PM practices.

The questionnaire did not include a description of each PM practice, as answers were sought from people that use or have used the practice, therefore they should know their meaning. Also, adding even a brief description would have increased the length of the questionnaire.

- **Part D – characteristics of the respondent and respondent's organisation**

In order to answer the research question 5 respondents were asked for both information about themselves, experience and work context (e.g. industry, size, types of project, geographic location, role, PM experience, education level, gender, age). A total of 16 variables were collected.

7.3 Conducting the Questionnaire

The questionnaire was available on-line between January and April 2013. During this period of data collection, the researcher maintained personal 'on-line' contact with respondents and potential respondents, asking them, individually, to advertise the survey to people that they understood that could bring valuable contribution to this research project. Most of the time consumed during the data collection was on this activity, but this proved an effective way of increasing the number of responses obtained.

From the 300 emails sent to different PM associations, asking them to advertise the survey, about 10% supported this survey through advertisement on websites, newsletters, mailing to members and LinkedIn groups (see in Appendix C some examples).

Several respondents used the questionnaire option 'save and quit' and finished the questionnaire later. Nevertheless, in spite of sending two follow-up mailings to non-respondents, one on February 27th and another on April 11th, at the end of the data collection period, a considerable number of participants (eighty five) had saved the survey, but afterwards did not complete and submit the questionnaire. The cause may have been related to the questionnaire length.

Many respondents expressed, by email, an interest in receiving the results of the survey, which is a good indicator that the research topic is of interest in the

professional community; and that, hopefully, the final result of this research – the 'proposed framework' for improving an embedding PM practice in organisations– could be a useful instrument to practitioners.

7.4 Descriptive Statistics

Descriptive statistics from the 793 respondents are presented in order to:

- conduct an analysis of the nature of the respondents;
- show which of the PM practices used brings a high benefit to PM performance;
- identify the perceived degree of influence of the PMIIs on improving PM practice in organisations, identified in the 'revised framework'; and
- identify views of the potential effect of each of the factors identified, in the 'revised framework', on embedding PMIIs in organisations.

Summary statistics are presented for the different variables surveyed, such as the mean (arithmetic average) and standard deviation (average distance of a set of scores from the mean). Furthermore, because mean and standard deviation values can be affected by extreme observations, other statistics, such as mode (most frequent value) and median (middle value when data is arranged in ascending order) are also included.

7.4.1 Respondents Characterisation

The countries with the highest participation were: Portugal (41%), United States (9%), United Kingdom (6%), Australia, Brazil and Netherlands (4%/ each), Canada, Italy, Spain and India (2%/ each). Participation is concentrated in these ten countries with 76% of the responses and the other 65 countries with 24% of participation.

Several countries had just one or two respondents. Therefore, it was necessary to group the countries, accordingly to the continent to which they belong (Europe, North America, Central and South America, Middle East, Asia, Africa and Australia), to conduct the analysis of the contextual variable geographic location (see Figure 7.1). The highest participation comes from Europe (68%), mainly because of the highest participation obtained from Portugal.

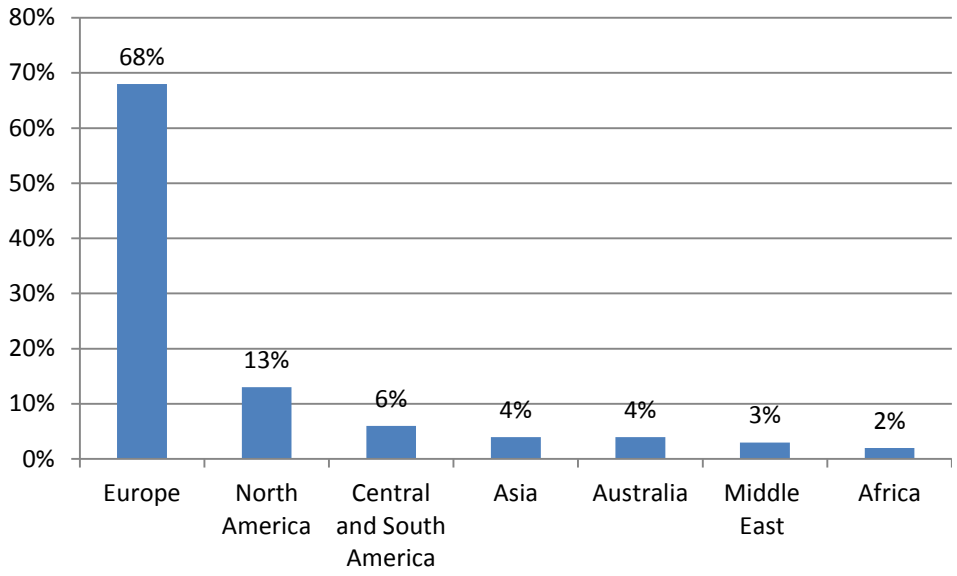


Figure 7.1: Respondents by group of countries

The organisation's sector of activity of respondents was:

- Information and technology: 37%
- Business services: 17%
- Engineering and construction: 14%
- Telecommunications: 8%
- Industry services: 3%
- Other industry sector: 21%

Data was gathered on both, the sector of activity of the respondents' organisation and the type of deliverable produced by the respondents' primary project. The sample is weighted toward information and technology (IT) projects but includes a sufficient number of respondents in five different project types, allowing for comparisons between the following subgroups:

- Information and technology: 45%
- Business services: 20%
- Engineering and construction: 17%
- Telecommunications: 6%
- Industrial services: 3%
- Other project types: 9%

There were a high number of respondents (21%) that have selected the 'other industry sectors' category. However, if we look for the numbers of type of deliverable produced, 'other project types' reduces to 9%.

Questionnaire Survey Research Phase

Three questions related to organisation size were made: number of workers, balance-sheet total and annual sales. About 94.1% of the respondents answered the three questions that allowed the determination of the respondents' organisation size. Figure 7.2 shows that respondents were from different organisations sizes. Most of the respondents (43.7%) were from large organisations.

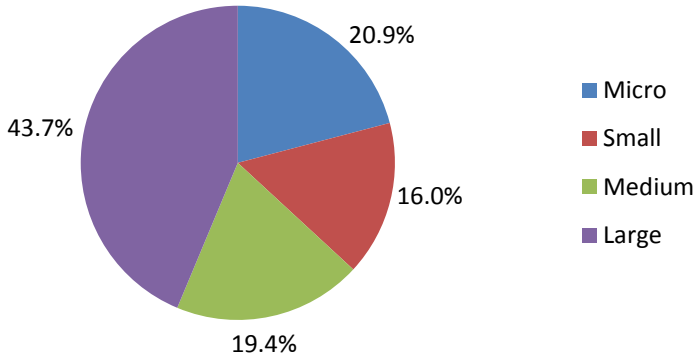


Figure 7.2: Questionnaire respondents by organisation size

The primary role of respondents was:

- Portfolio and programme manager: 19.9%
- Project manager: 42.9%
- Team member: 7.1%
- Functional manager: 6.3%
- Director: 16.2%
- Other: 7.6%

As expected the highest participation category was project managers. Most of the respondents were aged between 30 years old and 50 years old (71.6%). Almost 50% of the respondents had more than 10 years of experience as a project manager and 15% had more than 10 years of experience as a portfolio or programme manager. They appear well qualified to provide valuable information. A vast majority had at least a postgraduate degree (83%), 33% had a postgraduate degree, 44% had a master degree and 6% a doctorate degree.

Most of the respondents were male (83%), which perhaps gives an idea of the female presence in PM area worldwide. During the conduction of the semi-structured interviews the proportion of female participants (20%) was similar to the questionnaire.

The sample was evenly distributed in relation to the type of project scope: 56% of respondents work on projects which were fairly similar in scope, while 44% work on projects which vary in scope. About 44% of respondents were involved in projects with a high level of technical innovation, while 24% and 32% work on projects with low level of technical innovation and a standard product and technology, respectively.

Similar to the experience of interview participants, most questionnaire respondents (79%) had experience of projects with durations between 3 months and 2 years. Approximately 35% work on projects between 6 months to 1 year (see Figure 7.3).

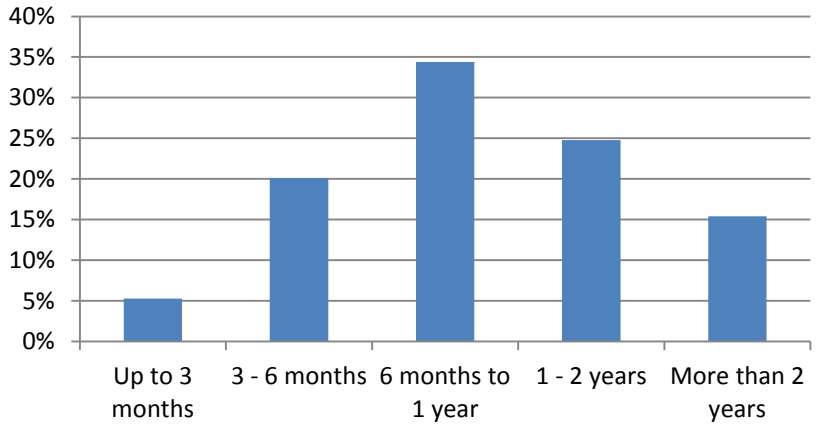


Figure 7.3: Questionnaire respondents by typical project duration

Figure 7.4 shows the percentage of respondents by project typical cost. Almost half of the responses were clustered on the intervals 50.000 and 250.000 and 1.000.00 and 5.000.000€, which gives an idea of the most typical project costs.

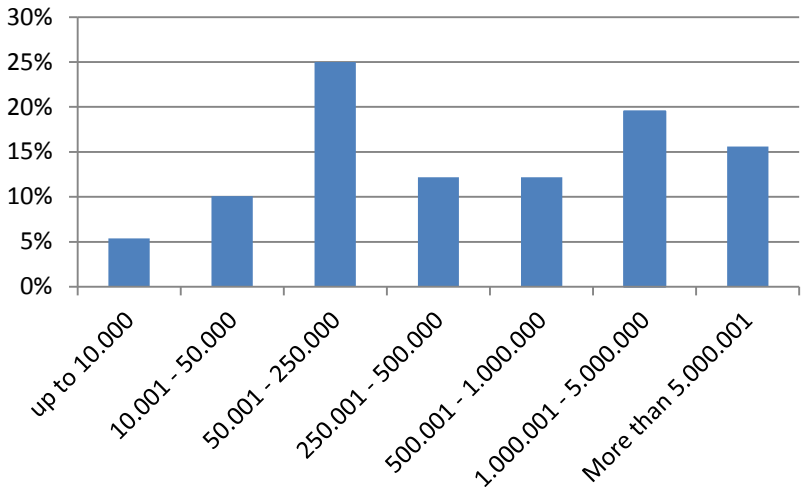


Figure 7.4: Questionnaire respondents by typical project cost

The sample is split evenly for many of the contextual variables, which renders the analysis easier and more reliable.

7.4.2 RQ1: Most Useful PM Practices

Only 46% of the 793 respondents fully replied to the questions pertaining to the most useful PM practices. This seems to indicate that many respondents did not use or had not used some of the tools and techniques surveyed. The least responded to, which gives an indication that are also the least used, were 'Monte-Carlo analysis' and 'PM software for simulation' with just 363 (46%) and 384 (48%) respondents, respectively, indicating a level of benefit obtained on PM performance.

The following Tables 7.3, 7.4 and 7.5 present the obtained rank in decreasing order of the most useful PM practices. Table 7.3 shows the top 20th most useful PM practices, Table 7.4 presents the most useful PM practices in the middle list, and Table 7.5 shows the bottom 20th most useful PM practices. It is possible to observe a variation in the perceived level of benefit that PM professionals obtain with the use of the specific tools and techniques on PM performance. For all tools and techniques the mean values range between 3.01 and 4.33. The median (the value above and below which half of the cases considered fall) is 4 for most of the tools and techniques (84%), as also the mode (the most frequent answer) is for 86% of the tools and techniques, which evidences the positive direction of respondents' answers (positive direction

includes the 3, 4 and 5 categories of answer). The low standard deviations values (between 0.773 and 1.269) indicate a low variability of answers.

The interpretation of these Tables is straightforward. The tool perceived as the most useful is the 'progress report', while the one perceived as the least useful is 'Monte-Carlo analysis'. Curiously, exactly these two tools were identified by Besner and Hobbs (2006) as the tools most and least used. This might indicate an expectable relation between the most used and the most useful tools and techniques.

Table 7.3: Statistical results of the 20th most useful PM practices

PM Practices	N		Mean	Median	Mode	Std. Dev.
	Valid	Missing				
1. Progress report	771	22	4.33	4.00	5	.773
2. Requirements analysis	752	41	4.33	5.00	5	.870
3. Progress meetings	772	21	4.32	4.00	5	.802
4. Risk identification	753	40	4.30	5.00	5	.895
5. Project scope statement	750	43	4.24	4.00	5	.850
6. Kick-off meeting	768	25	4.21	4.00	5	.853
7. Milestone planning	752	41	4.20	4.00	4	.832
8. Work breakdown structure	753	40	4.18	4.00	5	.914
9. Change request	753	40	4.17	4.00	5	.887
10. Project issue log	713	80	4.11	4.00	4	.886
11. Gantt chart	759	34	4.11	4.00	5	.957
12. Activity list	743	50	4.10	4.00	4	.875
13. Client acceptance form	705	88	4.10	4.00	5	.995
14. Risk response plan/ Contingent plans	730	63	4.05	4.00	5	1.019
15. Project statement of work	726	67	4.04	4.00	4	.941
16. Communication plan	741	52	4.03	4.00	4	.940
17. Responsibility assignment matrix	715	78	4.00	4.00	4	.947
18. Baseline plan	730	63	3.99	4.00	4	.976
19. Qualitative risk analysis	719	74	3.98	4.00	4	.962
20. Project charter	704	89	3.97	4.00	5	1.007

The top twenty of the list of the most useful tools and techniques (mean ≥ 4.0) is composed by very well-known and widely used tools. There are few surprises here. Figure 7.5 shows that the practices acknowledged cover the overall PM life cycle from initiation to project closing, although particular relevance is given to tools and techniques from planning. The areas of

knowledge: scope, time, risk, communication and integration assume a high relevance amongst the most useful PM practices, each with at least three PM practices on the top of the list. For example, under the risk management practices were identified: 'risk identification', 'risk response plan/ contingent plans' and 'qualitative risk analysis.' Curiously, none of the tools from the area of cost or quality, related usually to the project's objectives, were in the top of the list.

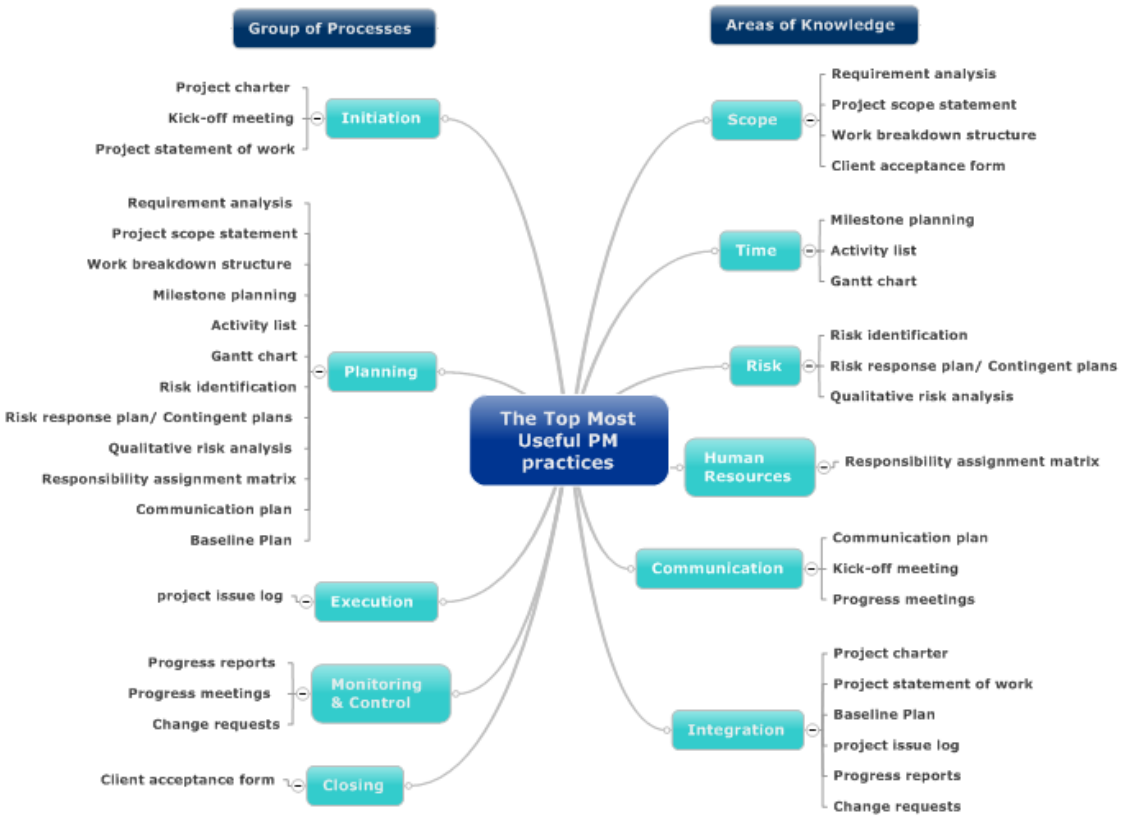


Figure 7.5: The top twenty most useful PM practices by group of processes and areas of knowledge

The set of the top most useful PM practices identified from the survey (Table 7.3) were largely similar to the set identified from the interviewees (Table 6.2). However, on the survey results other PM practices got more significance as: project issue log; Gantt chart; client acceptance form; activity list; project statement of work and qualitative risk analysis.

Thomas and Mullaly (2008) found that the aspect with least impact on project performance was the structured and timely reporting on project progress (administration of documents, templates and checklists) to the clients, sponsors, and stakeholders. The response *"information overload through*

reporting" came from a variety of roles within organisations, including the clients and senior managers, indicating it as a counter-productive aspect of PM. In spite of, this aspect has also been mentioned in Thomas and Mullaly's study rather frequently as the one with the greatest impact. Nevertheless, this research provides more empirical evidence that 'progress report' is in the top of the list of the most useful PM practices.

Several reasons may explain the presence of a tool on the bottom of the list. Individuals can use some tools without any organisational investment or support. For example, the use of a project charter or a Gantt chart does not require any specialised resources. However, the use of databases does require significant organisational resources and support, and these tools may not be identified as useful PM practices, because of the lack of resources and support, for respondents to perceive their level of benefit. Most of the tools and techniques on the list have been in wide circulation for over 15 years, with the exception of for example, the critical chain method. The relatively recent arrival of such tools on the PM scene may, at least partially, explain their low usage levels (selection of 'not used') and consequently, the perceived level of benefit.

This study surveyed seven functionalities often served by PM software. Table 7.4 and 7.5 show shaded in grey that the seven functionalities of PM software surveyed vary greatly in their perceived level of benefit to project management performance. The 'PM software for task scheduling' and 'PM software to monitor schedule' are identified as the twenty-third and twenty-fourth most useful tools and techniques, respectively, while 'PM software for simulation' and 'PM software for resources leveling', are near the very bottom of the list. The other three functionalities: 'PM software to monitor cost', 'PM software for resources scheduling' and 'PM software for cost estimating' are in the middle of the list. Overall, the usefulness of PM software functionalities decreases for more complex usages.

Table 7.4: Statistical results of the most useful PM practices in the middle list

PM Practices	N		Mean	Median	Mode	Std. Dev.
	Valid	Missing				
21. Project closure documentation	745	48	3.93	4.00	4	.992
22. PM Software for task scheduling	716	77	3.91	4.00	4	1.034
23. PM software to monitor schedule	693	100	3.91	4.00	4a	1.046
24. Handover (the proposal team to the project team)	666	127	3.90	4.00	4	.985
25. Close contracts	664	129	3.88	4.00	4	1.013
26. Customer satisfaction surveys	705	88	3.87	4.00	4a	1.080
27. Stakeholder analysis	722	71	3.85	4.00	4	1.045
28. Lessons learned	739	54	3.85	4.00	4a	1.100
29. Product breakdown structure	649	144	3.84	4.00	4	1.016
30. Critical path method analysis	694	99	3.80	4.00	4	1.094
31. Re-basellining	688	105	3.79	4.00	4	1.008
32. Project communication room (war room)	616	177	3.78	4.00	4	1.047
33. Bottom-up estimating	676	117	3.76	4.00	4	.987
34. Requirements traceability matrix	616	177	3.76	4.00	4	1.046
35. Quantitative risk analysis	675	118	3.75	4.00	4	1.076
36. Feasibility study	653	140	3.72	4.00	4	1.029
37. PM software to monitor cost	627	166	3.71	4.00	4	1.142
38. PM software for resources scheduling	678	115	3.71	4.00	4	1.105
39. Bid documents	637	156	3.70	4.00	4	.978
40. Cost/ benefit analysis	697	96	3.70	4.00	4	1.053
41. Risk re-assessment	675	118	3.69	4.00	4	1.087
42. Quality inspection	695	98	3.65	4.00	4	1.010
43. Financial measurement tools (eg. ROI NPV Pay-back)	675	118	3.64	4.00	4	1.071
44. Top-down estimating	672	121	3.64	4.00	4	1.037
45. Team building event	699	94	3.62	4.00	4	1.052
46. Work authorisation	637	156	3.61	4.00	4	.970
47. Self-directed work teams	626	167	3.60	4.00	4	1.021
48. Quality plan	716	77	3.56	4.00	4	1.042

a: Multiple modes exist. The smallest value is shown.

Table 7.5: Statistical results of the bottom 20th most useful PM practices

PM Practices	N		Mean	Median	Mode	Std. Dev.
	Valid	Missing				
49. Bid/ seller evaluation	589	204	3.54	4.00	4	1.047
50. Team member performance appraisal	660	133	3.53	4.00	4	1.034
51. Earned value management	605	188	3.51	4.00	4	1.163
52. PM software for cost estimating	625	168	3.50	4.00	4	1.163
53. Database of risks	566	227	3.49	4.00	4	1.109
54. Network diagram	609	184	3.46	4.00	4	1.162
55. Project Web site	636	157	3.44	3.00	3	1.097
56. Critical chain method and analysis	468	325	3.44	4.00	4	1.153
57. Database of contractual commitment data	525	268	3.43	4.00	4	1.081
58. Database for cost estimating	524	269	3.43	4.00	4	1.115
59. Database of lessons learned	660	133	3.42	3.00	3	1.183
60. Configuration review	593	200	3.39	3.00	3	1.035
61. Parametric estimating	508	285	3.38	3.00	3	1.062
62. PM software for resources levelling	623	170	3.38	3.00	3	1.195
63. Database of historical data	595	198	3.33	3.00	3	1.081
64. Probabilistic duration estimate (PERT)	533	260	3.30	3.00	4	1.201
65. Design of experiments	505	288	3.29	3.00	3	1.091
66. Bidders conferences	489	304	3.27	3.00	3	1.093
67. PM software for simulation	384	409	3.08	3.00	3	1.269
68. Monte-Carlo analysis	363	430	3.01	3.00	3	1.230

This research had hypothesised that the concept studied by Besner and Hobbs (2006), the 'intrinsic value' of a tool and technique, corresponds to the concept investigated by this research of 'most useful' PM tools and techniques. The survey results showed that fifteen of the twenty 'most useful' tools and techniques identified in the survey are the same identified by Besner and Hobbs (2006) with the highest 'intrinsic value' (Table 3.2). Table 7.6 shows the differences between the positions from the Besner and Hobbs' list and the results of this study. For example, 'client acceptance form' is positioned in the thirteenth position and in Besner and Hobbs' study assumes a lower position (20^{th}).

Table 7.6: Comparisons between the 20th most useful PM practices with 20th 'highest intrinsic value' from Besner and Hobbs (2006)

Tools and Techniques	Position in this study	Position in Besner & Hobbs' study
Progress report	1st	2nd
Requirements analysis	2nd	4th
Progress meetings	3rd	Not included
Risk identification	4th	14th
Project scope statement	5th	3rd
Kick-off meeting	6th	5th
Milestone planning	7th	11th
Work breakdown structure	8th	10th
Change request	9th	8th
Project issue log	10th	Not included
Gantt chart	11st	6th
Activity list	12nd	15th
Client acceptance form	13rd	20th
Risk response plan/ Contingent plans	14th	18th
Project statement of work	15th	12nd
Communication plan	16th	-
Responsibility assignment matrix	17th	-
Baseline plan	18th	17th
Qualitative risk analysis	19th	19th
Project charter	20th	-

Two of the tools and techniques, 'progress meetings' and 'project issue log' not included in Besner and Hobbs (2006) study, but identified by the interviews data analysis as most useful PM practices, were positioned in top positions, third and tenth position, respectively. The tools and techniques: 'communication plan', 'responsibility assignment matrix' and 'project charter' are in the middle of the list of Besner and Hobbs' study.

7.4.3 RQ2: Key PMIIs

The vast majority (96%) of the respondents fully replied to the questions pertaining to the key PMIIs.

For all variables related to the PMIIs the mean values range between 3.06 and 3.88, the median is 4 for most of the variables, as also the mode. The obtained results evidence the positive direction of respondents' answers (positive direction includes the 3, 4 and 5 categories of answer). Only four of the 25 variables related to the PMIIs: 'benchmarking to PM assess and continuous improvement'; 'corporate standardisation and tailoring of PMIS'; and 'manage PM competence' have a mode of 3. The low standard deviations values (between 1.023 and 1.203) indicate a low variability of answers.

Table 7.7 shows variables relating to the same PMII, for example 'manage PM competences' and 'develop a project sympathetic organisation structure' (shaded in grey and blue, respectively) assuming different positions on the list. This might indicate that:

- the most important issue under the PMII 'manage PM competences' is V10 – 'the assessment of project management performance in terms of scope, time, cost and quality during the project's life cycle, in order to inform the assessment of PM staff', and the less important ones are V11 – 'the existence of an internal project stakeholders' PM competences portfolio which is updated' and V12 – 'the establishment of internal PM communities'.
- the most important issues under the PMII 'develop a project sympathetic organisation structure' is V20 – 'winning the respect from all departments in the organisation for the project manager role' and V19 – 'increasing the authority of project managers in the process of managing projects, for example, by the reward or penalty of team members' performance', and the less important one is V18 – 'the development of an organisation structure sympathetic to PM practices (for example, a projectised structure or a strong matrix structure, in order that resource allocation is project oriented)'.

Table 7.7: Statistical results of the key PMIIs

Variable	Related PMIIs	N		Mean	Median	Mode	Std. Dev.
		Valid	Missing				
V1	Corporate standardisation and tailoring of PM processes	788	5	3.88	4	4	1.043
V25	Establish PM practices as internal standards	788	5	3.85	4	4	1.023
V16	Integrate the PM system with the general management system	781	12	3.82	4	4	1.055
V14	PM professionalisation	785	8	3.8	4	4	1.115
V20	Develop a project sympathetic organisation structure	777	16	3.75	4	4	1.041
V2	Corporate standardisation and tailoring of PM tools & techniques	788	5	3.69	4	4	1.005
V19	Develop a project sympathetic organisation structure	780	13	3.69	4	4	1.037
V23	Develop awareness of PM value among all staff	787	6	3.68	4	4	1.015
V24	Develop a basic understanding of organisational PM practices among all project stakeholders	784	9	3.68	4	4	1.029
V17	Develop supported infrastructure	780	13	3.67	4	4	1.153
V10	Manage PM competences	779	14	3.62	4	4	1.029
V3	Corporate standardisation and tailoring of PMIS	784	9	3.59	4	4	1.067
V7	Provide PM training	784	9	3.58	4	4	1.07
V15	Establish PM career path for all PM roles	779	14	3.58	4	4	1.203
V13	Develop a culture of learning	780	13	3.57	4	4	1.165
V4	Corporate standardisation and tailoring of PM processes	782	11	3.56	4	4	1.089
V5	Implement corporate standardisation and tailoring of PM tools & techniques	780	13	3.46	4	4	1.071
V18	Develop a project sympathetic organisation structure	781	12	3.45	4	4	1.076
V8	Manage PM competences	785	8	3.43	4	4	1.106
V21	Benchmarking to PM assess and continuous improvement	775	18	3.35	3	4	1.09
V9	Manage PM competences	779	14	3.34	3	4	1.104
V22	Benchmarking to PM assess and continuous improvement	770	23	3.18	3	3	1.128
V6	Corporate standardisation and tailoring of PMIS	774	19	3.15	3	3	1.129
V11	Manage PM competences	762	31	3.09	3	3	1.087
V12	Manage PM competences	770	23	3.06	3	3	1.142

Since the beginning of this study, the level of detail of the framework was raised, and once again arises here. During the questionnaire design, it was desirable to ask more than one item for a given PMII in order to clarify the nature of the PMII. What Table 7.7 shows is that respondents perceived different degrees of influence for the detailed items under each PMII. Therefore, it might be argued that the present list of PMIIs is not detailed enough.

In order to give some guidance to organisations on what initiatives organisations should embed first and in what order, new variables were computed, from the means of the surveyed variables under each PMII. As a result the PMIIs scored higher (mean) are listed in Table 7.8, by descending order.

Table 7.8: Questionnaire results of the key PMIIs

1. Corporate standardisation and tailoring of PM processes	2. Establish PM practices as internal standards
3. Integrate the PM system with the general management system	4. PM professionalisation
5. Corporate standardisation and tailoring of PM tools & techniques	6. Develop awareness of PM value among all staff
7. Develop a basic understanding of organisational PM practices among all project stakeholders	8. Develop supported infrastructure
9. Develop a project sympathetic organisation structure	10. Corporate standardisation and tailoring of PMIS
11. Provide PM training	12. Establish PM career path for all PM roles
13. Develop a culture of learning	14. Manage PM competences
15. Benchmarking to PM assess and continuous improvement	

The list of the most useful PMIIs has some surprises. The new key PMII, identified during the interview analysis, 'PM professionalisation' is in the top of the list. While more consolidated PMIIs in the literature, such as 'provide PM training' and 'develop a culture of learning' are in the bottom of the list.

7.4.4 RQ3: Key Embedding Factors

A vast majority of the respondents (94%) fully replied to the questions pertaining to the key embedding factors. For all variables related to the embedding factors the mean values range between 3.28 and 4.06, which also

gives an indication that respondents are answering on a positive direction of the 5-point Likert scale. The median and mode for most of the variables is 4. Only 1 of the 27 variables related to the embedding factor: 'interorganisational PM practices' have a mode of 3. Standard deviations also show low values (between 0.86 and 1.157) which indicate a low variability of answers.

Table 7.9: Statistical results of the key embedding factors

Variable	Related Embedding Factors	N		Mean	Median	Mode	Std. Dev.
		Valid	Missing				
V36	Sponsorship	775	18	4.06	4	5	1.029
V31	Demonstrating the PMII value	774	19	3.93	4	4	0.881
V33	Opinion leaders and key facilitators support	772	21	3.91	4	4	0.975
V47	Adaptation/ re-invention	774	19	3.89	4	4	0.937
V28	Adopter motivation	767	26	3.87	4	4	0.961
V32	Stakeholders involvement	772	21	3.84	4	4	1.008
V34	Opinion leaders and key facilitators support	772	21	3.84	4	4	0.939
V46	Specific training	773	20	3.83	4	4	0.963
V26	Perceived usefulness	763	30	3.82	4	4	0.86
V48	Integration with the existent practices	775	18	3.82	4	4	0.951
V29	Predisposition for change	767	26	3.78	4	4	0.926
V35	Resources to support change	775	18	3.72	4	4	0.96
V37	PM maturity	774	19	3.7	4	4	1.049
V50	Feedback on PMII impacts	775	18	3.7	4	4	1.059
V45	Gradual implementation	772	21	3.65	4	4	0.921
V51	PM quality assurance process	771	22	3.65	4	4	1.063
V43	Environmental culture	749	44	3.62	4	4	1.03
V39	Absorptive capacity for new knowledge	763	30	3.56	4	4	0.963
V27	Perceived ease of use	758	35	3.54	4	4	0.898
V52	Adopter accountability	761	32	3.5	4	4	1.125
V44	Piloting	763	30	3.48	4	4	0.945
V38	Tension for change	761	32	3.48	4	4	1.058
V42	Unstable economic environment	767	26	3.46	4	4	1.039
V30	Nature of adoption decision- mandatory	765	28	3.44	4	4	1.007
V41	External stakeholder requirement	771	22	3.4	3	4	1.157
V40	Interorganisational PM practices	766	27	3.31	3	3	0.958
V49	External collaboration	769	24	3.28	3	4	1.039

In designing the questionnaire in respect of the embedding construct, it was practicable to ask just one item for each embedding factor, except for the factor 'opinion leaders and key facilitators support' (shaded in grey in Table 7.9). But, both variables under the factor are in the top of the list, just 'opinion leaders' have slightly scored higher than 'key facilitators' to support the change.

Under the same line of argument as for the PMIIs, professionals might be more aware of the embedding factors to which respondents give a higher score. The embedding factors which scored higher (mean) are listed in Table 7.10, by descending order.

Table 7.10: Questionnaire results of the key embedding factors

1. Sponsorship	2. Demonstrating the PMII value
3. Adaptation/ re-invention	4. Opinion leaders and key facilitators support
5. Adopter motivation	6. Stakeholders involvement
7. Specific training	8. Perceived usefulness
9. Integration with the existent practices	10. Predisposition for change
11. Resources to support change	12. PM maturity
13. Feedback on PMII impacts	14. Gradual implementation
15. PM quality assurance process	16. Environmental culture
17. Absorptive capacity for new knowledge	18. Perceived ease of use
19. Adopter accountability	20. Piloting
21. Tension for change	22. Unstable economic environment
23. Nature of adoption decision-mandatory	24. External stakeholder requirement
25. Interorganisational PM practices	26. External collaboration

Table 7.10 shows that in general, factors under the theme 'communication & influence' are in the top of the list ('demonstrating the PMII value', 'opinion leaders and key facilitators support', and 'stakeholders involvement'), while factors under the theme 'outer context' are in the bottom of the list ('interorganisational PM practices', 'external stakeholder requirement' and 'unstable economic environment').

7.5 Construct Validity and Reliability Analysis

The first steps in the data analysis were to analyse:

1. **Construct validity,** the degree to which the right information sources are used, the variables used are measuring the constructs they claim to be measured. Factor analysis (FA) was applied to the questionnaire data collected to refine and explore the appropriate underlying themes ('factors' in FA) associated with each construct for improving and embedding PM practice in organisations.
2. **Reliability**, ability to replicate results when repeating the study under same setting. Cronbach's alpha analysis was used to conduct reliability analysis.

Although a questionnaire data collection instrument can be reliable but not valid, it cannot be valid if it is not reliable.

The identification of a limited number of improving and embedding themes ('factors' in FA) from a large number of key PMIIs and embedding factors is of interest for two reasons:

1. better understanding of PMIIs and key embedding factors based on the themes, and
2. reduction of the number of PMIIs and embedding factors to a limited set to allow further investigation. Namely, the analysis of the inter-relationships between improving "things that organisations could do to improve PM practice" and embedding "ways that organisations could try to embed PM practice", and additionally, how improving and embedding themes are dependent on different organisational contexts.

As indicated in Figure 7.6 three FAs were conducted: FA#1 for the improving construct, FA#2 for the embedding construct, and FA#3 to test for differences between improving and embedding concepts.

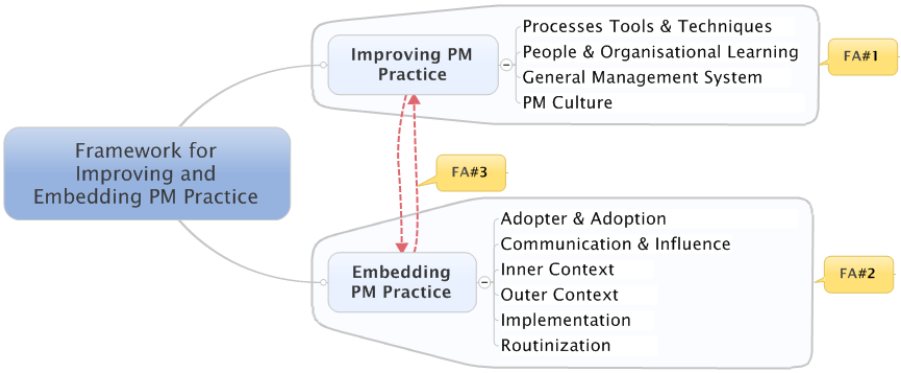


Figure 7.6: Construct validity of the 'revised framework'

Before performing FA, the data were examined for missing data patterns. It was concluded that the majority of missing information was due to answers related to 'no opinion' in Part A and B and 'not used' in Part C, and not because respondents skipped the question. As the sample was sufficiently high to conduct the statistical analysis, even excluding the cases with missing responses, no treatment was made in order to estimate the remaining missing values (e.g. the use of the average of each question as the value of the missing answer).

Table 7.11 provides a summary of the FA steps this research followed to establish construct validity and better determine the composition of the themes for the improving and embedding constructs.

Performing FA using SPSS, the following menu was chosen: *Analyse > Data Reduction > Factor*. This procedure allows the user to select the variables for the analysis. Simultaneously, it is necessary to select from the menus the method used for the extraction and the rotation method. Principal Components Analysis and Varimax rotation with Kaiser Normalization were used. Varimax rotation was used because it makes it possible to easily identify which variable has a large loading on which 'factor'. The method selected for calculating the factor scores was the regression method. These scores have mean of 0 and their variance is given by the squared multiple correlation between the estimated factor scores and the true factor values. FA produced several statistics such as KMO test[21], correlation matrix of variables, initial solution (communalities, eigenvalues, and percentage of variance explained) and rotated component matrix.

[21] The SPSS software also presents the Bartlett's test of sphericity jointly with the KMO test.

Table 7.11: Factor analysis steps

Steps	Questions answered	Statistical tools	Threshold
1. Determine if FA applicable to data set	Is the data suitable for FA?	Correlation Matrix (all variables)	Substantial number of correlations > 0.3
	Is the data suitable for FA?	KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy	• Minimum of 0.5 • If 0.5<KMO<0.7: mediocre data set • If 0.7<KMO<0.9: good data set • If KMO>0.9: excellent data set
	Is the data suitable for FA?	Barlett's test of sphericity	P<0.5 (the matrix is not an identity matrix)
	Is the data suitable for FA?	1st Extraction with SPSS PCA: communalities	Although not always a conclusive test, this test indicates that the more communalities >0.5 show that there are more variables explained by the factors
2. Determine number of factors (themes)	How many potential factors (themes) are there?	1st Extraction with SPSS PCA: Eigenvalues - Keiser 1	Number of components with eigenvalues >1
	How many potential factors (themes) are there?	Scree plot	Where plot levels off to a linear decreasing pattern show number of components
3. Develop factor (theme) structure	Optimize the factor (theme) structure using Varimax	Factor rotation	Variable loadings are maximised on one factor for easier interpretation
	Which variable load more on which factor (theme)?	Variables and factors	Using rotation results, obtain factor loading matrix
4. Develop factor (theme) structure	What is the factor score for each variable for each factor (theme)? Find the value of the construct for each respondent by 1) for each factor: multiplying each variable (question) value with the corresponding factor score, 2) Sum these values for each factor to find the overall factor score for each respondent, 3) Compute the overall construct value by summing the product of each factor with its construct variance percent.	Factor Sore Matrix and Compute Construct final value (score development and construct calculation)	Values are used to compute final construct value for each respondent

7.5.1 FA#1 – Factor Analysis for the Improving Construct

FA was firstly conducted to determine the validity of the questions with regard to their ability to measure the improving construct following the steps described in Table 7.11.

First the correlation matrix: showing correlation coefficients between all improving variables was computed using SPSS. Table AF.1 in Appendix F shows that half or more correlation coefficients for each variable are significant, i.e. > 0.3 (Kim & Mueller, 1978), except for V4, V5 and V6.

- V4 has 19 coefficients out of 25 lower than the 0.3 threshold.
- Both V5 and V6 have 16 coefficients out of 25 lower than the 0.3 threshold.

Therefore, there was some evidence that V4, V5 and V6 might need to be eliminated from the analysis since they seemed to be poorly correlated to most other variables. To further investigate if V4, V5 and V6 should be kept or not, it was calculated the significance levels of the correlation coefficients. But, all the three variables had in all significant coefficients, indicating that the variables might be maintained. These results were expected because of the large size of the sample.

However, removing V4, V5 and V6 from the analysis is also rationalised by the KMO scores obtained before and after removing the variables. The KMO score actually slightly improved – before removing V4, V5 and V6 is 0.952 (Table AF.2), and after removing is 0.960 (Table AF7.3). A KMO of 0.960 indicates a strong correlation amongst variables, which means that the data set is 'excellent' for factorability. Bartlett's test was also satisfied ($p \approx .000$). Therefore the set of data (minus V4, V5 and V6) is adequate for FA.

Using an extraction method based on eigenvalues >1, with all improving variables, created a four- theme structure, in which one theme grouped these three variables (V4, 5 and 6). Another FA was conducted by fixing the number of themes ('factors' in FA) to two. The results continued to separate these three variables only in one theme and the other 22 variables in another theme. This provided further confirmation of the low correlation of these variables with all other improving variables. Consequently, these variables were removed from the analysis.

These three variables are about the concept of tailoring:

- V4: Tailoring PM processes to particular projects
- V5: Tailoring PM tools & techniques to particular projects
- V6: Tailoring PM information system to particular projects

When these three variables were included in the questionnaire, the objective was to ask about the importance of tailoring, i.e. when the organisation is standardising PM, processes should be adapted to different types of projects handled in the organisation. However, from the data analysis, maybe the respondents understood tailoring as something that each project manager might do when is using PM processes, meaning that instead of using standardise PM process, he/she should tailor the processes to the specific project's needs. This might be the reason why these variables have a low correlation coefficient level with other variables, and even the KMO score slightly improves.

Therefore, because there are doubts that the variables used are measuring in fact the constructs they claim to be measuring, these three variables are removed from the following analysis. The conceptualisation of this research was that when an organisation is standardising its PM processes, tools and techniques, it must also carefully tailor the standardised PM processes, tools and techniques to different projects categories existing in the organisation', i.e. 'one size does not fit all' (Shenhar, 2001).

The first Principal Component Analysis (PCA) extraction produced communalities that are all above the 0.5 threshold (Field, 2009), except for V12, however very near from the threshold. Table AF.4 provides the results of the communalities. These findings also justify the factorability of collected data.

After ascertaining that FA was applicable to the data set, the next step was to determine how many themes ('factors/components') were underlying the improving construct.

The eigenvalues were examined: the results indicate that three themes ('components' in Principal Component Analysis) had eigenvalues above 1, suggesting that this construct was based on three themes explaining 63.4% of total variance (Table AF.5).

Since the number of responses is large, another way to check a fairly reliable criterion for the number of themes selection is through the scree-plot analysis. Analysing the scree plot (Figure AF.1), this research concluded that the improving construct was a 3-theme construct instead of the originally assumed 4-theme structure. It should be noted, that based on the shape of the scree plot curve only, it could also be inferred that the construct is a 3-to-4 theme construct. Another FA was undertaken with anticipated solutions for four themes. The results showed that adding a fourth theme only increased total variance by 4%. Furthermore, the variables loadings are more difficult to conceptualise than with the 3-theme construct, which is very similar to the conceptualisation of the 'revised framework'. In the four based construct, there is an attempt to distinguish the theme 'people & organisational learning' into two themes 'people' and 'organisational learning'. Therefore, it was decided to keep the structure of the construct at 3-themes.

Then rotation of the variables was used in order to make the output more understandable and help with interpreting the themes ('components' in PCA). All variables present loadings above 0.4 and therefore were kept on the analysis. Variables with loadings lower than 0.4 are not clearly correlated with one particular theme. In general, it is assumed that variables with loading scores lower than 0.4 probably must be removed (Rummel, 1970). Table 7.12 shows the loading of each question after Varimax rotation with Kaiser Normalization and total variance explained.

The rotation showed that, V7, V8, V9, V10, V11, V12, V13, V21, V22 and V24 load more on Factor#1 (F1), V14, V15, V17, V18, V19, V20 and V25 load more on Factor#2 (F2) and V1, V2 and V3 loaded more on Factor#3 (F3). Based on the content of the questions V1 to V25, it was determined:

- Factor#1 (V7, V8, V9, V10, V11, V12, V13, V21, V22, V23 and V24), although V23 have slightly loaded higher on Factor#2, dealt with the theme 'people & organisational learning';
- Factor#2 (V14, V15, V16, V17, V18, V19, V20 and V25), although once more V16 have slightly loaded higher on Factor#1, better represented the theme 'general management system'; and
- Factor#3 (V1, V2 and V3) represents the theme 'processes, tools & techniques'.

Table 7.12: Improving construct: Varimax rotation and variance explained

Variable	PMIIs in the 'revised framework'	Component ('theme')		
		1	2	3
V1	Corporate standardisation of PM processes	.304	.287	.789
V2	Corporate standardisation of PM tools & techniques	.260	.247	.840
V3	Corporate standardisation of PM Information System	.271	.161	.793
V7	Provide PM training	.617	.242	.368
V8	Manage PM competences	.714	.238	.307
V9		.747	.229	.252
V10		.516	.404	.351
V11		.725	.191	.278
V12		.618	.274	.141
V13	Develop a culture of learning	.677	.382	.139
V14	PM professionalisation	.163	.758	.177
V15	Establish PM career path for all PM roles	.494	.597	.264
V16	Integrate the PM system with the general management system	.500	.483	.270
V17	Develop supported infrastructure	.274	.559	.389
V18	Develop a project sympathetic organisation structure	.305	.635	.301
V19		.286	.755	.169
V20		.362	.731	.105
V21	Benchmarking to PM assess and continuous improvement	.584	.455	.246
V22		.616	.354	.250
V23	Develop awareness of PM value among all staff	.523	.582	.156
V24	Develop a basic understanding of organisational PM practices among all project stakeholders	.628	.420	.185
V25	Establish PM practices as internal standards	.436	.536	.394
	Eigenvalues	**11.620**	**1.281**	**1.048**
	Percent of variance explained	**52.8%**	**5.8%**	**4.8%**

After determining the number and nature of the themes, it was then calculated the factor scores in order to provide measurements for the improving construct.

The factor scores for each variable for each theme ('factor/ component' in FA) were computed using SPSS. Table AF.6 provides these scores in SPSS component score coefficient matrix. Finally, the final values for the improving construct are calculated by weight-averaging each theme by its respective

percentage of the total variance. As shown in Table 7.12, these percentages are 52.8% for F1, 5.8% for F2 and 4.8% for F3.

Once established the final structure of the themes ('factors/ components' in FA), it was necessary to conduct reliability analysis, using Cronbach's alpha analysis for the three themes under the improving construct. Table 7.13 shows that all Cronbach's alpha values for each improving theme are above the 0.5 minimum threshold, and the 0.7 desired threshold (Nunnally, 1978), which means the results are reliable.

Table 7.13: Improving construct: Reliability analysis- Cronbach's alpha analysis

Construct	Theme ('Factor' in FA)	Cronbach's alpha
FA#1: Improving	F1: V7, 8, 9, 10, 11, 12, 13, 21, 22, 23, 24	0.927
	F2: V14, 15, 16, 17, 18, 19, 20, 25	0.904
	F3: V1,2,3	0.875

7.5.2 FA#2 – Factor Analysis for the Embedding Construct

Using the same conditions as in the improving construct (Varimax rotation with Kaiser Normalization) PCA for validity, Cronbach's alpha for reliability, and score development for construct values were also conducted for the embedding construct.

Table AF.7 in Appendix F shows that all variables of the embedding construct (V26 to V52), except V42, have half or more correlation coefficients for each variable significant, i.e. > 0.3 (Kim & Mueller, 1978). V42 has 19 coefficients out of 27 lower than the 0.3 threshold.

Therefore, there was some evidence that V42 might need to be eliminated from the analysis since it seems to be poorly correlated to most other variables. To further investigate if V42 should be kept or not:

- the significance tests of the correlation coefficients was performed and as it was expected, because the sample is large, there is a significant level of correlation.
- The KMO scores were calculated. The KMO score slightly improves from 0.958 to 0.959, which is not significant (Table AF.8 and Table AF.29).

The decision to keep V42 is also rationalised by the Cronbach's alpha analysis of the themes. If variable 42 would not be included on the analysis, one theme resultant from FA would have a Cronbach's alpha lower than the ideally 0.7 threshold (Nunnally, 1978).

A KMO of 0.959 indicated a strong correlation amongst variables, indicating that the data set is "excellent" for factorability. Bartlett's test of sphericity indicated that correlations between items were sufficiently large to use FA.

The PCA extraction produced communalities that are all above the 0.5 threshold (Field, 2009) except for V49, but even V49 is quite near the threshold (Table AF.10). Therefore, the data shows factorability.

The eigenvalues were examined: the results indicate that four themes ('factors/ components' in FA) had eigenvalues above 1, suggesting that this construct was based on 4-themes explaining 56.2% of total variance (Table AF.11). However, the eigenvalues of theme ('factors/ components' in FA) five and six are close to 1, and including these two components the total explained variance increases to 63% (Table AF.12). A second criterion for component extraction consists of keeping those components that explain at least 60% of the total variance (Field, 2009). On another hand, the 4-theme structure (eigenvalues > 1, which minimises the number of 'factors/ components') mixes almost all concepts that this research conceptualised in the 'revised framework' and for meaning purposes the research wants to separate. The 6-theme structure is also rationalised by the analysis of the scree plot, which shows that 6 themes 'components' have an eigenvalue above or near 1, where the plot starts to flatten in a linear way (Figure AF.2). Therefore, a better conceptualisation is under a 6-theme construct. With the 6-theme construct the FA results grouped the embedding factors in a structure of themes ('components' in PCA) similar to the conceptualisation of the 'revised framework'. Table 7.14 summarises the results of SPSS Varimax rotation and total variance explained.

Table 7.14: Embedding construct: Varimax rotation and variance explained

Variable	Factors in the 'revised framework'	Component ('theme')					
		1	2	3	4	5	6
V26	Perceived usefulness	.270	.118	.169	.142	.736	.126
V27	Perceived ease of use	.132	.083	.105	.263	.783	.068
V28	Adopter motivation	.364	.418	.164	.084	.579	.047
V29	Predisposition for change	.337	.400	.183	.009	.562	.086
V30	Nature of adoption decision- mandatory	.027	.000	.725	.024	.335	.271
V31	Demonstrating the PMII value	.513	.106	.290	.216	.393	.140
V32	Stakeholders involvement	.631	.050	.229	.137	.254	.237
V33	Opinion leaders and key facilitators support	.660	.182	.029	.106	.210	.288
V34		.700	.260	.175	.130	.212	.171
V35	Resources to support change	.363	.513	.329	.171	.156	.083
V36	Sponsorship	.481	.525	.378	.072	.185	.054
V37	PM maturity	.245	.535	.440	.151	.094	.129
V38	Tension for change	.046	.695	.008	.173	.181	.279
V39	Absorptive capacity for new knowledge	.322	.591	.220	.235	.184	.232
V40	Interorganisational PM Practices	-.027	.292	.219	.375	.069	.583
V41	External stakeholder requirement	.194	.283	.093	.136	.141	.609
V42	Unstable economic environment	.197	.009	.118	.068	.044	.784
V43	Environmental culture	.454	.144	.092	.224	.108	.481
V44	Piloting	.145	.094	.128	.718	.220	.224
V45	Gradual implementation	.257	.151	.076	.752	.149	.162
V46	Specific training	.450	.208	.342	.510	.163	.054
V47	Adaptation/ re-invention	.586	.197	.166	.411	.221	-.001
V48	Integration with the existent practices	.555	.185	.214	.405	.131	.113
V49	External collaboration	.164	.188	.245	.452	.028	.378
V50	Feedback on the PMII impacts	.447	.342	.467	.261	.122	.096
V51	PM quality assurance process	.360	.227	.657	.253	.097	.080
V52	Adopter accountability	.234	.267	.652	.207	.102	.135
Eigenvalues		**11.337**	**1.547**	**1.193**	**1.095**	**0.962**	**0.873**
Percent of variance explained		**42.0%**	**5.7%**	**4.4%**	**4.1%**	**3.6%**	**3.2%**

The rotation showed that, V31, V32, V33 and V34 loaded more on Factor#1 (F1); V35, V36, V37, V38 and V39 load more on Factor#2 (F2); V30, V50, V51 and V52 loaded more on Factor#3 (F3); V44, V45, V46 and V49 loaded more on Factor#4 (F4); V26, V27, V28 and V29 loaded more on Factor#5 (F5); and finally V40, V41, V42 and V43 loaded more on Factor#6. Based on the nature of the variables V26 to V52, it was determined:

Based on the nature of the variables V26 to V52, it was determined:

- Factor#1 (V31, V32, V33, V34) dealt with the theme 'communication & influence';
- Factor#2 (V35, V36, V37, V38, V39) dealt with the theme 'inner context';
- Factor#3 (V30, V50, V51, V52) dealt with the theme 'routinisation'. The factor 'nature of adoption decision – mandatory' (V30) in the 'revised framework' categorised under the theme 'adopter & adoption'. However, the statistical analysis confirmed that this factor is more correlated with the theme 'routinisation', indicating that to a new PM practice be routinely used, the adoption process need to be mandatory as opposed to optional;
- Factor#4 (V44, V45, V46, V47, V48, V49) dealt with the theme 'implementation' although 'adaptation/ re-invention' (V47) and 'integration with the existent practices' (V48) have slightly loaded higher on Factor#1 'communication & influence'. Even with the necessity to communicate that new PM practices are integrated with existent practices, and there was adaptation to the project needs. Firstly, it is necessary during the implementation process to take into account these two factors.
- Factor#5 (V26, V27, V28, V29) dealt with the theme 'adopter & adoption'. This theme after questionnaire data analysis was renamed just for 'adopter' as the factor 'nature of adoption decision- mandatory' (V30) was included under the theme 'routinisation';
- Factor#6 (V40, V41, V42, V43) dealt with the theme 'outer context'.

The factor scores for each variable for each theme ('factor/ component' in FA) was computed. Table AF.13 provides these scores in an SPSS component score coefficient matrix. Finally, the final values for the embedding construct are calculated by weight-averaging each theme by its respective percentage of the total variance (Table 7.14). These theme values will be used in order to answer the RQ4: *How are the identified key PMIIs and key factors to facilitate embedment related?* And RQ5: *How does the set of key PMIIs and key factors to*

facilitate PMIIs embedment vary in different organisational contexts and demographics?

Finally, a reliability analysis was conducted. Table 7.15 shows that all Cronbach's alpha values for the six embedding themes are above the 0.5 minimum threshold, and the 0.7 desired threshold (Nunnally, 1978), which means the results are reliable.

Table 7.15: Embedding construct: Reliability analysis–Cronbach's alpha analysis

Construct	Theme ('Factor' in FA)	Cronbach's alpha
FA#2: Embedding	F1: V31, 32, 33, 34	0.821
	F2: V35, 36, 37, 38, 39	0.826
	F3: V30, 50, 51, 52	0.804
	F4: V44, 45, 46, 47, 48, 49	0.832
	F5: V26, 27, 28, 29	0.825
	F6: V40, 41, 42, 43	0.718

7.5.3 Factor Analysis for the Improving and Embedding Construct – Limited to the Portuguese Sample

The construct validity and reliability analysis discussed in the earlier subsections may raise a question of "potential" data bias because, the 'revised framework' was developed using interview data from a specific geographic context. In fact only PM practitioners from Portugal were interviewed, while the sample used to analyse construct validity and reliability was from PM practitioners worldwide. The 'revised framework', developed from interviews with Portuguese practitioners was not dramatically different from the 'initial framework' conceptualised from literature review, suggesting that the Portuguese based 'revised framework' is fairly robust.

Nevertheless, recognising the potentially Portuguese biased perspective of the 'revised framework', the construct validity and reliability analysis was repeated using only questionnaire responses from the Portuguese respondents, firstly for the improving construct and secondly for the embedding construct. This analysis was statistically feasible, because a significant proportion of the

questionnaire respondents were from Portugal – 41% of a total sample of nearly 800 respondents.

Factor analysis for the improving construct – Portuguese sample

Table AF.16 in Appendix F shows that all variables of the improving construct (V1 to V25), except V4, V5 and V6, have half or more correlation coefficients for each variable significant, i.e. > 0.3 (Kim & Mueller, 1978). For the same reasons explained in Section 7.5.1 these three variables were excluded from the analysis. Namely, the KMO score improves from 0.946 to 0.955, (Table AF.27 and Table AF.28).

A KMO of 0.955 indicates a strong correlation amongst variables, concluding that the data set is "excellent" for factorability. Bartlett's test of sphericity indicated that correlations between items were sufficiently large to use FA.

The PCA extraction produced communalities that are all above the 0.5 threshold (Field, 2009) except for V7 (Table AF.29), but even V7 is quite near the threshold (0.485). Therefore, the data shows factorability.

The eigenvalues were examined: the results indicate that 3 themes ('factors/ components' in FA) had eigenvalues above or near 1, suggesting that this construct was based on 3-themes explaining 65.0% of total variance (Table AF. 20). The 3-theme structure is also rationalised by the analysis of the scree plot, which shows that 3 themes 'components' have an eigenvalue above or near 1, where the plot starts to flatten in a linear way (Figure AF.3). Table 7.16 summarises the results of SPSS Varimax rotation and total variance explained.

Based on the content of the questions V1 to V25, it was determined:

- Factor#1 (V14, V15, V16, V17, V18, V19, V20, V23 and V25) better represented the theme 'people & organisational learning'.
- Factor#2(V7, V8, V9, V10, V11, V12, V13, V21, V22, and V24), better represented the theme 'general management system'; and
- Factor#3 (V1, V2 and V3) represents the theme 'processes, tools & techniques'.

Table 7.16: Improving construct: Varimax rotation and variance explained – Portuguese sample

Variable	PMIIs in the 'revised framework'	Component ('theme')		
		1	2	3
V1	Corporate standardisation of PM processes	.372	.267	.772
V2	Corporate standardisation of PM tools & techniques	.276	.248	.838
V3	Corporate standardisation of PM Information System	.180	.294	.806
V7	Provide PM training	.303	.453	.434
V8	Manage PM competences	.442	.531	.296
V9		.353	.631	.239
V10		.464	.578	.307
V11		.224	.738	.269
V12		.233	.734	.148
V13	Develop a culture of learning	.340	.691	.233
V14	PM professionalisation	.737	.226	.191
V15	Establish PM career path for all PM roles	.600	.487	.323
V16	Integrate the PM system with the general management system	.552	.422	.330
V17	Develop supported infrastructure	.525	.381	.363
V18	Develop a project sympathetic organisation structure	.660	.282	.282
V19		.776	.280	.203
V20		.760	.326	.172
V21	Benchmarking to PM assess and continuous improvement	.423	.580	.324
V22		.345	.628	.280
V23	Develop awareness of PM value among all staff	.699	.353	.245
V24	Develop a basic understanding of organisational PM practices among all project stakeholders	.522	.553	.180
V25	Establish PM practices as internal standards	.614	.422	.351
	Eigenvalues	**12.213**	**1.143**	**0.942**
	Percent of variance explained	**55.5%**	**5.2%**	**4.3%**

Table 7.16 shows that the improving construct conceptualisation, using only the sample from Portuguese respondents, is very similar to the conceptualisation using the total sample, which included respondents worldwide. The main difference, signalled in a blue square in Table 7.16, is for the variable V23 – 'develop awareness of PM value among all staff'. V23– clearly loads higher in the theme 'general management system' rather than in the theme 'people and organisational learning', as it was categorised using the total sample. Using the total sample, the loads of V23 were very similar

between these two themes (0.523 in the theme 'people & organisational learning' and 0.582 in the theme 'general management system').

Using only the Portuguese sample, the variable V16- 'integrate the PM system with the general management system' loads higher on the theme 'general management system' (0.552), as it was expected, and already categorised in the 'revised framework'. Although, using the total sample loaded slightly higher on 'people & organisational learning',

Once the final structure of the themes ('factors/ components' in FA) was established, Cronbach's alpha analysis for the three themes under the improving construct was conducted. Table 7.17 shows that all Cronbach's alpha values for each improving theme are above the 0.5 minimum threshold, and the 0.7 desired threshold (Nunnally, 1978), which means that, even using only the Portuguese sample, the results are reliable. Actually, the Cronbach's alpha values are very similar to results with the total sample.

Table 7.17: Improving construct: Reliability analysis- Cronbach's alpha analysis- Portuguese sample

Construct	Theme ('Factor' in FA)	Cronbach's alpha
Improving	F1: V14, 15, 16, 17, 18, 19, 20, 23, 25	0.928
	F2: V7, 8, 9, 10, 11, 12, 13, 21, 22, 24	0.922
	F3: V1,2,3	0.886

Factor analysis for the embedding construct – Portuguese sample

Table AF.21 in Appendix F shows that all variables of the embedding construct (V26 to V52), except V30 and V42, have half or more correlation coefficients for each variable significant, i.e. > 0.3 (Kim & Mueller, 1978). V30 has 19 coefficients out of 27 lower than the 0.3 threshold and V42 16 coefficients. Therefore, there is some evidence that V30 and V42 might need to be eliminated from the analysis since it seems to be poorly correlated to most other variables. However, for the same reasons explained in Section 7.5.2 these two variables were not excluded from the analysis. Namely, the KMO score only slightly improves from 0.933 to 0.935 (Table AF.22 and Table AF.23).

A KMO of 0.933 indicates a strong correlation amongst variables, indicating that the data set is "excellent" for factorability. Bartlett's test of sphericity indicated that correlations between items were sufficiently large to use FA.

The PCA extraction produced communalities are all above the 0.5 threshold (Field, 2009) except for V49, as happened for the total sample, but even V49 is quite near the threshold (Table AF.24). Therefore, the data shows factorability.

The eigenvalues were examined: the results indicate that 6 themes ('factors/ components' in FA) had eigenvalues above or near 1, suggesting that this construct is based on 6-themes explaining 62.8 % of total variance (Table AF. 25). The 6-theme structure is also rationalised by the analysis of the scree plot, which shows that 6 themes 'components' have an eigenvalue above or near 1, where the plot starts to flatten in a linear way (Figure AF.4). Table 7.18 summarises the results of SPSS Varimax rotation and total variance explained.

Based on the nature of the variables V26 to V52, it was determined:

- Factor#1 (V44, V45, V46, V47, V48, V49) dealt with the theme 'implementation'.
- Factor#2 (V30, V50, V51, V52) dealt with the theme 'routinisation'.
- Factor#3 (V31, V32, V33, V34) dealt with the theme 'communication & influence', although the variable V32 'stakeholders involvement' loads equally also in the theme 'implementation'. As discussed in earlier sections, 'stakeholders involvement', should happen during the entire embedding process, from the beginning stage diffusion/ dissemination, which corresponds to the theme 'communication & influence', as well as, in the 'implementation'.
- Factor#4 (V26, V27, V28, V29) dealt with the theme 'adopter'.
- Factor#5 (V35, V36, V37, V38, V39) dealt with the theme 'inner context', although 'resources to support change' (V35) have slightly loaded higher on Factor# 2 'routinisation'. In fact, it is perceived, since the beginning of this research, that factors related to the 'adopter', 'inner context' and 'outer context' will have influence during all the stages of the embedding process, namely, 'communication and influence' (diffusion/ dissemination), implementation and routinisation. In this particular case, the data shows that the existence of 'resources to support the change' will have a slightly high influence in the routinisation of the PM practice.
- Factor#6 (V40, V41, V42, V43) dealt with the theme 'outer context'.

Table 7.18: Embedding construct: Varimax rotation and variance explained – Portuguese sample

Variable	Factors in the 'revised framework'	Component ('theme')					
		1	2	3	4	5	6
V26	Perceived usefulness	.179	.204	.083	.778	.065	.155
V27	Perceived ease of use	.209	.045	.109	.779	.094	.120
V28	Adopter motivation	.307	.320	.357	.559	-.050	-.095
V29	Predisposition for change	.222	.249	.438	.556	.041	-.092
V30	Nature of adoption decision- mandatory	-.101	.517	-.036	.329	.402	.134
V31	Demonstrating the PMII value	.166	.238	.486	.418	-.002	.337
V32	Stakeholders involvement	.446	.065	.446	.280	.239	.057
V33	Opinion leaders and key facilitators support	.155	.077	.711	.079	.309	.174
V34		.294	.261	.725	.155	.082	.181
V35	Resources to support change	.253	.505	.124	.199	.434	.142
V36	Sponsorship	.228	.201	.357	.241	.592	.044
V37	PM maturity	.220	.176	.237	.291	.596	-.031
V38	Tension for change	-.095	.305	.359	.287	.497	.254
V39	Absorptive capacity for new knowledge	.292	.397	.416	.173	.494	-.040
V40	Interorganisational PM Practices	.284	.185	.107	.012	.264	.689
V41	External stakeholder requirement	.238	.128	.206	.164	.081	.766
V42	Unstable economic environment	.277	.112	.133	-.021	.154	.726
V43	Environmental culture	.182	.122	.297	-.014	.413	.491
V44	Piloting	.639	.132	.076	.082	.234	.212
V45	Gradual implementation	.641	.222	.174	.183	.134	.203
V46	Specific training	.611	.375	.168	.233	-.043	.286
V47	Adaptation/ re-invention	.713	.249	.220	.283	-.038	.075
V48	Integration with the existent practices	.658	.205	.277	.175	.109	.061
V49	External collaboration	.508	.211	.051	.176	.392	.086
V50	Feedback on the PMII impacts	.353	.662	.281	.125	.047	.121
V51	PM quality assurance process	.327	.723	.131	.059	.089	.169
V52	Adopter accountability	.191	.699	.077	.073	.198	.180
Eigenvalues		**10.835**	**1.715**	**1.321**	**1.161**	**1.033**	**0.898**
Percent of variance explained		**40.1%**	**6.4%**	**4.9%**	**4.3%**	**3.8%**	**3.3%**

Table 7.18 shows that using only the responses from Portuguese respondents, the embedding construct conceptualisation is very similar to the conceptualisation using the worldwide sample. The categorisation results of the embedding factors in the 6 embedding themes are exactly the same using the total sample or the limited Portuguese sample.

Finally, once the final structure of the themes ('factors/ components' in FA was established, Cronbach's alpha analysis for the six themes under the embedding construct was conducted. Table 7.19 shows that all Cronbach's alpha values for each embedding theme are above the 0.5 minimum threshold, and the 0.7 desired threshold (Nunnally, 1978), which means that, even using only the Portuguese sample, the results are reliable. Although, the Cronbach's alpha values are a little lower than the presented in the worldwide sample.

Table 7.19: Embedding construct: Reliability analysis–Cronbach's alpha analysis – Portuguese sample

Construct	Theme ('Factor' in FA)	Cronbach's alpha
Embedding	F1: V44, 45, 46, 47, 48, 49	0.797
	F2: V30, 50, 51, 52	0.827
	F3: V31, 32, 33, 34	0.786
	F4: V26, 27, 28, 29	0.843
	F5: V35, 36, 37, 38, 39	0.826
	F6: V40, 41, 42, 43	0.707

7.5.4 FA#3 – Factor Analysis to Confirm Improving and Embedding as Different Concepts

Since the beginning of this research, a distinction had been made between the concepts of improving and embedding. In order to confirm this separate conceptualisation, a third FA was conducted, including in the same analysis all the variables in the improving and embedding construct. The results show a complete separation of the key PMIIs (variables 1 to 25) from the key embedding factors (variables 26 to 52). That is, none of the variables for improving have a high load under embedding themes, and none of the variables for embedding have a high load under improving themes. Table 7.20 shows that all the variables measuring the PMIIs identified from the interview analysis have a high load on themes 2, 3 and 4 and that all the variables measuring the embedding factors have a high load on themes 1, 5, 6, 7, 8 and

9. This justifies the distinction drawn between these two concepts, although there is some correlation between the key PMIIs and key embedding factors, as with for example, the PMII: 'develop awareness of PM value among all staff' and the embedding factor: 'demonstrating the PMII value'. In the PMII 'develop awareness of PM value among all staff', the message is that for an organisation to improve PM practice it is crucial that staff perceive the general benefits of the discipline of PM, and what it brings to the success of projects and to the organisation. In the embedding factor 'demonstrating the PMII value', the message is if the organisation wants to embed a new practice, it should first communicate/ demonstrate to the stakeholders involved the specific benefits of that new practice for the stakeholders and for the organisation.

Table 7.21 summarises the FA steps followed by this research and the results obtained to establish construct validity and better determine the structure of the themes ('factors/components' in FA) for improving and embedding PM practice.

Table 7.20: Improving and embedding different concepts: Varimax rotation and variance explained

	Themes ('components')								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
V1	.135	.313	.284	.732	.063	.112	.033	.106	.157
V2	.121	.291	.251	.775	.025	.089	.103	.070	.172
V3	.140	.285	.182	.764	.071	.040	.121	.012	-.006
V7	.084	.625	.177	.272	.175	.215	-.081	.248	.088
V8	.144	.709	.186	.215	.195	.177	-.035	.225	.048
V9	.089	.744	.163	.156	.151	.176	.069	.121	.142
V10	.213	.519	.386	.237	.086	.002	.051	.062	.221
V11	.173	.678	.208	.180	.107	.006	.187	.066	.120
V12	.311	.561	.303	.118	-.065	-.050	.194	-.108	-.091
V13	.319	.641	.360	.105	-.048	.078	.128	.040	-.085
V14	.138	.168	.757	.098	.004	-.014	.012	.053	.150
V15	.255	.496	.586	.176	-.010	.050	.070	.041	.076
V16	.222	.468	.426	.228	.081	.180	.030	.209	-.058
V17	.113	.256	.562	.289	.055	.067	.022	.165	.127
V18	.143	.289	.573	.237	.125	.138	.158	.113	.006
V19	.070	.294	.684	.123	.213	.209	.118	.087	.062
V20	.160	.340	.658	.032	.152	.229	.072	.085	.019
V21	.174	.539	.447	.100	.050	.006	.211	-.005	.356
V22	.124	.581	.376	.079	.069	.003	.242	-.014	.388
V23	.155	.487	.518	.110	.268	.203	.065	.050	.011
V24	.160	.570	.363	.121	.240	.249	-.012	.102	.018
V25	.223	.391	.493	.343	.145	.186	-.003	.103	.116
V26	.360	.155	.195	.086	.098	.662	.097	.054	.081
V27	.241	.147	.123	.119	.173	.715	.079	.035	.089
V28	.493	.191	.218	-.005	.007	.486	.047	.283	.113
V29	.432	.192	.226	.036	-.012	.460	.060	.263	.197
V30	.166	.072	.141	.176	.062	.284	.208	.039	.669
V31	.582	.141	.160	.189	.181	.321	.132	.011	.124
V32	.595	.227	.093	-.015	.188	.189	.170	-.061	.195
V33	.647	.165	.058	.030	.042	.184	.301	.040	-.024
V34	.744	.169	.139	.081	.054	.122	.161	.104	.088
V35	.498	.097	.215	.135	.155	.081	.072	.395	.183
V36	.603	.113	.280	.110	.064	.102	.030	.420	.190
V37	.371	.169	.156	.219	.140	-.005	.080	.523	.279
V38	.179	.111	.120	.019	.108	.138	.293	.651	-.020
V39	.456	.274	.137	.053	.182	.088	.217	.450	.129
V40	.094	.131	.062	.001	.365	.050	.585	.266	.197
V41	.260	.142	-.074	.017	.155	.183	.580	.295	.042
V42	.153	.027	.149	.152	.119	.023	.727	.011	.105
V43	.446	.134	.219	.090	.217	.036	.458	.065	-.035
V44	.231	.162	.137	.002	.637	.140	.241	.039	.113
V45	.342	.079	.150	.065	.691	.103	.167	.060	.032
V46	.539	.135	.140	.182	.489	.137	.039	.151	.104
V47	.643	.120	.122	.130	.361	.176	-.006	.133	-.021
V48	.580	.107	.120	.151	.409	.101	.087	.100	.040
V49	.217	.189	.056	.028	.509	-.016	.284	.179	.158
V50	.563	.296	.118	.045	.240	.067	.067	.246	.309
V51	.506	.206	.085	.178	.253	.040	.038	.185	.477
V52	.384	.150	.135	.077	.247	.050	.043	.257	.526
Eigenvalues	**18.89**	**3.86**	**1.64**	**1.45**	**1.18**	**1.14**	**1.08**	**1.05**	**0.97**
% explained	**38.5%**	**7.9%**	**3.4%**	**3.0%**	**2.4%**	**2.3%**	**2.2%**	**2.2%**	**2.0%**

Table 7.21: Summary of FA results for improving and embedding constructs

Steps	Results and Comments: Improving Construct (FA#1)	Results and Comments: Embedding Construct (FA#2)	Results and Comments: Improving + Embedding Construct (FA#3)
1. Determine if FA applicable to data set	• All variables have at least half of more of their correlation > 0.3, except V4,V5, V6 • All data except V4,V5, V6 is suitable for FA	• All variables have at least half of more of their correlation > 0.3, except V42	•Almost variables have at least half of more of their correlation > 0.3, except V4,V5, V6, V42, V38, V49
	• KMO = 0.952 Including V4,V5, V6 • KMO = 0.960 Excluding V4,V5, V6 • The data set is the "excellent" level for FA (If KMO >0.9)	• KMO = 0.958 Including V42 • KMO = 0.959 Excluding V42 • KMO increased 0.001, however, it is not significant, so V42 is maintained for FA •The data set is the "excellent" level for FA	•KMO = 0.958 Including all variables •KMO = 0.963 Excluding V4,V5, V6 •KMO = 0.965 Excluding V4,V5, V6, V42, V38, V49 •KMO increased 0.002, however, it is not significant, so only V4,V5, V6 is excluded from FA •The data set is the "excellent" level for FA
	• Test is significant (P< 0.5) • The data is factorable	• Test is significant (P ≈ 0.000) • The data is factorable	•Test is significant (P≈ 0.000) • The data is factorable
	• All variable have communalities above the threshold level, except for V12, with 0.476, very near from the threshold 0.5 • The data shows factorability	• All variable have communalities above the threshold level, except V49 with 0.470, very near from the threshold 0.5 • The data shows factorability	•All variable have communalities above the threshold level, except V49 with 0.483, very near from the threshold 0.5 •The data shows factorability
2. Determine number of factors (themes)	• Three factors have an eigenvalue > 1 explaining 63.4% of the total variance • This is a 3-theme construct	• Four factors have an eigenvalue > 1 explaining 56.2% of the total variance • By adding two other factors with eigenvalue near of 1, total explained variance totals 63%	•Eight factors have an eigenvalue > 1 explaining 61.8% of the total variance •However, the nine factor has a eigenvalue very close to 1 (0.972) and total explained variance increases to 63.8%
	• Scree plot shows that three components/factors have an eigenvalue above 1, where the plot starts to flatten in a linear way • This also shows that this is a 3-theme construct	• Scree plot shows that six components/factors have an eigenvalue above or near 1, where the plot starts to flatten in a linear way • This also shows that this is a 6-theme construct	• Scree plot shows that nine components/factors have an eigenvalue above or near 1, where the plot starts to flatten in a linear way • This also shows that this is a 9-theme construct
3. Develop factor (theme) structure	• Using rotation results, obtain factor loading matrix FA#1: • F1:V7, 8, 9, 10, 11, 12, 13, 21, 22, 23, 24 • F2: V14, 15, 16, 17, 18, 19, 20, 25 • F3: V1, 2, 3	• Using rotation results, obtain factor loading matrix FA#2: • F1: V31, 32, 33, 34 • F2: V35, 36, 37, 38, 39 • F3: V30, 50, 51, 52 • F4: V44, 45, 46, 47, 48, 49 • F5: V26, 27, 28, 29 • F6: V40, 41, 42, 43	•Using rotation results, obtain factor loading matrix FA#3: • F1: V31, 32, 33, 34, V35, 36, 47, 48, 50 • F2: V7, 8, 9, 10, 11, 12, 13, 21, 22, 23, 24 • F3: V14, 15, 16, 17, 18, 19, 20, 25 • F4: V1, 2, 3 • F5: V44, 45, 46, 49 • F6: V26, 27, 28, 29 • F7: V40, 41, 42, 43 • F8: 37, 38, 39 • F9: V30, 51, 52

7.6 Questionnaire Discussion

7.6.1 Modifying the Framework for Improving PM Practice

In summary, the FA conducted on variables pertaining to the improving PM practice construct is a 3-theme structure instead of the originally hypothesised 4-theme structure which included the theme 'PM culture'. The theme 'PM culture' did not emerge perhaps for two different reasons:

1. 'PM culture' is a complex and vague concept and it is strongly correlated with the other themes, particularly with the themes 'people & organisational learning' and 'general management system'; or
2. the questionnaire design was lacking in respect of this theme. During the questionnaire design, the formulation of more detailed questions to explore this theme directly was questioned.

Consequently, in the draft 'proposed framework' (Figure 7.7) the 'PM culture' theme was removed. This does not mean that 'PM culture' is not a very relevant theme to improve PM practice. In popular parlance the term 'PM culture' is a short hand term for the way practitioners manage projects in our organisations. In this sense many of the PMIIs might be regarded as about PM culture, and 'PM culture' is implicit in all the three improving themes.

There were some slight differences in the categorisation into themes of a few key PMIIs:

- the factor 'PM professionalisation' (V14) and the factor 'establish PM career path for all PM roles' (V15) in the 'revised framework' categorised under the theme 'people & organisational learning'. However, statistical analysis confirmed that these factors are more correlated with the theme 'general management system'. In fact, under the construction of the 'revised framework' there was doubts in which of these two themes should be these two factors categorised.
- the factor 'benchmarking to PM assess and continuous improvement' (V21 and V22) in the 'revised framework' categorised under the theme 'general management system'. However, statistical analysis confirmed that this factor is more correlated with the theme 'people & organisational learning', which means that most respondents see this factor as a process of continuous improvement, and therefore it loads more on 'organisational

learning', although some people also see it more as process to assess as the research initially conceptualised it.

7.6.2 Modifying the Framework for Embedding PM Practice

Most of the conceptualisation from the embedding construct of the 'revised framework' was confirmed by the questionnaire data analysis. All the themes conceptualised were confirmed (the embedding construct is a 6-theme construct), with a slight adjustment. The theme named 'adopter & adoption' was renamed just for 'adopter', because the only embedding factor related to the adoption process 'nature of adoption decision - mandatory' loaded higher on the theme 'routinisation'. In fact, the factor 'nature of adoption decision - mandatory' was the only factor from the whole embedding construct re-categorised under another theme. This re-categorisation increases evidence for the importance of the nature of the adoption decision being mandatory in order that a PM practice become routinely used by the staff. If a particular PM practice is not a requirement established by the organisation, its routine use will decrease, especially if other established practices are taking most of the available resources.

Figure 7.7 presents a draft 'proposed framework' of pertinent PMIIs and embedding factors, which is divided in 'key themes and PMIIs for improving' and 'key themes and factors for embedding'. Figure 7.7 highlights in blue, the PMIIs and embedding factors that were re-categorised into themes based on the survey data analysis. The draft 'proposed framework' does not show yet how the identified key PMIIs and key embedding factors are related. Therefore, the link between the boxes 'key themes and PMIIs to improve' and 'key themes and factors to embed' to highlight the relationship between these two concepts is maintained. This inter-relationship is analysed in the following section.

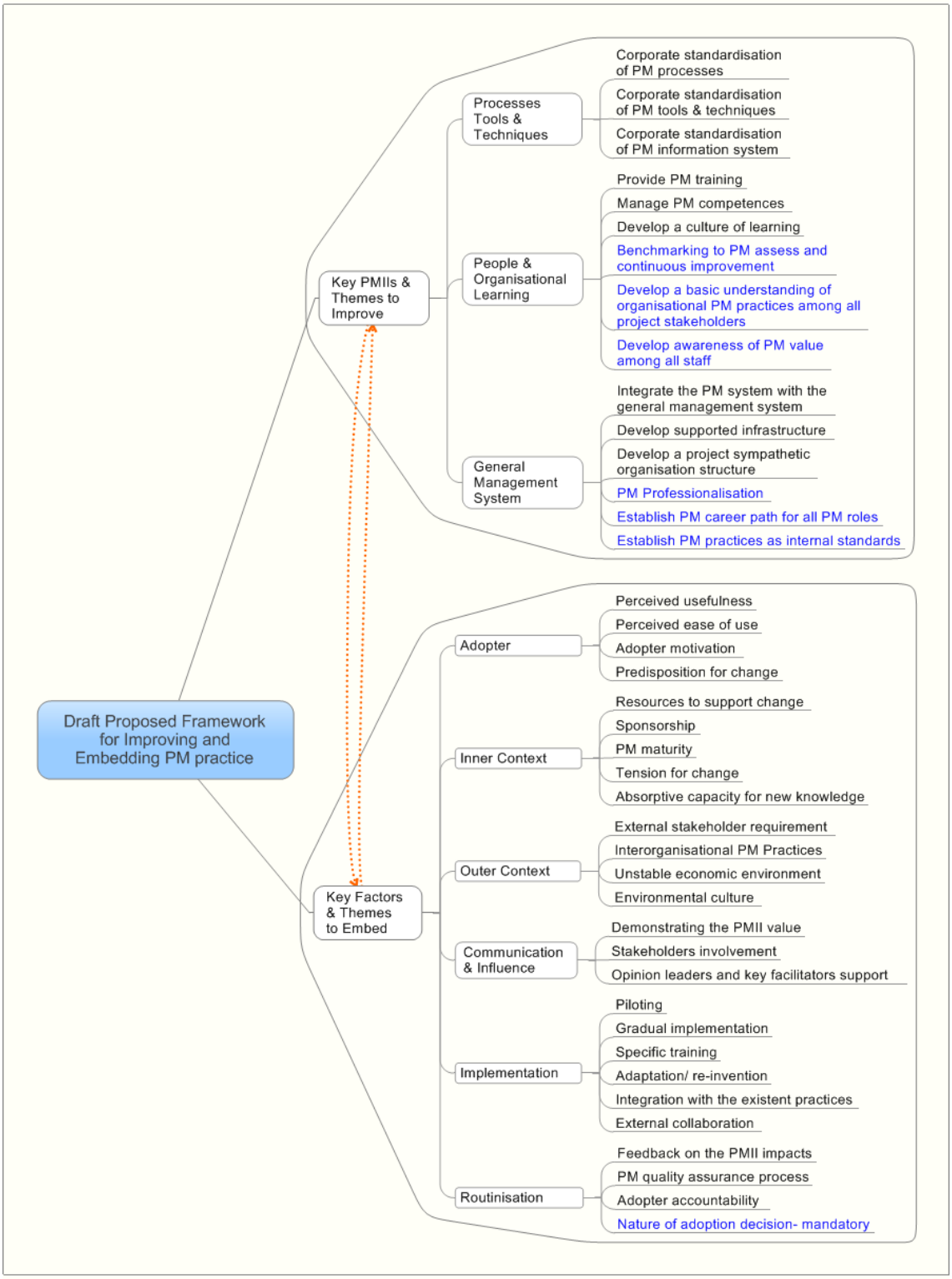


Figure 7.7: Draft 'proposed framework' for improving and embedding PM practice

7.7 RQ4: Correlation Analysis between Improving and Embedding Themes

A fourth research question for this study was to identify the main inter-relationships between the key PMIIs and key embedding factors.

RQ4: How are the identified key PMIIs and key factors to facilitate embedment related?

Conducting FA, this research study was determining the group of PMIIs and embedding factors that can be summarised into a smaller set of themes. Therefore, the result of the number of PMIIs and embedding factors under one theme, means that these PMIIs and embedding factors are highly correlated between them.

The reduction of the number of factors to a limited set of improving and embedding themes allowed the simplification of analysis to answer the fourth research question of this research. The conduction of correlation analysis under 15 PMIIs and 26 embedding factors would be too complex. Therefore, the correlation analysis is conducted between the three improving and six embedding themes. Improving and embedding PM practice are two separate concepts, as demonstrated in section 7.5.4; however, as referred earlier, there is an expectation of existence of the linkage between these two concepts.

Although the analysis has been conducted under themes and not under PMIIs and embedding factors, the research question is maintained, because, at the beginning of the research conceptualisation it was not possible to anticipate such issue.

Correlation measures allow the recognition of how variables are related, although it is not possible to draw conclusions about causality.

Depending on the data collected, the Pearson Product's correlation coefficient or Spearman's correlation coefficient should be used. Spearman's correlation coefficient is a non-parametric statistic and so should be used when the data have violated parametric assumptions, such as normality. Pearson's product correlation coefficient is a more robust test, and would be chosen if data seems normally distributed. However, Pearson's correlation coefficient has also another assumption - data are interval (Field, 2009). Data are interval if equal

intervals on the scale represent equal differences in the property being measured. This assumption is tested only by common sense.

The data collected is from 793 respondents, which can be considered a large sample, and from the central limit theorem, it is known that in large samples the sampling distribution tends to be normal (Greasley, 2008; Field, 2009). However, the data was analysed in order to assure that the three improving themes and six embedding themes variables created by the exploratory FA are normally distributed. Several analyses through the SPPSS were conducted, namely:

1. the Kolmogorov–Smirnov test and Shapiro–Wilk test. If the test is non-significant ($p > .05$) it tells us that the distribution of the sample is not significantly different from a normal distribution (i.e. it is probably normal). If, however, the test is significant ($p < .05$) then the distribution in question is significantly different from a normal distribution (i.e. it is non-normal). However, these tests have an important limitation for this research, because large sample sizes tend to get significant results from small deviations from normality, and so a significant test does not necessarily confirm whether the deviation from normality is enough to bias the use of any statistical procedures (Field, 2009). Table AF.26 shows the Kolmogorov–Smirnov test and Shapiro–Wilk test that indicates that data is not normal distributed. However, as argued by Field (2009, p 148) *"in large samples these tests can be significant even when the scores are only slightly different from a normal distribution. Therefore, they should always be interpreted in conjunction with histograms, P–P or Q–Q plots, and the values of skew and kurtosis."*

2. The values of skewness and kurtosis should be zero in a normal distribution. However, significance tests of skew and kurtosis should also not be used in large samples (because they are likely to be significant even when skew and kurtosis are not too different from normal) (Greasley, 2008; Field, 2009), and therefore,

3. An observatory analysis of the P–P plots or the Q–Q plots, which produce similar results, should be used to large samples (Greasley, 2008). If the data are normally distributed, then the observed values (the dots on the chart) should fall along the straight line (meaning that the observed values

are the same as it would be expect to get from a normally distributed data set). Analysing the P-P plots it was assumed that all the nine improving and embedding themes ('variables') are normally distributed. An example of the theme 'outer context' P-P plot is presented in Figure 7.8.

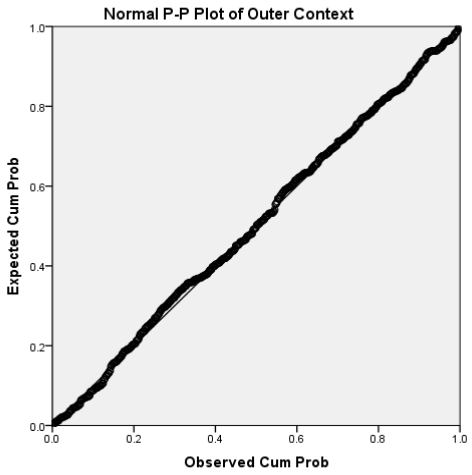


Figure 7.8: P-P Plot of the theme 'outer context'

In order to compute correlation coefficients between the themes of the improving and embedding constructs, the bivariate correlations procedure from the SPSS software package was used, and as the assumptions were verified the Pearson product coefficient of correlation was selected.

The significance of the correlation coefficients was tested through two-tailed probabilities. Table 7.22 presents the results obtained between the improving and embedding themes. The improving themes are not correlated between them, neither the embedding themes, i.e. the improving theme 'process, tools & techniques' is not correlated to the improving theme 'people & organisational learning' or the theme 'general management system'. Because these themes were created through FA, and the exact purpose of conducting FA is to create independent themes ('factors/ components' in FA).

Table 7.22 shows a low level of correlation between most of the improving and embedding themes, which varies between the values r^{22}=0.036 and 0.258. This might be influenced by the large size of the sample (N). Although low, almost all these levels of correlation are significant. This is largely consistent with the

[22] The correlation coefficient has to lie between -1 and +1. A coefficient of +1 indicates a perfect positive relationship, a coefficient of -1 indicates a perfect negative relationship, a coefficient of 0 indicates no linear relationship at all (Greasley, 2008).

expectation of this study that each of the improving themes would be correlated with each of the embedding themes. Only three linkages do not exist, i.e., there is no significant level of correlation between:

- 'process, tools & techniques' / 'outer context'
- 'process, tools & techniques' / 'implementation'
- 'general management system' / 'outer context'

Table 7.22: Correlations between the key themes for improving and embedding

Improving Themes		**Embedding Themes**					
		Adopter	Inner context	Outer context	Communication & influence	Implementation	Routinisation
Processes, tools & techniques	Pearson Correlation	.082*	.086*	.036	.086*	.048	.258**
	Sig. (2-tailed)	.046	.036	.377	.036	.242	.000
	Nº of responses	594	594	594	594	594	594
People & organisational learning	Pearson Correlation	.188**	.204**	.169**	.231**	.184**	.181**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	Nº of responses	594	594	594	594	594	594
General management system	Pearson Correlation	.255**	.159**	.078	.192**	.114**	.157**
	Sig. (2-tailed)	.000	.000	.057	.000	.005	.000
	Nº of responses	594	594	594	594	594	594

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

The three instances of no significant correlation in Table 7.22 warrant some explanation:

- **'Process, tools & techniques' / 'outer context'**

The improving theme 'process, tools & techniques' might not be correlated with the embedding theme 'outer context' because 'outer context' might influence the "first shot" of the PM processes tools and techniques implementation, but might not influence the standardisation of them in the organisation. Standardisation means that project processes are performed in the same way for every project (Milosevic, 2003), the way defined by the organisation. However, the statistical results show that to achieve the embedment of PM processes, tools and techniques, the factors under the theme 'outer context' would not have high influence.

For example, it might have much more effect, the factors under the embedding theme 'routinisation': 'PM quality assurance' and 'adopter accountability'. If adopters have a process that would verify if they are using the standardised PM

processes or not, and if they have penalties for not complying with it, it would have much more impact on the standardisation of PM processes, tools and techniques, than for example the factors 'interorganisational PM practices' or the 'unstable economic environment' under the theme 'outer context'. In fact, most of the embedding factors under the theme 'outer context' are in the bottom list of the higher scored embedding factors (see Table 7.9).

- **'Process, tools & techniques' / 'implementation'**

For similar reasons the theme 'processes, tools & techniques' is also not correlated with the embedding theme 'implementation'. The factors (variables) compressing the 'implementation' theme would influence the implementation of the processes, tools and techniques, but not its standardisation. Standardisation assumes that implicitly the processes, tools and techniques are embedded in the organisation, i.e. they are routinely used in the same way in the organisation.

- **'General management system' / 'outer context'**

The improving theme 'general management system' is not correlated with the embedding theme 'outer context' because the PMIIs under the theme 'general management system' are more internal productivity oriented and therefore, not so influenced by external impacts. For example, an organisation 'develops a project sympathetic organisation structure' or 'establishes PM career paths for all PM roles', or the development of 'PM professionalisation' (PMIIs under the theme 'general management system'), if internally sees concrete benefits of these deeply structural changes. It would not be the factors 'interorganisational practices' or the 'unstable economic environment' under the theme 'outer context' that would have an influence on organisation changes of this magnitude. Or even, the 'outer context' embedding factor 'requirement of external stakeholder' that usually is related with more specific PM practices, such as, the report of the project progress using the technique EVM, and usually not related to organisational structural changes.

Indeed, the embedding theme 'outer context' is only correlated with the theme 'people & organisational learning'. Some examples might give light to this correlation:

1. it is common PM professionals to apply to a specific PM training because their colleagues from peer's organisations had applied and say that is important ('interorganisational PM practices');

2. PM professionals want to become certified project managers because clients sometimes require certified project managers to manage a particular project (e.g. the project management professional (PMP®) certification from Project Management Institute) ('external stakeholder requirement'); additionally
3. people are also influenced by the factor 'environmental culture'.

7.8 RQ5: PM Organisational Context and Demographics Dependency Analysis

The idea that PM practice varies from one organisational context to another is widely accepted (Thomas & Mullaly, 2008; Cooke-Davies et al. 2009; Shi, 2011; Besner & Hobbs, 2013).Therefore, the last objective of this research is to find if the identified key PMIIs and key embedding factors are dependent on the organisational context.

RQ5: How does the set of key PMIIs and key factors to facilitate PMIIs embedment vary in different organisational contexts (industry, size, geographic location and project type) and in demographics (primary role, PM experience, level of education, gender and age)?

The reduction of the number of PMIIs and embedding factors to a limited set of improving and embedding themes also allowed the simplification of this analysis. Therefore, to detect differences in the improving and embedding themes corresponding to different organisational contextual variables (sector of activity, organisation size, geographic location and different project types, in terms of scope, time and cost) a comparison between the means of different groups (categories) in a contextual variable needs to be conducted. The ANOVA analysis was the procedure used to conduct this analysis.

ANOVA was selected because is a more robust than several t-tests or the use of non-parametric procedures, such as the Mann-Whitney test, the Wilcoxon signed-rank test, Friedman's test and the Kruskal-Wallis (Field, 2009). However, to use ANOVA the four assumptions of parametric tests needed to be assured (Greasley, 2008; Field, 2009):

1. The sampling distribution is normally distributed (assumptions discussed earlier in section 7.7 for the use of the Pearson's correlation coefficient);
2. Data are measured at least at the interval level (assumption discussed earlier in section 7.7);
3. Scores are independent, which is true because they come from different people.
4. Homogeneity of variance. This assumption means that the variances should be the same throughout the data. When testing several groups of respondents, as in this case, this assumption means that each of these samples comes from populations with the same variance.

The homogeneity of variance can be assured by the Levene's test[23] that can be performed at the same time of ANOVA in SPSS. However, as well as the Kolmogorov-Smirnov test for test normality, when the sample size is large, small differences in group variances can produce a Levene's test that is significant. Therefore, it is necessary to also look at Hartley's F_M also known as the variance ratio (Field, 2009). This is the ratio of the variances between the group with the biggest variance and the group with the smallest variance. This ratio should be compared to critical values[24] in a table published by Hartley (in Field, 2009, p 151) and should be less than the critical value.

During the conduction of the homogeneity variance analysis, six Levene's tests presented values below <0.05, which *per se* indicates a violation of the homogeneity variance assumption. Therefore, the analysis of the variance ratio was performed. The six variance ratios presented values between 1.13 and 1.6, and all of them below the critical values in the Hartley's graph. Consequently, it was assumed the homogeneity of variance, and ANOVA was applied for all the analysis.

Table 7.23 shows a summary of the results of ANOVA, and only the significant differences $p<0.05$ (Field, 2009), are presented. Several main dependences of the improving and embedding themes are spotted on several organisation contextual variables. For example, in the first row of Table 7.23, the ANOVA test shows that respondents from different sectors of activity have scored

[23] Levene's test tests the null hypothesis that the variances in different groups are equal, i.e. the difference between the variances is zero (Field, 2009).
[24] Critical values depend on the number of cases per group (n-1), and the number of variances being compared (Field, 2009).

significantly differently the variables under the four themes: 'processes, tools & techniques' (p≈0.000); 'people & organisational learning' (p=0.029); 'communication & influence' (p=0.016); and 'routinisation' (p≈0.000).

Table 7.23: ANOVA results on the themes for improving and embedding and the contextual variables

Context variable	Processes, tools & techniques	People & organisational learning	General management system	Adopter	Inner context	Outer context	Communication & influence	Implementation	Routinisation
Sector of activity	≈.000	.029	-	-	-	-	.016	-	≈.000
Geographic location:									
I.7groups	-	-	-	-	-	.002	-	-	-
II.Portugal/ Europe/ Rest of the world	.001	.048	-	-	-	-	-	-	-
III.Portugal/ Rest of the world	.001	.022	-	-	-	-	-	-	-
Organisation size	-	.001	-	-	-	-	-	.002	-
Type of projects:									
I. Internal/ external/ Projects/ or both	-	-	-	-	-	-	-	-	.042
II.Scope (type of delivery produced)	.001	.003	-	.028	-	-	-	-	.009
III.Scope (projects similar to another or different)	-	-	-	-	-	-	-	-	-
IV.Scope (technical innovation)	-	.028	.026	-	-	-	.015	-	-
V.Cost	-	-	-	-	-	-	-	-	-
VI.Time	-	-	-	-	-	-	-	-	-

The ANOVA test, in Table 7.23, just shows that there are differences between groups; it does not provide specific information about which groups were

affected. For example, Table 7.23 signals differences between the different categories (groups) under the contextual variable sector of activity (engineering and construction; business service; IT; telecommunications; industrial services; and others). However, to better understand these differences, additional tests are required to exactly identify in which categories they occur. Therefore, the post-hoc Tukey test, the most used test for large samples (Field, 2009), was performed for all themes.

Table 7.24 presents the results of the post-hoc Tukey test under the themes spotted with the ANOVA. This test allows the identification of which categories from the context variable are influencing the spotted differences. Once again only the significant differences $p<0.05$ (Field, 2009), are presented. For example, in the first row of Table 7.24, the Tukey test shows that under the theme 'processes, tools & techniques' there are differences between the categories: IT/ engineering and construction ($p=0.015$); IT/ telecommunications ($p=0.029$); and IT/ other ($p\approx0.000$).

The summary of the differences results under the improving and embedding themes on different organisational contextual variables (see Table 7.23 and 7.24) are discussed below. In order to better understand why these differences are observed, particular responses in the questionnaire were examined. Each variable under a theme was analysed and compared to see how respondents from different categories, have scored these variables. For example, on the spotted differences between the sector of activity IT and the sector engineering & construction ($p=0.015$) under the theme 'processes, tools & techniques', statistical results show that IT sector score higher, i.e. a higher percentage of respondents have selected the 4 (high) or 5 (very high) answers, on the PMIIs under the theme 'processes, tools & techniques' than in the sector engineering & construction. The example of the statistical results of this analysis is presented in the Tables AF.27, AF.28 and AF.29, in Appendix F.

Table 7.24: Tukey test results for differences in means on the themes for improving and embedding and the contextual variables

Context variable	Theme	Category1	Context variable	Theme
Sector of activity	Processes, tools & techniques	IT	Engineering & construction	.015
		IT	Telecommunications	.029
		IT	Other	≈.000
	Communication & influence	Industrial services	Business services	.015
		Industrial services	IT	.026
		Industrial services	Other	.041
	Routinisation	IT	Telecommunications	.017
		IT	Industrial services	.012
Geographic location (7 groups)	Outer context	Africa	Europe	.038
		Africa	North America	.005
		Africa	Middle East countries	.027
		Africa	Australia	.029
		North America	Central and South America	.012
Geographic location (Portugal/ Rest of Europe/ Rest of the world)	Processes, tools & techniques	Portugal	Rest of Europe	.001
	People & organisational learning	Portugal	Rest of Europe	.044
Geographic location (Portugal/ rest of the world)	Processes, tools & techniques	Portugal	Rest of the world	.001
	People & organisational learning	Portugal	Rest of the world	.022
Size	People & organisational learning	Micro	Small	.031
		Micro	Medium	.002
		Micro	Large	.002
	Implementation	Large	Micro	.004
		Large	Small	.050
Type of project (type of delivery produced)	Processes, tools & techniques	IT	Engineering & construction	.008
		IT	Other	.020
	People & organisational learning	Business services	Engineering & construction	.015
		Business services	IT	.001
	Adopter	Business services	Other	.044
	Routinisation	Business services	IT	.037
Type of project: Scope (technical innovation)	People & organisational learning	Standard product and technology	High level of innovation	.022
	General management system	Standard product and technology	High level of innovation	.023
	Communication & influence	Standard product and technology	High level of innovation	.030
		Standard product and technology	Low level of innovation	.031

- **Sector of activity**

When comparing the survey results from different sectors of activity, ANOVA tests show differences under four themes: 'processes, tools & techniques' ($p \approx 0.000$); 'people & organisational learning' ($p=0.029$); 'communication & influence' ($p=0.016$); and 'routinisation' ($p \approx 0.000$) (Table 7.23). However, the Tukey test does not show exactly in which sectors are these differences under the theme 'people & organisational learning'. Because the differences are too small to be shown when the sample is separated on different sectors of activity. However, Burnes et al. (2003) argued that there are sectors of activity where change remains relatively slow, and therefore organisational learning does not play such an important role as in other sectors.

Under the theme 'processes, tools & techniques' the Tukey test shows differences between IT/ engineering & construction ($p=0.015$); IT/ Telecommunications ($p=0.029$), and IT/ Other ($p \approx 0.000$) (Table 7.24). Looking to particular responses in the questionnaire, the statistical results show that the IT sector score higher, i.e. a higher percentage of respondents have selected the 4 or 5 in the Likert-scale, on the PMIIs (variables) under the theme 'processes, tools & techniques' than in the sectors engineering & construction, telecommunication, and others. This might indicate that respondents from IT sector recognise more the importance of standardisation of PM processes, tools and techniques than the other mentioned sectors. For example, in the engineering & construction sector this might happen, at least in Portugal (researcher's professional experience), because engineering & construction sector has a lower PM maturity level than the IT sector.

Moreover, under the theme 'communication & influence' the Tukey test shows differences between industrial services/ business services ($p=0.015$); industrial services/ IT ($p=0.026$) and industrial services/ others ($p=0.041$) (Table 7.24). Respondents from industrial services sector scores lower embedding factors (variables) under the theme 'communication & influence' than in the sectors business services, IT and others. This might happen because, in general, industrial organisations are much more process oriented than people oriented, therefore embedding factors under the theme 'communication & influence', oriented to the involvement of people are not perceived as so important as in the other sectors mentioned.

Lastly, under the theme ‘routinisation' the Tukey test shows differences between IT/ Telecommunications (p=0.017); IT/ industrial services (p=0.012) (Table 7.24). Respondents from IT sector scores higher embedding factors (variables) under the theme 'routinisation' than the sectors: industrial services and telecommunications. ‘Routinisation’ is a theme related to the continuous involvement of people on the PMIIs embedment process, and maybe for similar reasons, industrial services are not, in general, people oriented, and respondents scored lower the embedding factors under this theme. For example, the embedding factor continuous ‘feedback on the PMII impacts’ is scored much higher by IT respondents than respondents from industrial services sector.

- **Geographic location**

Respondents were from 75 different countries, and as referred in section 7.4.1, the respondents were grouped into seven different geographic locations: Europe, North America Central and South America, Middle East countries, Asia, Africa and Australia. Ex ante, the researcher believed that these locations could have significant cultural differences that might impact on the perceived influence of the key PMIIs and embedding factors by respondents.

Comparing the results from these seven different geographic locations, ANOVA test only shows differences between the different geographic locations under the theme: ‘outer context’ (p=0.002) (Table 7.23). Analysing the results from the Tukey test, there are differences between Africa/ Europe; Africa/ North America; Africa/ Middle East countries and Africa/ Australia and also between North America/ Central and South America (Table 7.24). Respondents from Africa score higher embedding factors (variables) under the theme ‘outer context’ than in Europe, North America, Middle East countries and Australia, as well as, respondents from Central and South America score higher the embedding factors under the theme 'outer context' than in North America.

These differences are not surprising, because, in general, less developed countries, as in Africa, are much more influenced by the ‘outer context’ than more developed countries, as in North America. Organisations from more developed countries usually have better defined internal strategies and are not so directly influenced by organisational external events.

Because the participation of Portugal is very high (41%), and the results are particularly relevant in this context, as this research was funded by Portuguese government, additional comparative analysis was conducted, dividing the sample in three respondent groups: Portugal, rest of Europe and rest of the world.

ANOVA test only shows differences between the three different geographic locations under the themes ‘processes, tools & techniques’ (p=0.001) and ‘people & organisational learning’ (p=0.044) (Table 7.23 and 7.24). Respondents from Portugal score higher PMIIs under the theme 'processes, tools & techniques' than in the rest of Europe. On the other hand respondents from Portugal score lower PMIIs under the theme 'people & organisational learning' than the rest of Europe. In general terms, Portugal is less developed than the rest of Europe, and this might be the reason for Portuguese respondents, in general, be more process oriented than people oriented. However, there were no spotted differences between the rest of the world, maybe because, in the rest of the world group, there is a large mix of countries, from Africa to North America.

When Portugal is simple compared with the rest of world, the same differences (when compared Portugal/ Europe/ rest of world) on the themes were spotted, perhaps influenced by the respondents from the rest of Europe attending to the prior results.

- **Organisation size**

When the results from different organisation sizes (large, medium, small and micro) were compared, differences were observed under two themes: ‘people & organisational learning’ (p=0.001) and ‘implementation’ (p=0.002) (Table 7.23).

Under the theme ‘people & organisational learning’ the Tukey test shows differences between micro/small (p=0.031); micro/ medium (p=0.002), and micro/ large (p=0.002) (Table 7.24). Respondents from micro organisations score higher PMIIs under the theme 'people & organisational learning' than small, medium and large organisations, which from the researcher’s professional experience, was also expected. People in micro organisations assume a much important role on the management of projects than for

example the ‘corporate standardisation and tailoring of PM processes, tools & techniques’ very important in large companies.

Furthermore, the Tukey test shows differences between large/small (p=0.050) and large/micro organisations (p=0.004) under the theme ‘implementation’. Respondents from large organisations score lower embedding factors under the theme 'implementation' than the micro and small organisations. For example, the factor ‘external collaboration’ under the theme ‘implementation’ might be crucial for micro and small organisations and not for large companies. Because, there is a higher probability of the necessary knowledge to implement a PMII exist in large organisations than in micro or small organisations, which is expected to need more external support.

- **Project types: scope, time and cost**

When comparing the questionnaire results from different project types in terms of scope, time and cost, there were only spotted differences under different types of scope. There are no differences on the improving and embedding themes, when comparing respondents from different project durations (up to 3 months to more than 2 years), as well as, from different project costs (less than 10.000 to more than 5.000.000 euros).

Under different project scopes, three contextual variables were studied: ‘type of deliverable produced’; ‘technical innovation’; and ‘similarity of projects”. However, on the variable ‘similarity of projects' no differences were observed (respondents were asked if the projects they usually work on are similar to one another –‘fairly similar’ or different – ‘quite different’).

Note that the variable ‘type of deliverable produced’ by the respondent’s typical project was surveyed because an individual working in engineering & construction or business services sector maybe working in IT projects. So, when the results from different ‘type of deliverable produced’ were compared, differences were observed under four themes: ‘process, tools & techniques’ (p=0.001); ‘people & organisational learning’ (p=0.003); ‘adopter’ (p=0.028); and ‘routinisation’ (p=0.0029) (Table 7.23). Differences on all of these themes were also observed when the ‘sector of activity’ variable was studied, except on the theme ‘adopter’.

Under the theme ‘process, tools & techniques’ the Tukey test shows differences between IT/ engineering & construction (p=0.008); and IT/other (p=0.020). Respondents from IT project types score higher PMIIs under the theme 'processes, tools & techniques' than respondents with engineering & construction project types. Maybe for the same reason already mentioned under the contextual variable ‘sector of activity’ of the organisation.

Furthermore, under the theme ‘people & organisational learning’ the Tukey test shows differences between business services/ engineering & construction (p=0.015); and business services/ IT (p=0.001). Respondent from business services projects score higher PMIIs under the theme ‘people & organisational learning’ than respondents from engineering & construction and IT projects, as well as, in the theme ‘adopter’ from other project types. This might indicate that business services projects are much focused on people than, for example, engineering & construction, which might be more focused on the project’s product deliveries.

Additionally, under the theme ‘routinisation’ the Tukey test shows differences between business services/ IT (p=0.037). Respondents from business services project types score lower embedding factors under the theme 'routinisation' than respondents from IT project types. No straightforward reason was found which may justify this difference.

Lastly, when comparing the results from project scope variable ‘technical innovation’ (three categories surveyed: high level of innovation; low level of innovation; and standard product and technology) differences were identified under three themes ‘people & organisational learning' (p=0.028); 'general management system' (p=0.026); and ‘communication & influence’ (p=0.015).

Under the themes 'people & organisational learning' and 'general management system' the Tukey test shows differences between standard product and technology/ high level of innovation (p=0.022) and (p=0.023) respectively. Respondents with a standard product and technology project scope score lower PMIIs under the themes: 'people & organisational learning' and 'general management system' than respondents with a high level of innovation project scopes. This might indicates that as higher is the project scope level of innovation the PMIIs under these two themes plays a more critical role on improving PM practice.

Under the theme 'communication & influence' the Tukey test shows differences between the standard product and technology/ high level of innovation (p=0.030); and standard product and technology/ low level of innovation (p=0.031). Respondents with a standard product and technology project scope tend to score lower embedding factors under the theme 'communication & influence'. This might indicate that respondents from projects with a high level of project innovation tend to value more communication, which is in fact not a surprise.

Summarising, the One-Way ANOVA showed that the improving and embedding themes are dependent on organisational context, namely: sector of activity, geographic location, organisation size and project scope. There were no observed differences related to project duration and cost. The themes where more differences were observed when the contextual variables were studied were two improving themes: 'processes, tools & techniques' and 'people & organisational learning'; and one embedding theme 'routinisation'.

Additionally, analysis was undertaken of dependency of the improving and embedding themes on some respondent characteristics, including demographics, such as: primary role, PM experience, level of education, gender and age.

Table 7.26 shows the results of ANOVA and Table 7.26 presents the results of the post-hoc Tukey test.

The summary of the differences results under the improving and embedding themes relating to different respondents' characteristics (Table 7.25 and 7.26) are presented below.

- **Primary role**

When the results from different primary roles (portfolio and programme manager, project manager, team member, functional manager, director, and other) were compared, differences were observed under three themes: 'people & organisational learning' (p=0.017), 'general management system' (p≈0.000), and 'communication & Influence (p=0.036) (Table 7.25).

Table 7.25: ANOVA results on the themes for improving and embedding and the respondents' characteristics

Context variable	Processes, tools & techniques	People & organisational learning	General management system	Adopter	Inner context	Outer context	Communication & influence	Implementation	Routinisation
Primary role	-	.017	≈.000	-	-	-	.036	-	-
PM experience: project manager	-	-	.006	-	-	-	.014	-	-
Education Level	-	-	-	-	-	-	-	-	-
Gender	-	-	-	-	-	-	.001	-	-
Age**	-	-	-	-	-	-	.008	.029	-

** It was not possible to conduct the Tukey tests to analyse the differences on the original 5 categories, because the group respondents up to 25 has fewer than two cases. Therefore, it was grouped the two categories up to 25 and 25-29, resulting on the category up to 29.

Table 7.26: Tukey test results for differences in means on the themes for improving and embedding and respondent's characteristics

Respondent Characteristic	Theme	Category1 (Group1)	Category2 (Group2)	Tukey
Primary role	People & organisational learning	Project manager	Director	.017
	General management system	Team member	Project manager	.002
		Team member	Portfolio and programme manager	≈.000
		Team member	Director	.001
	Communication & influence	Team member	Portfolio and programme manager	.004
PM experience: Project Manager	General management system	More than 16 years	4-6 years	.023
	Communication & influence	More than 16 years	1-3 years	.021
			4-6 years	.021
Gender	Communication & influence	Female	Male	-
Age	Communication & influence	50 years old and over	Up to 29	.017
	Implementation	40-49	Up to 29	.039
		40-49	50 years old and over	.040

Under the theme ‘people & organisational learning’ the Tukey test shows differences between project managers/ directors (p=0.017) (Table 7.26). Directors scored higher those PMIIs under the theme ‘people & organisational learning’ than project managers. This might happen because directors are more business orientated and people oriented than project managers. In some projects, project managers still have an important role on the projects’ technical issues, which perhaps does not let them see clearly the importance of people in the whole process.

Additionally, under the theme ‘general management system’ the Tukey test shows differences between team members/ project managers (p=0.002); team members/ portfolio and programme managers (p≈0.000); and team members/ directors (p=0.001). Team members scored lower those PMIIs under the theme ‘general management system’ than the other roles mentioned above. Perhaps, because team members have a more operational view and not see the importance of management issues, under the theme 'general management system’, such as, the ‘development of a supported infrastructure’, the ‘PM professionalisation’ or the ‘establishment of a PM career path for all PM roles’.

From the interviews research phase, it was realised that team members, as expected, are more technically focused and more ‘soft’ PMIIs were not even raised by them.

Lastly, under the theme ‘communication & influence’ the Tukey test shows differences between team members/ portfolio and programme manager (p=0.004). Team members scored lower those embedding factors under the theme ‘communication & influence’ than portfolio and programme managers. In the same line of argument, team members are not so sensitive to the importance of ‘communication & influence’, for example, the factor ‘stakeholders involvement’ in the design and implementation’ process of a PMII.

- **PM experience**

When comparing the results from different PM experiences, differences were observed under two themes: ‘general management system’ (p=0.006), and ‘communication & Influence (p=0.014).

Under the theme ‘general management system’ the Tukey test shows differences between more than 16 years / 4- 6 years of experience (p=0.023). Respondents with a high PM experience (more than 16 years) tended to give higher scores PMIIs under the theme 'general management system' than people with less PM experience, particularly those with 4-6 years of PM experience. More experienced PM professionals tended to give more importance to the ‘soft’ side of PM than to the ‘hard’ side of PM. Therefore, PMIIs as for example, the ‘development of a project sympathetic organisation’ or the ‘PM professionalisation’ are much more sensitive for more experienced professionals.

Moreover, under the theme ‘communication & influence’ the Tukey test shows differences between more than 16 years / 1-3 years and 4- 6 years of experience (p=0.021). Respondents with a high PM experience (more than 16 years) tended to score higher embedding factors under the theme ‘communication & influence’ than respondents with less PM experience, 1 to 6 years of PM experience. Maybe, because from their past experience, they understood how important is the involvement of people on the embedding process of a PMII.

- **Education level**

Respondents come from all different levels of education from just a technical qualification to a doctorate degree. Moreover, there were no significant differences in their responses to any of the improving and embedding themes. This might indicate that in the PM profession it is not the level of education that makes the difference, but PM experience.

- **Gender**

When comparing the results from male and female, differences were only observed under the theme ‘communication & influence’ (p=0.001). Female respondents tended to score higher embedding factors under the theme 'communication & influence' than male respondents. For example, as argued by Venkatesh et al. (2000), women are more influenced than men from the claims by peers or other referents and availability of adequate support - embedding factor ‘opinion leaders and key support facilitators’ under the theme ‘communication & influence’.

- **Age**

When the results from different ages intervals were compared, differences were observed under two themes: 'communication & influence' (p=0.008) and 'implementation' (p=0.029).

Under the theme 'communication & influence' the Tukey test shows differences between 50 years old and over/ up to 29 (p=0.017). Respondents over 50 years old tend to score higher embedding factors under the theme 'communication & influence' than respondents up to age 29 years. This might indicate that more experienced PM professionals tend to focus more on people, and give more importance on how to communicate and influence them.

Additionally, under the theme 'implementation' the Tukey test shows differences between 40-49 years old/ up to 29 and over 50 years old (p=0.039) and (p=0.040) respectively. Respondents within the category 40-49 years of age tended to score lower embedding factors under the theme 'implementation' than people up to age 29. This might indicate that younger PM professionals give more importance to how the implementation process of a PMII is conducted than more experienced people. However, PM professionals over 50 years of age also tended to give higher scores to embedding factors under the theme 'implementation', which blurs this analysis.

In summary, One-Way ANOVA showed that the improving and embedding themes are dependent on respondent's characteristics, namely: primary role; PM experience, gender and age. There were only no observed differences in respect of the education level of respondents. The themes where more differences were observed when the respondents characteristics were studied, were the embedding theme 'communication & influence' and the improving theme 'general management system'.

7.9 Summary

Factor Analysis allowed the construct validity of the conceptual 'revised framework' to be assessed. During quantitative analysis, some of the PMIIs and embedding factors were re-categorised into different improving and

embedding themes, initially conceptualised through the qualitative analysis (interviews). This resulted in a 'draft proposed framework'.

Although a lengthy questionnaire was created, it was necessary to incorporate multiple issues in some questions to avoid an excessive number of factors investigated. Ideally more questions might have been included relating to developing a PM culture in the organisation, since this concept did not emerge from quantitative analysis.

Recognising the potentially Portuguese biased perspective of the interview based 'revised framework', the factor analysis was undertaken twice, first with the whole worldwide set of questionnaire responses and second with just the Portuguese response (which comprised 41% of the total set of some 800 responses). For each sample set, factor analysis for the improving construct and secondly for the embedding construct was undertaken. Some differences in factor analysis results were identified for the two sets of responses, but the results were substantially the same with each sample set.

Factor Analysis including all the questionnaire response data for improving and embedding construct showed evidence of the distinction between the improving and embedding concepts.

Reliability analyses showed that the questionnaire data was reliable and further analysis could be conducted. Pearson's correlation coefficients were used to identify the main correlations between the improving and embedding themes. Consistent with the expectation of the researcher, each of the improving themes were correlated with each of the embedding themes, except in three cases: 1) 'process, tools & techniques' / 'outer context'; 2) 'process, tools & techniques' / 'implementation' and 3) 'general management system' / 'outer context'. Furthermore, a One-Way ANOVA showed that the improving and embedding themes are dependent on:

- organisational context, namely: sector of activity, geographic location, organisation size and project scope. There were no observed differences on different project durations and costs.
- respondent's characteristics, namely: primary role; PM experience, gender and age. No differences were observed solely on the education level.

The following chapter draws conclusions from the analysis and offers recommendations for practice and further research.

8. Conclusion

The concluding chapter presents a summary of the main findings of the research, some reflections on the research process, and discusses the contribution of this research both to PM knowledge and to PM practice. Finally, the chapter also presents the limitations of this research and identifies Organisations can also explore the use of distance based education. As Thomas and Mengel (2008) argued distance education (i.e. Web based education) provides an ideal approach for many practicing projects managers.

Organisations can also explore the use of distance based education. As Thomas and Mengel (2008) argued distance education (i.e. Web based education) provides an ideal approach for many practicing projects managers.

8.1 Conclusions

This research focused on the development of a framework to embed useful PMIIs in organisations. The framework has been developed in four main steps:
1. An 'initial framework' of key PMIIs and key factors to embed PMIIs, derived from the literature and the researcher's professional experience, comprised of fifteen key PMIIs and thirty two key embedding factors, with PMIIs and factors categorised into themes based on the literature.

2. A 'revised framework' constructed following an exploratory study consisting of thirty semi-structured interviews with specialists in different levels of the organisational hierarchy (directors, portfolio, programme managers, project managers, and team members), from seven companies. Analysis of this interviews data: (a) identified three new PMIIs and ten embedding factors; (b) confirmed twelve PMIIs and sixteen embedding factors; (c) merged into other PMIIs three PMIIs, and five embedding factors, and (d) discredited eleven embedding factors, resulting in a modified total of fifteen PMIIs and twenty six embedding factors.

3. A 'draft proposed framework', derived from the data analysis obtained from a worldwide web-based questionnaire prepared to explore and confirm the structure of the 'revised framework'. The questionnaire survey confirmed all the key PMIIs and key embedding factors presented in the 'revised framework',

however some of the PMIIs and factors were re-categorised into different themes based on the survey data analysis.

4. A 'proposed framework', the final outcome of this Ph.D. research, derived from the consolidation of interviews data analysis and questionnaire survey data analysis. The consolidation of the findings was a straightforward process because, as referred, the questionnaire survey confirmed most of the conceptualisation resulting from the interview analysis ('revised framework'). However, during the survey analysis three variables (questions), pertaining to tailoring of the PMIIs: 1. 'corporate standardisation and tailoring of PM processes', 2. 'corporate standardisation and tailoring of PM tools & technique' and 3. 'corporate standardisation and tailoring of PM information system', were excluded from the quantitative analysis, since the researcher suspected that the participants understood tailoring as something that each project manager might do when is using PM processes, meaning that instead of using standard PM processes, he/she should tailor the processes to the specific project's needs. However, the meaning of tailored suggested during the interviews is that the standardisation of PM processes, tools and techniques must also be carefully tailored to different projects categories existing in the organisation, i.e. 'one size does not fit all'. Therefore, the word 'tailoring' was eliminated from the 'draft proposed framework', and included again in the final 'proposed framework', since the interviews heavily emphasised the importance of tailoring on improving PM practice.

Summarising, the 'proposed framework', presented in Figure 8.1, incorporates the initial PMIIs and embedding factors listed from the literature review, modified to reflect the alterations suggested from the programme of interviews, and clarified by the questionnaire results.

The semi-structured interviews and the questionnaire survey were also conducted in order to answer **the first research question: *What are the most useful PM practices?*** A total of 68 tools and techniques were surveyed. The results show a variation in the perceived level of benefit that PM professionals obtain with the use of the specific tools and techniques on PM performance. For all tools and techniques the mean values range between 3.01 and 4.33. The median is 4 for most of the tools and techniques (84%), as also the mode is 4 for 86% of the tools and techniques, which evidences the positive direction of respondents' answers. The standard deviations show low values which

indicate a low variability of answers. The ten top tools perceived as the most useful were:

1. Progress report
2. Requirements analysis
3. Progress meetings
4. Risk identification
5. Project scope statement
6. Kick-off meeting
7. Milestone planning
8. Work breakdown structure
9. Change request
10. Project issue log.

The set of the top most useful PM practices identified from the questionnaire survey (Table 6.2) were largely similar to the set identified from the interviewees (Table 7.3). However, in the questionnaire survey results other PM practices get also high significance such as: project issue log; Gantt chart; client acceptance form; activity list; project statement of work and qualitative risk analysis.

Figure 8.1 answers two main and following research questions of this study:

- **The second research question:** ***what PMIIs have the higher impact on the improvement of PM practice?*** 15 key PMIIs were found, grouped by the factor analyses, of questionnaire data, into three PMII themes: 'process, tools and techniques', 'people and organisational learning', and 'general management system', presented at the top of Figure 8.1.
- **The third research question:** ***How can we increase the embeddedness of PMIIs into organisations in order to improve project management performance?*** The research identified 26 embedding factors, that can act as levers to be used by organisations in devising strategies to promote embedding PMIIs into their systems, also grouped by the factor analyses into six embedding themes: 'adopter', 'inner context', 'outer context', 'communication and influence', 'implementation', and 'routinisation', presented at the bottom of Figure 8.1.

At the beginning of the research conceptualisation, the researcher was hoping to come up with a short list of relevant embedding factors, on which professionals should focus their attention. However, the results of the

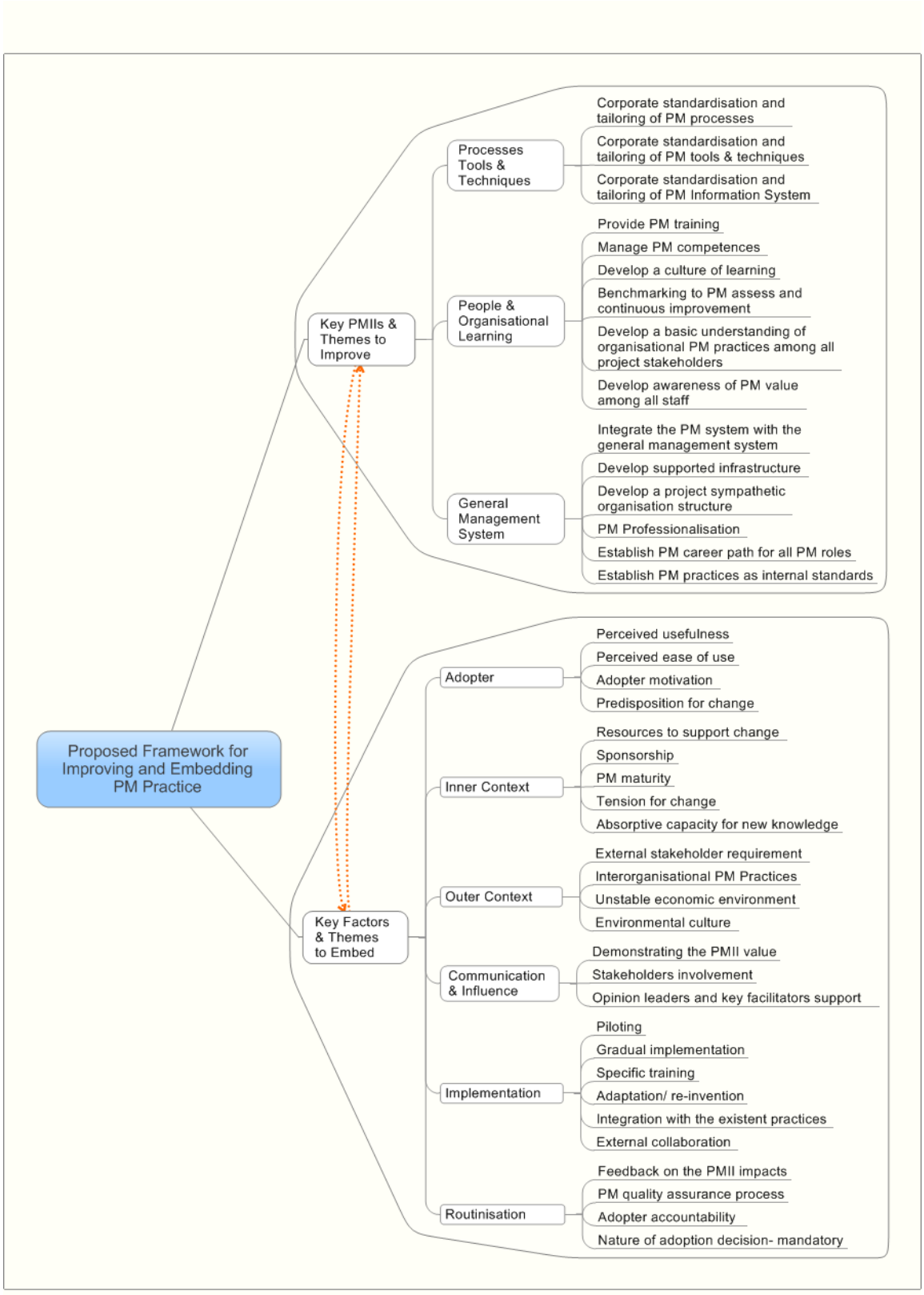


Figure 8.1: 'Proposed framework' for improving and embedding PM practice

empirical work show that the concept of embedding PMIIs is complex, and cannot be reduced to a small and well established list of factors. It may be argued that even the present list of embedding factors and PMIIs is not detailed enough.

The analysis of the questionnaire data also allowed the researcher to answer **the forth research question:** ***How are the identified key PMIIs and key factors to facilitate embedment related?*** The answer to this question suffered limitations, discussed in the Section 8.6 – Limitations of the Research. The Pearson's correlation coefficients were used to identify the main correlations between the improving and embedding themes, and not between the PMIIs and embedding factors. Consistent with the expectation of the researcher, each of the improving themes were correlated with each of the embedding themes, except in three cases: 1) 'process, tools & techniques' / 'outer context'; 2) 'process, tools & techniques' / 'implementation' and 3) 'general management system' / 'outer context'. An attempt to explain these three instances of no significant correlation between improving and embedding themes is made in Section 7.7.

Additionally, the questionnaire data allowed to answer **the fifth research question:** ***How does the set of key PMIIs and the key factors to facilitate PMIIs embedment vary in different organisational contexts (industry, size, geographic location and project type) and in demographics (primary role, PM experience, level of education, gender and age)?***

There were only no observed differences in respect of project duration and cost. Table 8.1 shows a summary of the dependencies spotted on the data analysis. For example, respondents from IT sector perceived more relevance of the PMIIs under the improving theme 'processes, tools & techniques' than the sectors engineering & construction and telecommunications.

The results presented add further information for organisations interested in increasing their performance in the management of projects, by giving priority to PMIIs and focusing their attention on the embedding factors, taking into account the organisational contextual variables. For instance, organisations from the IT sector might give more attention in the embedding process to factors under the theme 'routinisation' than the industrial services sector, or organisations from African countries might give more focus to factors under

the theme 'outer context' than countries from Europe, North America, Middle East and Australia.

Table 8.1: Summary of themes for improving and embedding dependency on the organisational contextual variables

Contextual Variable	Category (group)	Perceived relevance	Of the PMIIs/factors under theme	Category (group)
Sector of activity	IT sector	more	'Processes, tools & techniques'	• Engineering & construction • Telecommunications
Sector of activity	IT sector	more	'Routinisation'	• Industrial services • Telecommunications
Sector of activity	Industrial services sector	less	'Communication & influence'	• Business services • IT
Organisation size	Micro organisations	more	'People & organisational learning'	• Small • Medium • Large
Organisation size	Large organisations	less	'Implementation'	• Micro • Small
Geographic location	Africa countries	more	'Outer context'	• Europe, • North America, • Middle East countries • Australia
Geographic location	Central and South America countries	more	'Outer context'	• North America
Project scope: type of delivered produced	IT sector	more	'Processes, tools & techniques'	• Engineering & construction
Project scope: type of delivered produced	Business services	more	'People & organisational learning'	• Engineering & construction • IT
Project scope: type of delivered produced	Business services	more	'Routinisation'	• IT
Project scope: technical innovation	Standard product and technology project scopes	Less	'People & organisational learning' and 'General management system'	• High level of innovation projects
Project scope: technical innovation	Standard product and technology project scopes	Less	'Communication & influence'	• High level of innovation projects • Low level of innovation projects

The key PMIIs and factors/themes to embed PMIIs are also dependent on the respondents' characteristics, namely: primary role; PM experience, gender and age. Only the respondents' education level showed no observed differences. These results (for detailed information see section 7.8) might also help organisations in the process of improving and embedding PM practice by taking into account the characteristics of their resources.

8.2 Reflections on the Research Process

The results of the research indicate that the 'proposed framework' is a useful analytical tool that can help explain how organisations can improve and embed PM practice. However, like any conceptual framework, it is a simplification of reality and should be used with caution, not least because of a number of inter-related issues related to the research process itself.

1. Although the research problem was identified during the researcher's professional experience (difficulty of organisations to improve and embed PM practice), defining how to address this problem (research questions and methodology) was a particularly difficult task in the research process. The identification of the research questions, the existent literature addressing the problem, as well as the research methodologies mostly used in scientific valid research, and the most appropriate methodology to answer the research questions, while securing its feasibility (such as access to potential sample, time constraints, etc…) proved to be a time consuming research process, often felt as two steps forward, one step behind.

2. Difficulty in the selection of an appropriate level of decomposition for the conceptual framework developed. In this research study, a reasonably high abstraction level of factor descriptions was adopted. In the improving construct it was necessary to make judgments about how far to distinguish the range of PMIIs. For example, a key PMII identified was 'corporate standardisation and tailoring of PM processes', rather than distinguishing different kinds of process, which each organisation should select dependent on its organisational context. In the embedding construct, the factor 'perceived usefulness', is not broken down further into the components of 'perceived usefulness', in which case a more detailed, second level of discrimination would be needed.

3. The development of the 'initial framework' for the embedding construct adopted an 'innovation lens' perspective and borrowed the concepts of diffusion of innovation from other disciplines, namely from Information and Technology and Health Care Services. The inclusion of PMIIs and embedding factors in the 'initial framework' was based on the researcher's judgment of their relevance on literature and practice. A different researcher setting out to answer the same research questions might have produced a different 'initial framework'. A different set of primary sources might have been identified, and different judgments made about their quality and relevance. This is an inherent characteristic of any review that addresses complex interventions and seeks to unpack the nuances of their successful implementation in different social, organisational, or environmental contexts (Greenhalgh et al. 2004). For example, Chan and Thong (2009) developed a conceptual framework for the acceptance of agile methodologies (e.g. SDM, Scrum, XP), and adopted a knowledge management perspective, selecting a different set of primary sources. Another example, the researcher decided not to include factors addressing 'environment', such as "sociopolitical climate", incorporated in Greenhalgh's conceptual framework, one of the main theoretical foundations for the development of the 'initial framework'. The evidence for the impact of environmental variables on organisational innovativeness is sparse and heterogeneous, with each group of researchers exploring somewhat different aspects of the 'environment' (Greenhalgh et al. 2004).

4. During the interview phase of the research, the researcher, although having some experience in conducting interviews as a consultant, experienced difficulty in effectively managing interviews. For example, how to better manage periods of silence, and when to prompt interviewees further. Or how to maintain an interviewee's focus on interview questions rather than rambling reflections on their problems.

8.3 Theoretical Contributions

There are four main theoretical contributions of this research. Firstly, this research builds knowledge in the area of embedding PM, for which there is limited understanding (Cranefield & Yoong, 2009). Even the word 'embedding' is scarcely used in PM literature, perhaps because there is a common notion

that if an organisation is improving its PM practices such PM practices must be successfully embedded in the organisation. However, this research conceptualises and provides empirical evidence that *improving* and *embedding* are different constructs. The research examines the problem of improving and embedding PM practice using a 'success factor' approach, and identifies a set of key PMIIs and factors that can influence the embedding of these initiatives in organisations, based on empirical work.

Secondly, the research formulates the embedding construct by drawing on existing knowledge about diffusion; dissemination; implementation and routinisation from information and technology tools; and new practices in the Health Care Services, and by considering how these ideas may apply to the embedding of PM practice construct. In doing so, the research project adopted an "innovation lens" perspective, which is itself a relatively novel approach. Most of the literature on diffusion of innovation has treated innovations as technology innovations and makes heavy use of a technology adoption perspective focused on adopter related factors (Chan & Thong, 2009). However, this research has identified other important factors beyond adopter related factors related to: inner context; outer context; communication and influence; implementation; and routinisation. By incorporating a more diverse group of factors into the framework, the research provides a more complete understanding of the embedding process of PMIIs (see Figure 8.1).

Thirdly, the results of this research study contribute to the contingent approach to PM. It is widely accepted that practice varied contextually (Besner & Hobbs, 2008; Thomas & Mullaly, 2008; Cooke-Davies et al. 2009). This research provides both a validation of this approach and adds empirical evidence that the PMIIs and embedding factors are dependent on the different organisational contexts, namely: sector of activity, organisation size, geographic location, and project scope. Therefore, as discussed in section 8.1 organisations might take into account the referred contextual variables on improving and embedding PM practice.

Finally, the conceptual framework, beyond its relevance for practice discussed in the following section, can be also a foundation for future empirical research. The framework has been validated by quantitative analysis of the survey data; however, further validation through the use of case studies in order to highlight contextual variables is warranted.

Conclusion

The ‘proposed framework’ is not dramatically different from the ‘initial framework’ conceptualised from literature review, suggesting that the empirical work of this research study confirmed most of the previous work, although as referred, this research has borrowed concepts of different research areas, such as information and technology and Health Care services, to build knowledge in the area of embedding PM. However, some differences should be noted, for example:

- the Greenhalgh’s conceptual model (Greenhalgh et al. 2004) included the embedding theme ‘innovation attributes’, included also in the ‘initial framework’ as ‘PMII attributes’, however, during the interview data analysis, the embedding factors identified as attributes of a PMII (e.g. relative advantage, complexity, etc.) were merged in other embedding factors, such as ‘perceived usefulness’ and ‘perceived ease of use’ by the adopter, i.e. the researcher understood from the data that these attributes belong to a different level of discrimination of the embedding factors.
- Greenhalgh et al. (2004) argued that generally, authoritative (mandatory) decisions for adoption may reduce in long term the chance that the innovation is successfully implemented and routinised. However, interviewees asserted the importance of the ‘imposition’ for the use of the new practice, and later the quantitative data from the worldwide questionnaire, confirmed the importance for the embedding process that the adoption decision of a PMII should be mandatory as opposed to optional.
- The Shi’s VAPM framework has identified the development of a PM culture as an important initiative to improve PM practices, which was included as a theme in the ‘initial framework’. However, the theme did not ‘come up’ from the quantitative data analysis, and consequently, it was eliminated from the ‘proposed framework’. For more detail information please follows the section 8.6- Limitations of the Research.”

8.4 Relevance for Practice

The main contribution to practice is the conceptual framework itself. The framework gathers current knowledge on improving and embedding PM practice which can provide guidance to organisations interested in increasing their performance in the management of projects. The framework highlights the need for organisations to focus on key PMIIs, beyond the specific PM tools and techniques, giving some guidance on priority areas, such as the alignment of PM activities with the whole organisation’s activities (for example, the

strategic planning of the organisation should be tightly coupled with the project identification and prioritisation), or the professionalisation of the project manager's role, i.e., project managers who dedicate almost 100% of his/her work to PM activities.

The framework lists a number of facilitating factors that can lead the embedding of PMIIs. While adopter features are an important group of factors to consider (Venkatesh & Bala, 2008), organisations should not neglect a broader perspective which considers inner context-related factors, outer context-related factors, communication and influence-related factors, implementation-related factors, and routinisation-related factors (Greenhalgh et al. 2004). This expanded list of facilitating factors can act as levers that organisations can use in devising strategies to promote embedding of PMIIs into their systems. For example, in respect of adopters embedding can be promoted by:

- educating adopters on the positive benefits of PMIIs (e.g. its usefulness, ease of use and value);
- influencing adopters' motivation by providing incentives (e.g. by emphasising on positive career consequences and availability of top management support);
- informing adopters about the outer context (e.g. by informing about interorganisational PM practices and the unstable economic environment which presses the organisation to become more competitive);
- enhancing the 'absorptive capacity for new knowledge' in the organisation by developing a culture of learning (e.g. by establishing small group meeting rooms, rewarding those who pursue learning and who teach others what they know); and
- implementing initiatives to enhance the ability of their adopters in using PMIIs (e.g. by providing adequate training, external collaboration support, piloting, etc.).

These actions form just one set of actions that organisations can pursue to facilitate the embedment of PMIIs using as guidance the key embedding factors set out in the 'proposed framework'.

This research also gives some guidance to professionals on which PMIIs and embedding factors should they focus on, more dependent on different organisational contexts, namely sector of activity, organisation's size,

geographic location and project types. For example, questionnaire respondents in the sector of Industrial services did not perceive embedding factors under the theme 'communication & influence' as important as did respondents in the sectors Business services and Information and Technology. This might be the case because, in general, industrial organisations are much more process oriented than people oriented. However, the 'proposed framework' also has important limitations discussed in detail in section 8.6.

Finally, this research also contributes to professional community by setting priorities for improving PM performance. Organisations and practitioners can identify ways to develop and enhance their PM practice by examining the tools and techniques identified in this study as the perceived most useful for increased contribution to PM performance.

Guidance on application of the conceptual framework

To develop some practical guidance on how practitioners could make use of the developed conceptual framework, an EXCEL template was created (see Appendix G). In respect of the embedding construct, the main idea is to use a weighting system to identify a score of readiness for embedding or stage of preparation "to make the things work", and plan a group of actions in order to enhance the effect of the embedding factors. In respect of the improving construct, the idea is to use a weighting system in order to identify a score of PM maturity level, regarding the 15 PMIIs identified in the framework. The process of identification of the PM maturity level is similar to other existent maturity models, such as the Organisational Project Management Maturity Model (Project Management Institute, 2013b). The main difference is the variables assessed, which are just the 15 key PMIIs. Additionally, prioritise the initiatives regarding their state and the organisational context, and plan a set of actions in order to embed the PMII in the organisation.

Embedding Construct

The following steps are suggested with a group of stakeholders involved in the embedding process of PMIIs. Embedding is a process rather than an event, with different concerns being dominant at different stages of the process (diffusion/ dissemination, implementation and routinisation) (Larsen & Myers, 1999).

1st step: Appraise stakeholders involved in the embedding process of all the key embedding factors in the framework that can potentially influence the embedding process of a PMII. This could be facilitated, for example, through a training course on the use of the conceptual 'proposed framework' for embedding useful PMIIs.

2nd step: In a given context, prioritise the relevance of the embedding factors, giving each one a weight between 0-100%.

3rd step: Using a 5-Likert scale, score the framework embedding factors that have influence during the *dissemination process* of a PMII, under the themes: 'adopter', 'inner context', 'outer contex' and 'communication & influence'. Answer the questions: Can these embedding factors be enhanced? If yes, answer the question: How can we enhance the effect of this factor in the embedding process of this particular PMII? Define actions.

4th step: Using a 5-Likert scale, score (or re-score) the framework embedding factors that have influence during the *implementation process* of a PMII. That is, relating to the themes: 'adopter', 'inner context', 'outer context', 'communication & influence', and 'implementation'.

5th step: Using a 5-Likert scale, score (or re-score) the framework embedding factors that have influence during the *routinisation process* of a PMII. That is, score the embedding factors, relating to the themes: 'adopter', 'inner context', 'outer context', 'communication & influence', 'implementation', and 'routinisation'.

Periodically monitor the actions taken to enhance the effect of each embedding factor in each stage of the embedment process. For example 'perceived usefulness' of a PMII, may be scored low at the beginning of the embedding process but after actions taken, could be scored high indicating that no more actions that have directly impact on 'perceived usefulness' are needed or would have impact on the embeddment of the PMII. Additionally, re-assess the relevance of each factor (0-100%), since as refered before, embedding is a process rather than an event, and different concerns are dominant at different stages of the process.

Improving Construct

Similar to the embedding construct, the following steps are suggested to be made with a group of stakeholders involved in the improving PM practice:

1st step: Appraise stakeholders involved in the improving process of all the key PMIIs in the framework, which would improve PM practice.

2nd step: Prioritise the relevance of the PMIIs for the organisation, giving each one a weight between 0-100%.

3rd step: Using a 5-Likert scale, score all key PMIIs, in order to get an overall position of the actual state of the organisation in relation to the 15 key PMIIs (the improving construct of the framework could work as a PM maturity model).

4th step: Select the PMIIs your organisation will handle. Note that a gradual implementation of PMIIs is important in order to better manage the expectations and benefits of each PMII. Additionally, answer the question: What are the main actions for operating these PMIIs in your organisation? Define actions.

5th step: Depending of the assessment period established (3, 6 or 12 months) re-assess the relevance and re-score each PMII and go back to **step 4th**.

This approach has some limitations, namely the subjectivity of the weighting system, and because of that it is suggested that this process should be conducted by a group of stakeholders.

8.5 Methodological Contributions

Most survey researches have a problem to obtain responses to questionnaires. The researcher recognised up front that this could be a problem, so she put a big effort into the process of identifying potential questionnaire respondents and collecting responses, to ensure a “good” number of responses. Therefore,

the researcher conducted the following steps, which could be useful for future similar research projects, namely using the 'snowball' technique for sampling:

- Build a good initial list of contacts. To create this list the researcher looked for several sources, namely:
  i) personal contacts that the researcher had been gathering through her professional career;
  ii) LinkedIN contacts. Besides, the researcher previous connections, the researcher invested, time and money through this platform, inviting individually PM practitioners to connect to her networking and to participate in the study;
  iii) contacts from delegates at conferences. The researcher, during a conference presentation of the research study, asked delegates to indicate their interest in participating in the study, through a questionnaire leaving their email contacts. In this way, she was getting the promise of potential respondents to participate in the questionnaire;
  iv) interviewee contacts. In this particular research, a qualitative research phase was previously conducted, and the participants, after this research stage, were immediately encouraged to participate in the quantitative research phase, by responding to a questionnaire;
  v) contacts from members of PM associations, including the US based Project Management Institute (PMI) with a large number of Chapters dispersed around the world, and the International Project Management Association (IPMA), collected via the PM association websites.

  The import lesson learnt here is to invest the necessary time and money in the creation of the initial list of contacts, and become creative in looking for uncommon sources of participants, as in this research, we used namely the LinkedIN database, or the direct invitation of a conference delegates during a presentation.

- Advertise the survey as much as possible. The researcher advertised it, namely through:
  i) PM associations. Over 300 PM associations were asked to advertise the survey to their members and invite them to consider taking part personal. Inclusively, the researcher also went through the process of

the Global PMI Research Programme in order to post the survey link directly on the website pmi.org.

ii) LinkedIN groups. The invitation to participate in the study was posted in several LinkedIN PM groups.

- Maintain personal 'on-line' contact with respondents and potential respondents, asking them, individually, to advertise the survey to people that they understood could bring valuable contribution to the research project. Most of the time consumed by the researcher during the data collection phase was on this activity. This proved to be an effective way of increasing the number of responses obtained.

8.6 Limitations of the Research

A main limitation of the developed framework relates to its practical contribution to PM professionals.

1. From the list of the fifteen PMIIs, what initiatives should organisations embed first and in what order? Organisations may select the initiatives that were emphasised by more interviewees, or that scored highest in the questionnaire survey, or select the ones that they feel more 'comfortable' to deal with faster. This is an important limitation on the application of the conceptual framework, which requires potential users of the framework to subjectively prioritise the relevance of the PMIIs and embedding factors for the organisation. The process of choosing the priorities of PM practice to develop in an organisation is, therefore, very complex, because many dimensions of context must be considered simultaneously, and several of the contextual effects may be even contradictory. To overcome this limitation further work is recommended in the following section.

2. Although the framework suggests a lengthy list of possible factors pertinent to embed PM practice, none of these can be thought of as a simple variable. Most of the factors interact with other factors. Therefore, the number of possible interactions is extremely high and the nature of interactions is likely to be highly contingent on the PMII and the organisational context. Therefore, it is not possible, nor will it ever be possible, to provide prescriptive and transferable recommendations on how different factors of the framework

will interact with one another in a particular situation. Rather, such interactions might best be explored in relation to the embedding of particular initiatives using an open-ended question format by the users of the framework. For example, interaction between 'key facilitators support' and 'perceived ease of use': How does a particular adopter perceive that the existence of key facilitators to support the use of particular PMII will in turn ease the use of this particular PMII (and can he or she be supported to change these perceptions)?

3. The identification of the key PMIIs and embedding factors on the framework and the most useful PM practices are mostly based on the perceptions of practitioners involved in the interviews and the questionnaire research phases. Therefore, further work on validation of the framework through its application in case studies is warranted. The objective would be to test the real value added for the application of the framework, on organisations that are involved in the process of improving their PM practice.

4. The conceptual framework developed for embedding useful PMIIs is limited to the management of 'individual projects' (see section 2.2.4). However, the extension of the framework to embrace the worldview of PM (i.e. project, programme and portfolio management) might bring theoretical and some practical contributions.

5. The research needed to weigh practical considerations about what information could be obtained against objectives for the research. This was particularly apparent with the questionnaire survey design. Although a lengthy questionnaire was produced, ideally more questions might have been included relating to developing a 'PM culture' in the organisation. 'PM culture' is a complex theme and the decision was taken not to further extend the questionnaire with a long section of questions to explore this theme. Consequently, it is difficult to know whether 'PM culture' is a complex and vague concept that is strongly correlated with the other themes, as the quantitative analysis suggests, or the theme did not 'come up' because the questionnaire design was lacking in coverage of PMIIs exclusive to this theme. Further research work might explore the concept of 'PM culture' more explicitly.

6. The quantitative analysis of the questionnaire data suffered some limitations due to the high number of PMIIs and embedding factors to be analysed, when

answering the fourth research question: *How are the identified key PMIIs and key factors to facilitate embedment related?* The correlation analysis was conducted between the improving and embedding themes rather than individual PMIIs and embedding factors. A lengthy list of PMIIs and embedding factors (15 PMIIs and 26 embedding factors) led to this decision. The analysis under so many items would have been very complex with a correlation matrix of 15 by 26, resulting in the analysis of 390 correlation coefficients. However, a theme based analysis procedure, resulting in 3 improving and 6 embedding themes, allowed some simplification. The same decision was made to answer the fifth research question, where for which the analysis was performed under the improving and embedding themes. Additionally, during the questionnaire design process, questions regarding the level of maturity of the organisation were not included because it was understood that many participants would not be able to meaningfully classify their organisation's PM maturity level. However, it would have been a theoretical contribution to add information in order to ascertain if the key embedding factors are dependent on different PM maturity organisational contexts.

8.7 Suggestions for Further Work

The results presented in this research study are exploratory. As is often the case with exploratory research, the results open up many avenues for future research (Besner & Hobbs, 2012). Table 8.2 briefly summarises the suggestions presented in the following paragraphs.

Table 8.2: Avenues for future research

1. Test the explanatory power of the framework
2. Understand if there are some PMIIs and embedding factors that might usefully precede others
3. Study if the relevance of the embedding factors varies for embedding different PMIIs
4. How organisations can enhance the effect of the embedding factors
5. Explore what are the key PMIIs to develop a PM culture in organisations
6. Study if the key PMIIs and key embedding factors are dependent on strategic context
7. Explore the implications, advantages and even some drawbacks of the PMII 'PM professionalisation' in organisations
8. Use of confirmatory factor analysis within the framework through structural equation modeling
9. Development of a model to evaluate the degree of embeddedness of a PMII in an organisation

One avenue is to empirically validate the explanatory power of the conceptual framework via case studies in different organisational contexts. Validating the framework through case studies will be very valuable, namely in understanding the weight that different organisations (industry, size, strategy, geographic location, project types) place on different PMIIs and factors in promoting embedding PM practice in organisations. The results of exploratory studies such as this require replication.

A second avenue is to use case studies to understand if there are some PMIIs that might usefully precede others. For example, 'develop awareness of PM value among all staff' might precede 'corporate standardisation and tailoring of PM processes', following the conceptualisation of Shi (2011) on the development of the Value Adding Path Map (VAPM) framework, which indicates the steps to implement PM. Also, if there are critical embedding factors, for example, if there is no adopter's 'perceived usefulness' or 'perceived ease of use' of the PMII, it may not be worth working on the enhancement of other factors, such as 'resources to support change' or 'sponsorship'. The idea here may be to create something similar to the Maslow's hierarchy of needs[25], which would group the factors in different layers, i.e. the factors in the lower layer need to be fulfilled before it is worth working on the factors on the layer

[25] Maslow's Hierarchy of Needs (often represented as a pyramid with five levels of needs) is a motivational theory in psychology that argues that while people aim to meet basic needs, they seek to meet successively higher needs in the form of a hierarchy (Maslow, 1943).

above. Additionally, as discussed during the literature review, embedding is a process rather than an event, which comprises diffusion, dissemination, implementation and routinisation (Greenhalgh et al. 2004). Therefore, the relevance of factors might change during the embedding process, and perhaps would make sense to have a hierarchy or a pyramid of factors for each stage of the embedding process (diffusion, dissemination, implementation and routinisation). This conceptualisation of grouping factors in different layers could be made through the participation of stakeholders involved in the embedding process of PMIIs.

A third avenue is to study if the relevance of the embedding factors varies for embedding different PMIIs. The embedding of a PMII could involve a simple PM technique, such as the work breakdown structure, but also could be the standardisation, in the whole organisation, of a completely different PM methodology, which represents a much more radical change. Therefore, is the relevance of the embedding factors independent of the PMIIs? The use of case studies might be also a useful research methodology to study this issue.

A fourth avenue is to study how organisations can enhance the effect of the embedding factors. In identifying pertinent embedding factors it was necessary to make judgments about how far to distinguish different factors. For example, in the key embedding factor 'perceived ease of use', the framework does not detail the components of 'perceived ease of use'. However, it may be useful for organisations to understand how this factor and the others can be enhanced when embedding a particular PMII. For example, how can we enhance the capacity to absorb new knowledge in the organisation? For instance by knowledge sharing events, appointment of knowledge workers, etc.

A fifth avenue is to explore what are the key PMIIs to develop a PM culture in organisations. During this research study, this theme was not studied in sufficiently detail, and a research question still remain: 'PM culture' is a complex and vague concept that is strongly correlated with the other improving themes or can we identify explicitly the key PMIIs to develop a PM culture in organisations?

A sixth avenue is to study if the key PMIIs and key embedding factors are dependent on strategic context, for example using the strategic categorisation of Cooke-Davies et al. (2009). At the beginning of this research it was

intended to study the strategic organisational context. However, in the research interviews phase was very difficult to define the strategic context of each interviewee's organisation. Therefore, the researcher understood that this variable could not be adequately studied through the methodology proposed, and left it for future work, which might be better conducted, again, by the use of case studies.

A seventh avenue is to explore the implications, advantages and even some drawbacks of the PMII 'PM professionalisation' in organisations. The researcher understood this as a crucial PMII by the strong relevance that experienced interviewees put on it. Additionally, the literature found on the topic is general, focusing on PM being seen as a profession. For example, Muzio et al. (2011) explore patterns of professionalisation in a number of 'new' knowledge-based occupations, namely PM. Zwerman et al. (2004) look for answers to a series of questions, such as: *will PM become a fully recognised profession? What changes can we expect to see as it moves toward this goal?* The authors explore how the future of PM may be discerned in large measure by studying the evolution of other knowledge-based occupations such as nursing, teaching, medicine, law and engineering. The suggestion for further work is on the implications to organisations of having project managers dedicating almost 100% of his/her work to PM activities. For example, *how can organisations reduce the drawbacks of 'PM professionalisation'?* PM professionalisation might imply, at least temporarily, a separation of the PM role from the technical management role, until the development of awareness of the importance of PM amongst all staff in the organisation. Ideally, these two roles should be together, as their separation has some disadvantages, such as: increasing costs and potential conflicts between these two roles.

An eighth avenue for further research is to further explore the large amount of quantitative data collected through the on-line questionnaire survey. For example, the use of confirmatory FA to statistically confirm the postulated underlying structure of the improving and embedding constructs, developed through exploratory FA. One of the most rigorous methodological approaches for testing the validity of factorial structures is the use of confirmatory FA

within the framework of structural equation modeling[26] (SEM) (Byrne, 2001). SEM compared with traditional statistical procedures, can be considered a relatively recent technique, since it has been used for less than 30 years. The most widely used SEM computer programs are: AMOS, EQS and LISREL.

The ninth and final avenue is the development of a model to evaluate the degree of embeddedness of a PMII in an organisation. The development of such model would be a valuable practical and theoretical contribution, although, most probably, this assessment embedding model would result in subjective measures.

The use of case studies suggested should be best applied in organisations which are highly motivated for improving PM practice, since their involvement in the research process might be higher. The use of case studies would highlight contextual factors, as PM is dependent on the organisational context (Thomas & Mullaly, 2008; Cooke-Davies et al. 2009), but might be of less general explanation, i.e. the results from these case studies would not be generalizable.

[26] Ullman and Bentler (2012, p 661) defines Structural equation modeling (SEM) as "*a collection of statistical techniques that allow a set of relationships between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs), either continuous or discrete, to be examined. Both IVs and DVs can be either factors or measured variables*".

Appendices

Appendix A: Interview Documentation

Interview Protocol/ Process

1. General introduction: researcher and study and time available for the interview.

2. The plan is to take notes and if the interviewee agrees record the interview as well.

3. Assure the interviewee that the data collected will be anonymised treated as confidential and that it will be used only for academic purposes.

4. Make it clear to interviewees that they may withdraw from the interview at any time, and in this case any data collected will not be included in the study.

5. Briefing the document will be sent before the interview, and define key PM terms adopted by the study, such as PM, PM practices, PM improvement initiatives, PM performance, and embedding.

6. Questions for interviewees:

- Outline your experience in PM to date.
- Characterise your organisation in terms of business strategy and type of projects.
- Ask to tell stories of their initiatives to improve PM.
- Identify the most useful PM practices that you use or have used.
- Identify the most useful PMIIs, in terms of improving PM performance.
- Identify the factors that might make it easier or more difficult to achieve the diffusion, dissemination, implementation and sustainability, i.e. the embedment, of PM improvement initiatives in your organisation.
- Supplementary questions will be used to prompt more detailed responses to the above questions, if appropriate.

7. Advise that interviewees will receive a summary of the main findings from the interviews.

8. Register date and time, length and place of the interview.

9. In one or two days, the researcher will send by email to the interviewee a resume of the hand notes for his validation and possible additional comments.

Appendix A

Briefing Document

Introducing a study on Improving and Embedding Project Management Practices in Organisations

This study is being conducted by Gabriela Fernandes a Ph.D. student in the Management School at the University of Southampton as part of her doctoral thesis. The supervising faculty member for this study is Professor Stephen Ward. Fundação para a Ciência e Tecnologia in Portugal is funding this work.

Research scope

The purpose of this research is to develop a framework to help organisations to improve and embed project management (PM) practice in an effective way. While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner.

To develop an understanding of these issues, my study seeks to:

- identify the priorities of organisations when they chose to invest in PM practice improvement, and
- identify factors that influence the embedding of PM improvement initiatives into organisations.

The research will involve a detailed assessment of existing literature followed by interviews with practitioners and subsequently, a more widely circulated questionnaire. Currently, I am collecting data from semi-structured interviews, which you have kindly agreed to help me with.

I am hoping interviews would take one hour to one hour and half.

Main Interview Questions

1. Outline your experience in PM to date.
2. Characterise your organisation in terms of business strategy and type of projects.
3. Ask to tell stories of their initiatives to improve PM.
4. Identify the most useful PM practices that you use or have used.
5. Identify the most useful PM improvements initiatives, in terms of improving PM performance.

6. Identify the factors that might make it easier or more difficult to achieve the diffusion, dissemination, implementation and sustainability, i.e. the embedment, of PM improvement initiatives in your organisation.
7. Supplementary questions will be used to prompt more detailed responses to the above questions, if appropriate.

All participants will receive a summary of the main findings from the interviews.

Anonymity and Confidentiality

There are no anticipated risks associated with your participation. All responses will remain confidential and will be reported only in anonymous, summary form in my Ph.D. Thesis and any sub-sequent research articles. You can withdraw from the interview at any time, and in this case any data collected will not be included in the study.

If you have any additional questions about this research before our interview, please feel free to contact me at agf1a09@soton.ac.uk.

Key PM terms adopted by the Study

Project management in this study is seen as the management of an individual project (which excludes programme and portfolio management). Project management is a subfield of management which can deliver the goals of the project – generally the successfully completion of a development product on time, within budget, and in conformance with predetermined performance specifications – through the planning and control of variables, including schedule, cost, resources, risk and quality.

Project Management practices are those tools and techniques that practitioners use to "do the job" to "execute a PM process", as work breakdown structure or earned value management.

Project management improvement initiatives includes the implementation in the organisation of specific project management practices, as tools and techniques that practitioners use to "do the job" to "execute a process"; and the development of activities that would help to improve project management practices, as the standardisation of PM processes, tools and techniques or the designation of formal title and role for those in charge of projects, including their adequate training. Therefore, PM improvements initiatives are defined not

just a very specific tool, but a novel set of behaviours, routines, and ways of working that are directed at improving project management performance and that are implemented by planned and coordinated actions.

Project management performance is focused to the triple constraints, control of time and cost and progress of the project.

The process of embedding a PM improvement initiative (an innovation) into organisations implies the diffusion, dissemination, implementation and sustainability of the PM improvement initiative. Diffusion is the passive spread of innovations, whereas dissemination involves active and planned efforts to convince target groups to adopt an innovation. The implementation of the innovation includes active and planned efforts to incorporate an innovation within an organisation. An innovation is sustained if it is institutionalised and routinely used within an organisation.

A new PM practice embedded is a PM practice that is strongly contextualized (customised or personalised) and integrated with other contextualised management practices in the organisation and there is a sense of 'ownership' facilitated by the staff involvement at all levels.

Consent Form

Study title: Improving and Embedding Project Management Practices in Organisations

Researcher name: Gabriela Fernandes
(PGR student in the Southampton Management School)

Ethics Reference: 2830

Please initial the box(es) if you agree with the statement(s):

I have read and understood the briefing document (19/06/2012 /version 1 of participant briefing document) and have had the opportunity to ask questions about the study.	☐
I agree to take part in this research project and agree for my data to be used for the purpose of this study.	☐
I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.	☐
I agree with to tape record the interview.	☐

Data Protection

I understand that information collected during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of participant (print name)…… ……

Signature of participant……

Date……

Appendix A

Interviewee Hand Notes

Interviewee nº: 6 **Organisation:** 2 **Role:** Portfolio manager	**Date:** 26/07/2012 **Duration:** 40m

1. **PM experience:** About 1.5 years as portfolio manager/ director of the PMO, about 11 years as project manager and around 3 years as team member.
   Highest academic degree: Post-graduation

2. **Organisation and projects characterisation:**
   - Strategic position: need to economics of process – high / need for differentiation – high
   - The PM activities are applied to both external and internal projects
   - Project typical cost: 300.000€
   - project typical duration: 1 to 1.5 years
   - Projects scope: very different
   - Project typical level of technological innovation: high (although varies)

3. **Initiatives over the past few years to improve PM practice:**
   - Establishment of the PM office.
   - Development of a PM career plan.
   - Establishment of a pool of resources dedicated exclusively to PM activities (resources affected to the PMO).
   - Standardisation of the PM processes.
   - Development of tools to support the PM processes (for improving efficiency).
   - Management of the risk budget not only at the project level but also by the different project's technical areas.
   - The project manager became also responsible for the project cost management.
   - Integration of the PM processes with other processes of the organisation, in particular with the financial process, and with the different technical processes.
   - PM training.

- Introduction of agile methodologies - SCRUM (around 2 years ago). It was also necessary to adapt the standardised PM processes to the SCRUM methodology.

4. **Most useful PM Practices:**
   - Progress meetings. Especially for a good understanding of what are the project's expectations.
   - Baseline plan.
   - Updates of the plan (replanning, re-estimation of the project to the reality);
   - Earned value management. EVM is fundamental for my role. I can have the information of the project state with objective measures, without having to get involved in the project.
   - Client acceptance form
   - Kick-off meeting with the client to align expectations.

   Note: The most useful practices are undoubtedly related to monitoring and control.

5. **Key PMIIs:**

All the initiatives accomplished over the past few years to improve PM practice were important improvements in PM practice. Basically, we pass from one situation of not having PM practice at all to applying PM processes for almost all of our projects. Now**,** we only have small improvements where the impacts in PM practice are less significant. However, it would be important to:

- PM maturity level assessment. It is relevant for us to have a more concrete assessment of our PM practices, instead of having just perceptions. For example, we have the perception that we make more management than is needed (over management). We need to seek an appropriate level of management for our different projects (we have a high level of heterogeneity of projects).
- Project categorisation, in order to adjust the management processes to the type of project - tailoring practices by project type. We are presently handling this initiative. It is a challenge that we have at the moment. However, we are tailoring not only the PM processes, but also the technical processes, such as engineering.

- Measure the return of PM practices. It would be interesting to justify certain options taken, to rationalise some decisions.

Supplementary questions:
Do you understand 'to have an automated system to select the most appropriate project manager to a specific project' as a key PMII?

We do not have the need for an automated system to select the most appropriate project manager (upon their competences) to be allocated to a particular project, because we are small. We are only 10 project managers, we have a clear notion of each project manager' competences, and when we need to allocate a project manager, we don't have the universe of 10 to choose, because most of them are already allocated to other projects. Therefore, the decision is not difficult. But, we believe that it would be an interesting improvement for large organisations.

6. Key embedding factors:

- The existence of negative experiences in managing projects. It is necessary to demonstrate to people that the way we were managing projects doesn't work. Emphasising that in past projects which didn't run well, due to not applying the 'best' management practices, because they were not institutionalised.
- Awareness of the top management of the benefits of PM, in order to have PM sponsorship.
- A high organisational PM maturity is important for the embedment of new PM processes.
- Human resources prepared for the use of the practices, which is easier if there is sponsorship. The top management will support the training of people.
- Client requirement.
- It is important to have the participation of someone with relevant practical experience in the application of the particular PM technique. Someone who can speak in the first person of the benefits of the particular technique, and usually this person is not in the organisation.
- The participation in the implementation process of someone outside the organisation is crucial. However, it doesn't dismiss an internal

sponsorship, of someone internally responsible for the practice dissemination, for the change management, who knows well the organisation.

Supplementary questions:

Do you perceive 'complexity' as a key embedding factor?

- Yes, if it is difficult to use, this will be translated into costs. Therefore, it will be more difficult its embeddedness. It is necessary to analyse the benefits, but also the costs associated to the new PM practice, in order to demonstrate the value of the practice.

Do you perceive 'piloting' as a key embedding factor?

- Piloting. It is more than a key embedding factor, piloting a PMII is a prerequisite for any implementation.

Do you perceive 'homophily' as a key embedding factor?

- If there is sharing of vision and ideas, the communication between the adopter and the person responsible for the PM practice implementation will be much easier.

Do you perceive 'adopter involvement' as a key embedding factor?

- The involvement of people is very important. However, it is impossible to involve everyone, but we must engage those who are more available, that have more chances to contribute.

Do you perceive 'interorganisational PM practices' as a key embedding factor?

- The fact that other organisations are using a practice, and that practice is in fashion, is not a strong enough factor to facilitate or hinder the embedment of the PM practice in the organisation. There are other factors with higher weight.

Note: Presently, we are effective in the management of projects. We don't know if we are efficient in all situations. I mean if we could get the same results with less effort.

Appendix A

Interviewee nº: 14 **Organisation:** 4 **Role:** Director	**Date:** 03/07/2012 **Duration:** 2h45m

1. **PM experience:** About 20 years as portfolio manager/ director.
   Highest academic degree: Undergraduate

2. **Organisation and projects characterisation:**
   - Strategic position: need to economics of process – high / need for differentiation – low
   - The PM activities are applied to both external and internal projects
   - Project typical cost: 50.000€
   - project typical duration: 6 months
   - Projects scope: substantially different
   - Project typical level of technological innovation: low

3. **Initiatives over the past few years to improve PM practice:**
   - The development of an adequate organisational structure to support effective PM practices. For example, the person responsible for the project proposal should be responsible for project execution. In the past, we had a salesperson that was responsible for the project proposal; when the proposal was accepted by the client, a project manager, who hadn't had any involvement in the proposal, was assigned. Consequently, as a first obstacle in the project's success, it was the danger that the project manager didn't feel the responsibility to execute the project within the proposal's established objectives. We have also created the role of project manager to the different technical areas of the project, and the role of project leader, that coordinated all the project managers from the different technical areas.
   - The implementation of the 'SITAC' software that later gave rise to the 'SGP'. Primarily, the software was used to record the allocation of the resources' working hours to each project in order to determine the project cost. This information is being used for the management of subcontracts, project macro planning, invoicing and project closing.
   - Improvements in the project time management and human resources. It was and is possible to know online the present and future allocation of

each resource, as well as the estimation of the working hours necessary for each technical competency of the project.

- Standardisation of the PM processes and procedures.
- Quality management system certification. There is an integration of the PM process with the remaining processes of the organisation. The project plan is a requirement of our quality system.
- The weekly 'production' report, which is presented in presential meetings to accompany the progress of all projects in the portfolio. It is discussed with all project managers, their problems and how to solve them. One of the main objectives of these meetings is to develop a team spirit.

4. Most useful PM Practices:

- Clarification of the detailed requirements with the project stakeholders, primarily with the customer
- Kick- off meeting with the project team and the client. Statement of the project's guidelines in person.
- Planning the project divided into the project technical areas (POE – Planning and budgeting the project). Cost and schedule plan by each technical area and macro activity of the project, with the indication of the project manager *per* each technical competence, the duration and estimation of the working hours.
- Periodic progress meetings with the client and with the team, in order to communicate the difficulties and make decisions about the work in progress.
- Online progress reports. These reports have a greater focus on the project cost, with the indication of the hours spent by each resource in the month and the accumulated hours per each macro activity of the project.
- Control of changes.
- Project plan. We call it PQE.
- Keeping the plan updated. Making an initial plan and then do not update it, doesn't serve for anything.
- Earned value management.

5. Key PMIIs:

- Standardisation of the PM processes and general management procedures.
- The creation of an organisational structure that supports the execution of projects – the matrix structure.
- The development of a supported structure to support managers and staff in the implementation of PM practices (such a PMO structure).
- Projects categorisation (e.g. categorisation I, II and III). Tailoring the PM processes in function of the project type. We have projects that have a short duration and it is not even necessary the PQE (project plan).
- Increasing the power of project managers. Although, this power can't be total, because we have a matrix organisation. The projectised organisation is not adequate to us, because of the small size of our typical projects. Resources must be mandatorily shared.
- The assignment of the project leader in accordance to their competences and the competences required by the project and even the client.

Supplementary questions:

Do you understand the 'development of a knowledge management system' as a key PMII?

- Yes. Presently, we have an exponential growth of knowledge. All project information is archived in an organised structure in the server, with online access. It is very important the rapid and online access to the projects information.

Do you understand the 'development of a PM career plan' as a key PMII?

- The career plan and the competences assessment system are very important to motivate people. We have initiated this process a year ago. In paper we have defined the functions by each role and created a career plan. But, we didn't implement this initiative due to the economic situation of our country. It is not possible to ask the organisation for the evolution of its employees in the career, because currently the organisation is even considering cutting people's salary. It doesn't make sense to implement a career plan in practice without perspectives for evolution. It simply doesn't make sense.

Do you understand the 'general PM training to develop PM competences' as a key PMII?

- Training is not the best vehicle for the development of PM competences. It serves only as an awakening to the matter. Room training is not enough to produce changes in PM practice. It is necessary to have a strong self-education and strong commitment of people. People have to feel a need to improve. Hiring people already with PM competences is also not the 'best' way for us to develop PM competences in the organisation. Because our resources create a lot of resistance to the occupation of management positions by new resources. They understand that with their experience, these new and high positions should be taken by them.

6. Key embedding factors:

- The decision for the implementation of a new PM practice, such as the POE, should be mandatory and not optional. Coercion actions should be implemented if project managers do not make use of the PM practice. For example, if the project manager does not fill in the POE the estimation of resources' needs, by different technical areas, it shouldn't be allocated to the project a chief of each technical area, as well as, the technical team.
- Low complexity
- Simplicity = easy to use , objective
- Intuitive and appealing
- Quick use
- Demonstration of the PM practice value. However, the benefit/ cost ratio is very difficult to calculate. It is important for project managers to understand the importance of PM to their work. We have project leaders that feel that PM will not solve their problems; usually they focus their attention on technical problems. We have a more technical focus and not so much on the client. This is the paradigm that we feel we need to change. Most our project leaders are very technical oriented. They need to develop more the PM competences.
- Demonstration of the PM practice value through the use of a pilot, showing the use of the new practice in projects of the organisation.

- Adaptation of the PM software for the usage of some PM techniques. For example, our 'SGP' is not adapted for the usage of the EVM technique. We use Excel sheets to apply EVM to control the project progress.
- Experimentation and observation of the practical application of the PM practice to a real project in the organisation.
- PM culture. Our project leaders and project managers are very technical oriented. These resources came from a technical background and not management background. They do not see how the PM practices will solve their problems (focus on technical issues). This is a problem, because in such cases is very difficult to demonstrate the PM value.
- Relative advantage of what is intended to implement vs. what we already have. For example, when we tried to implement EVM – since the project leaders and project managers already have the information of the project cost deviation almost without effort, because this information is processed by the management control department, they didn't see the advantage of EVM practice.

Supplementary questions:

Do you perceive 'client requirement' as a key embedding factor?

- Yes. This is a very relevant factor. However, for our organisations this factor does not have expression, because usually our clients have a lower level of PM maturity, therefore they are not very demanding, with the exception of few international clients that we have in the industrial area. It would be much easier to embed a new practice if it is simply a client requirement than if it is a top management decision. If it is a project requirement, people simply do it. If it is a management decision they usually tend to say that it is more bureaucracy, which will only increase the project cost.

Do you perceive 'interorganisational PM practices' as a key embedding factor?

- No, it doesn't make sense. It might make sense for example in the field of architecture not in the area of PM.

Do you perceive 'opinion leaders' as a key embedding factor?

- No. In our organisation we don't have a culture of leaders and followers. Each project manager works alone, they don't use to share their practices.

Interviewee nº:19 **Organisation:** 5 **Role:** Project manager	**Date:** 25/07/2012 **Duration:** 58m

1. **PM experience:** About 10 years as project manager, and around 3 years as team member.
   Highest academic degree: Master degree

2. **Organisation and projects characterisation:**
   - Strategic position: need to economics of process – low / need for differentiation – high
   - The PM activities are applied to external projects
   - Project typical cost: 100.000€
   - project typical duration: 3-12 months
   - Projects scope: fairly similar
   - Project typical level of technological innovation: high

3. **Initiatives over the past few years to improve PM practice:**
   - Development of a PMO.
   - PM training and PM certification.
   - The top management recognition of the importance of the use of the institutionalised PM practices in the organisation, such as: weekly status report, follow-up meetings, and the assigning of a PMO officer to support the main projects.
   - Inside of the 'Easy Flow Project' which aims to improve the organisation's processes, we have standardised our processes, including the PM processes.
   - Adoption of the Planview software.

4. **Most useful PM Practices:**
   - Kick-off meeting, to formalise the beginning of the project and to the project's stakeholders meet each other.
   - Weekly progress meetings with the key project stakeholders in the organisation.
   - Project WBS. Important the involvement of the whole team in the preparation of the WBS and the activities' effort estimation.
   - Preparation of the internal weekly status report.

- Follow-up meetings with the client, typically in a weekly basis.
- Definition of the internal and external project milestones;
- The scope management process;
- The change management process, in order to assess the level of the change impact on the project, in terms of costs and duration. This is a process that we still need to improve.
- Risk management, which involves both risk identification and planning responses. This practice must grow with the development of PM maturity level.
- Registration of the lessons learned. What we made right and what we made wrong.

5. Key PMIIs:

All the initiatives accomplished over the past few years to improve PM practice were important improvements in PM practice. However, it would be also important to:

- Have a good understanding of what are the PM practices in the organisation by everyone, in order to be easier for the project manager to interact with the team, and follow the 'best PM practices'.
- The project manager should only perform PM activities, dedicating 100% of their time to PM. It is important the creation of exclusivity for PM activities. Many practices are not used by project managers for lack of time and availability. Because we are requested to make other technical activities, which have higher priority. For example, we have a practice that is the creation of a risk register, in reality; what we do is just to put 1 or 2 risks in the template to comply with the PM process requirement. However, we do not do an effective risk management as required.
- Limit the number of projects in which a person could be involved. Usually, the person's available time is fragmented by many projects, which makes it very difficult to manage.
- Increase the structure to support PM, namely the number of PM officers (people that are dedicate to support the project managers in applying the institutionalised PM practices).
- Improve the resources allocation process to the project. It is almost in a daily basis that the project manager needs to remember the resource that he/she needs to perform a project activity. If the functional

manager asks him/ her to undertake another activity, the resource simply does it, without any negotiation to realise what is more important for the organisation. It is a cultural issue, and cultural issues are very difficult to overcome.

Supplementary questions:

Do you understand 'to have a knowledge management system' as a key PMII?

- The knowledge management is very important. We made the registration of our lessons learned but at a very specific technical level, which is stored knowledge difficult to use in other projects. We need to improve this aspect.

Do you understand 'the empowerment of project managers' as a key PMII?

- The empowerment of project managers is very important; the functional managers are the responsible for our resources. Often these functional managers see the project and the project manager as something negative, who will "steal" them their resources.

6. Key embedding factors:

- Perception that the PM practice is simple to use.
- Sponsorship. Management support to the PM practices usage.
- Availability of resources, time available to the PM practice usage.
- The existence of a PM culture.
- The perceived usefulness, the perception that that practice adds value.

Supplementary questions:

Do you perceive 'piloting' as a key embedding factor?

- The experimentation of the practice in a pilot is important.

Do you perceive 'adopter involvement' as a key embedding factor?

- Yes, the stakeholder's involvement in the implementation process is very important.

Do you perceive 'the existence of opinion leaders' as a key embedding factor?

- Find people who support the use of practices and have the ability to influence others to use it is important; in fact we use it as a strategy for the implementation of PM practices, we call it the PM officers.

Do you perceive 'homophily' as a key embedding factor?

- Yes, it is important that the person responsible for the PM implementation be in some way similar to the project managers.

Do you perceive 'interorganisational PM practices' as a key embedding factor?

- Definitely it would help if the use of the PM practice is in fashion.

Do you perceive 'client requirement' as a key embedding factor?

- The client requirement has much more influence than if the practice is used for our competitors (interorganisational PM practices). I have managed many projects, because the client required a PMP® certified project manager.

Do you perceive 'the feedback on the PMII impacts' as a key embedding factor?

- Yes. It is very important to demonstrate the benefits of using a PM practice.

Do you perceive 'the nature of adoption decision as mandatory' as a key embedding factor?

- I'm not sure that this is a factor that will facilitate or not. Maybe yes, because when it is optional people tend to simply not use it. Although, when people begin to realise its importance, even if it is optional, people are going to use it.

Appendix B: Questionnaire

Consent form- First page of the on-line questionnaire

The purpose of this study is to develop a **framework to help organisations to improve and embed project management practices** in an effective way. While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner.

This survey is divided into the following parts:

- Part A – Key factors for improving project management practices
- Part B – Key factors for embedding project management practices
- Part C – Project management practices
- PartD– Some characteristics of the respondent and respondent's organisation

Participation in the study is entirely voluntary; you can withdraw from the survey at any point of time, without giving reason and without implications for you. There are no anticipated risks associated with your participation. If you cannot accurately provide an answer or do not feel confident about a question, please tick the box 'no opinion'. All responses will remain confidential and will be reported only in anonymous, summary form in a Ph.D. Thesis and any subsequent research articles. The study has **ethical approval** from Southampton University (project reference: 4911).

☐ Please tick (check) this box to indicate that you consent to taking part in this survey

Part A – Key Factors for Improving Project Management Practices

Please identify the degree of influence of the following activities (Project management improvement initiatives) on improving project management (PM) practices in your organisation.

*(**PM improvement initiatives** include the implementation in the organisation of specific PM practices, as tools and techniques that practitioners use to "do the job" to "execute a process", such as Work Breakdown Structure or Earned Value management; and the development of activities that would help to improve PM practices, such as the standardisation of PM processes, tools and techniques, or the designation of formal title and role for those in charge of projects, and their adequate training. Therefore, PM improvement initiatives are defined as not just specific tools, but a novel set of behaviours, routines, and ways of working that are directed at improving PM performance and that are implemented by planned and coordinated actions.)*

A1. Process Tools and Techniques

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. Corporate standardisation of PM processes.	○	○	○	○	○	○
2. Corporate standardisation of PM tools & techniques.	○	○	○	○	○	○
3. Corporate standardisation of PM information system.	○	○	○	○	○	○
4. Tailoring PM processes to particular projects.	○	○	○	○	○	○
5. Tailoring PM tools & techniques to particular projects.	○	○	○	○	○	○
6. Tailoring PM information system to particular projects.	○	○	○	○	○	○

A2. People and Organisation Learning

Continuation: **Please identify the degree of influence of the following activities (Project management improvement initiatives) on improving project management (PM) practices in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The development of PM training among all project stakeholders in the organisation.	○	○	○	○	○	○
2. The organisation establishes a process to ensure project stakeholders in the organisation have sufficient PM knowledge and experience.	○	○	○	○	○	○
3. The assessment of the PM competency of staff in various roles within the organisation, including executives, project managers and team members.	○	○	○	○	○	○
4. The assessment of project management performance in terms of scope, time, cost and quality during the project's life cycle, in order to inform the assessment of PM staff.	○	○	○	○	○	○
5. The development of an internal project stakeholders' PM competences portfolio which is updated.	○	○	○	○	○	○
6. The establishment of internal PM communities.	○	○	○	○	○	○

7. The development of a culture of learning (through the development of a knowledge management system or a proactive leadership directed toward sharing knowledge).	○	○	○	○	○	○
8. The professionalisation of the project manager's role, i.e., the project manager dedicates almost 100% of his/her work to PM activities.	○	○	○	○	○	○
9. The development of a PM career path for project managers (in order to ensure that the organisation has enough people with the right level of expertise to deliver project work and that PM staff is motivated to enhance their PM competences).	○	○	○	○	○	○

A3. General Management System

Continuation: **Please identify the degree of influence of the following activities (Project management improvement initiatives) on improving project management (PM) practices in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Vey Low	No Opinion
1. The alignment of PM activities with the whole organisation's activities (for example, the strategic planning of the organisation should be tightly coupled with the project identification and prioritisation).	○	○	○	○	○	○
2. The creation of a project management office or a similar structure.	○	○	○	○	○	○
3. The development of an organisation structure sympathetic to PM practices (for example, a projectised structure or a strong matrix structure, in order that resource allocation is project oriented).	○	○	○	○	○	○
4. Increasing the authority of project managers in the process of managing projects.	○	○	○	○	○	○
5. Winning the respect from all departments in the organisation for the project manager role.	○	○	○	○	○	○
6. Internal benchmarking to assess PM and continuous improvement.	○	○	○	○	○	○
7. Benchmarking to assess PM and continuous improvement using market PM standards , i.e., using a model from literature to assess your current capability to undertake PM, and to define what may be needed to make your organisation more capable in PM terms.	○	○	○	○	○	○

A4. PM Culture

Continuation: **Please identify the degree of influence of the following activities (Project management improvement initiatives) on improving project management (PM) practices in your organisation.**

	5- Vey High	4- High	3- Medium	2- Low	1- Vey Low	No Opinion
1. The development of awareness of the importance of PM among all staff.	○	○	○	○	○	○
2. The development of a basic understanding of PM practices, their purposes and benefits among all employees involved in project activities.	○	○	○	○	○	○
3. The establishment of PM practices as a standard requirement for projects.	○	○	○	○	○	○

Please specify any other project improvement initiatives not listed above that you believe bring very high (5) or high (4) **influence** on improving PM practices in your organisation.

Part B – Key Factors for Embedding Project Management Practices

The researcher's previous study of the literature and interviews led to the identification of several factors that might affect ability to achieve diffusion, dissemination, implementation and routinisation that is the embedment of PM improvement initiatives in organisations.

(***Embed*** *means a PM practice that is strongly contextualized (customised or personalised) and integrated with other contextualised management practices in the organisation and there is a sense of 'ownership' facilitated by the staff involvement at all levels.)*

Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.

B1. Adopter & Adoption

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The perceived usefulness of the PM improvement initiative by the adopters (the extent to which a person believes that using a particular PM practice will enhance her/ his job performance, that the practice has benefits).	○	○	○	○	○	○
2. The perceived ease of use of the PM improvement initiative by the adopters (the degree to which a person believes that using a PM practice will be free from effort, for example, if the perceived level of complexity is low).	○	○	○	○	○	○
3. Highly motivated adopters.	○	○	○	○	○	○
4. Adopters who are predisposed to change (i.e. resources are not accommodated and wish to learn more and do better).	○	○	○	○	○	○
5. The adoption decision of a PM improvement initiative being mandatory as opposed to optional.	○	○	○	○	○	○

B2. Communication & Influence

Continuation: **Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The demonstration of the value of the PM improvement initiative to the adopter and the organisation, i.e. the direct and indirect benefits.	○	○	○	○	○	○
2. Stakeholders' involvement in the design and implementation process of the PM improvement initiative.	○	○	○	○	○	○
3. The existence of individuals who are able to influence informally new adopters towards the use of PM practices (opinion leaders).	○	○	○	○	○	○
4. The existence of key facilitators to support the change, namely to provide coaching during the implementation and routinisation process.	○	○	○	○	○	○

B3. Inner Context

Continuation: **Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The organisation has resources available to be channelled to support PM improvement initiatives.	○	○	○	○	○	○
2. The organisation has strong sponsorship for the use of PM practices.	○	○	○	○	○	○
3. The PM maturity level of the organisation (if the organisation's PM maturity level is high, it is easier to embed PM improvement initiatives).	○	○	○	○	○	○
4. The organisation perceives that the current situation is intolerable and that a change is needed (tension for change).	○	○	○	○	○	○
5. The ability of the organisation (people) systematically to identify, capture, interprete, share and re-codify new knowledge to operationalise/ implement and use it effectively (absorptive capacity for new knowledge).	○	○	○	○	○	○

B4. Outer Context

Continuation: **Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The awareness of other similar organisations that have done or plan to do the same PM improvement initiative (interorganisational PM practices).	○	○	○	○	○	○
2. Pressure from customers or suppliers to adopt a new PM practice (external stakeholder requirement).	○	○	○	○	○	○
3. A turbulent economic environment which presses organisations to become more competitive and embed improved PM practices.	○	○	○	○	○	○
4. Culture in which the organisation is contextualised.	○	○	○	○	○	○

B5. Implementation

Continuation: **Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The PM improvement initiative is piloted on a limited basis, in order to demonstrate the benefits of PM practices and to a better customise and tailor PM practices.	○	○	○	○	○	○
2. The gradual implementation of PM improvement initiatives.	○	○	○	○	○	○
3. The existence of appropriate and specific training for the operationalisation of the PM improvement initiative.	○	○	○	○	○	○
4. The PM improvement initiative is adapted and modified in order to suit the organisations' needs (adaptation/ re-invention).	○	○	○	○	○	○
5. The integration of the PM improvement initiative with the existent practices.	○	○	○	○	○	○
6. The involvement of parties external to the organisation, who have personal experience of the benefits of PM.	○	○	○	○	○	○

B6. Routinisation

Continuation: **Please identify your view of the potential effect of each of the factors listed below on embedding PM improvement initiatives in your organisation.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	No Opinion
1. The organisation collects and provides continuous feedback on the PM improvement impacts.	○	○	○	○	○	○
2. An implemented PM quality assurance process, to monitor compliance with the organisation's PM standards and to take notice of feedback from the project staff on how to improve PM practice.	○	○	○	○	○	○
3. Adopter accountability, i.e. there are consequences which might be positive – rewards or negative – penalties if project staff are complying or not with the standardised PM practices.	○	○	○	○	○	○

Please specify any other factors not listed above that you believe have very high (5) or high (4) **effect** on the ability to achieve embedment of project improvement initiatives in your organisation.

Part C – Project Management Practices

If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.

*(**PM practices** in this study are seen as those tools and techniques that practitioners use to "do the job" to "execute a PM process".)*
*(**Project management performance** is focused to the triple constraints: control of time and cost and progress of the project.)*

C1. Project Initiation

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Handover (the proposal team to the project team)	○	○	○	○	○	○
2. Project charter	○	○	○	○	○	○
3. Project statement of work	○	○	○	○	○	○
4. Kick-off meeting	○	○	○	○	○	○
5. Stakeholder analysis	○	○	○	○	○	○
6. Financial measurement tools (eg. ROI, NPV, Pay-back)	○	○	○	○	○	○
7. Feasibility study	○	○	○	○	○	○

C2. Project Scope and Quality Planning

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Requirements analysis	○	○	○	○	○	○
2. Requirements traceability matrix	○	○	○	○	○	○
3. Project scope statement	○	○	○	○	○	○
4. Product breakdown structure	○	○	○	○	○	○
5. Work breakdown structure	○	○	○	○	○	○
6. Cost/ benefit analysis	○	○	○	○	○	○
7. Quality plan	○	○	○	○	○	○
8. Design of experiments	○	○	○	○	○	○

C3. Project Time and Cost Planning

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Activity list	○	○	○	○	○	○
2. Top-down estimating	○	○	○	○	○	○
3. Bottom-up estimating	○	○	○	○	○	○
4. Parametric estimating	○	○	○	○	○	○
5. Database for cost estimating	○	○	○	○	○	○
6. Milestone planning	○	○	○	○	○	○
7. Network diagram	○	○	○	○	○	○
8. Gantt chart	○	○	○	○	○	○
9. Critical path method analysis	○	○	○	○	○	○
10. Critical chain method and analysis	○	○	○	○	○	○
11. Probabilistic duration estimate (PERT)	○	○	○	○	○	○
12. PM Software to task scheduling	○	○	○	○	○	○
13. PM software for resources scheduling	○	○	○	○	○	○

14. PM software for resources levelling	○	○	○	○	○	○
15. PM software for cost estimating	○	○	○	○	○	○

C4. Project Risk Planning

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Risk identification	○	○	○	○	○	○
2. Qualitative risk analysis	○	○	○	○	○	○
3. Quantitative risk analysis	○	○	○	○	○	○
4. Risk response plan/ Contingent plans	○	○	○	○	○	○
5. Database of risks	○	○	○	○	○	○
6. Monte-Carlo analysis	○	○	○	○	○	○
7. PM software for simulation	○	○	○	○	○	○

C5. Project Overall Planning

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Responsibility assignment matrix	○	○	○	○	○	○
2. Communication plan	○	○	○	○	○	○
3. Bid documents	○	○	○	○	○	○
4. Database of historical data	○	○	○	○	○	○
5. Database of lessons learned	○	○	○	○	○	○
6. Database of contractual commitment data	○	○	○	○	○	○
7. Baseline plan	○	○	○	○	○	○
8. Re-basellining	○	○	○	○	○	○

C6. Project Execution

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Project issue log	○	○	○	○	○	○
2. Team member performance appraisal	○	○	○	○	○	○
3. Team building event	○	○	○	○	○	○
4. Work authorisation	○	○	○	○	○	○
5. Bid/ seller evaluation	○	○	○	○	○	○
6. Bidders conferences	○	○	○	○	○	○
7. Project communication room (war room)	○	○	○	○	○	○
8. Project Web site	○	○	○	○	○	○
9. Self-directed work teams	○	○	○	○	○	○

C7. Project Control

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Progress report	○	○	○	○	○	○
2. Progress meetings	○	○	○	○	○	○
3. Change request	○	○	○	○	○	○
4. Earned value management	○	○	○	○	○	○
5. Configuration review	○	○	○	○	○	○
6. Quality inspection	○	○	○	○	○	○
7. Risk re-assessment	○	○	○	○	○	○
8. PM software to monitoring schedule	○	○	○	○	○	○
9. PM software to monitoring of cost	○	○	○	○	○	○

C8. Project Closing

Continuation: **If you use or have used the following PM practices, please specify the level of benefit that you obtain on PM performance. If you never used it, please just tick the box 'not used'.**

	5- Very High	4- High	3- Medium	2- Low	1- Very Low	Not Used
1. Project closure documentation	○	○	○	○	○	○
2. Close contracts	○	○	○	○	○	○
3. Lessons learned	○	○	○	○	○	○
4. Client acceptance form	○	○	○	○	○	○
5. Customer satisfaction surveys	○	○	○	○	○	○

Please specify any other project management practices not listed above that you use or have used and that you believe bring very high (5) or high (4) **benefits** to project management performance.

Part D – Some Characteristics of the Respondent and Respondent's Organisation

1. What is your organisation's primary business activity?

- ○ Engineering and Construction
- ○ Business Services
- ○ Information Technology
- ○ Telecommunications
- ○ Industrial Services
- ○ Other

Specify:

2. Where is located your work site?

- Afghanistan
- Albania
- Algeria
- American Samoa
- .....

3. What is the number of workers of your organisation?

- Less than 10 workers
- Between 10 and 50 workers
- Between 50 and 250 workers
- More than 250 workers

4. What is the total balance-sheet of your organisation?

- Less than 2 million Euros
- Between 2 and 10 million Euros
- Between 10 and 43 million Euros
- More than 43 million Euros

5. What is the total annual sales (turnover) of your organisation?

- Less than 2 million Euros
- Between 2 and 10 million Euros
- Between 10 and 50 million Euros
- More than 50 million Euros

6. Which category best describes the focus of PM activities in which your organisation work?

- Internal projects (projects focus on the future vision for the organisation and may include: technology, product or process development, product/ service launch, business process reengineering or new capacity development)

- ○ External projects (projects related to business contracts)
- ○ Both internal and external projects

7. What is the type of deliverable produced by your typical project?

- ○ Engineering and Construction
- ○ Business Services
- ○ Information Technology
- ○ Telecommunications
- ○ Industrial Services
- ○ Other

Specify:

8. What is the typical cost (in Euros) of the projects that you are involved?

- ○ Up to 10.000
- ○ 10.001-50.000
- ○ 50.001-250.000
- ○ 250.001-500.000
- ○ 500.001-1.000.000
- ○ 1.000.001-5.000.000
- ○ More than 5.000.001

9. What is the typical duration of projects that you are involved?

- ○ Up to 3 months
- ○ 3 - 6 months
- ○ 6 months to 1 year
- ○ 1 - 2 years
- ○ More than 2 years

10. Are the projects you usually work on similar to one another or different?

- ○ Fairly similar

- ○ Quite different

11. What is the level of product or technical innovation of the typical projects that you are involved?

- ○ High level of innovation
- ○ Low level of innovation
- ○ Standard product and technology

12. What is your current primary role?

- ○ Portfolio or programme manager
- ○ Project manager
- ○ Team member
- ○ Functional manager
- ○ Director
- ○ Other

Specify:

13. Please indicate the level of PM experience you have by recording the total number of years you have been engaged at each level.

	1 to 3 years	4 to 6 years	7 to 9 years	10 to 12 years	13 to 15 years	More than 16 years	Not Applicable
Portfolio or programme manager	○	○	○	○	○	○	○
Project manager	○	○	○	○	○	○	○
Team member	○	○	○	○	○	○	○

14. Please select your age.

- ○ Up to 25
- ○ 25-30
- ○ 30-39

- 40–49
- 50 years and over

15. Please select your gender.

- Female
- Male

16. Please indicate your highest level of education obtained.

- Technical qualification
- Undergraduate degree
- Postgraduate degree
- Master degree
- Doctor degree

Debriefing Document – Last page of the on-line questionnaire

Ethics number: 4911

Thank you so much for completing the questionnaire. Your participation will be very valuable.

The results of this survey will be used to pursue the following research objectives:

- identify the priorities of organisations when they chose to invest in PM practice improvement;
- identify the key factors that influence the embedding of PM improvement initiatives into organisations;
- identify the main inter-relationships between the key factors to improve and embed PM practices, and
- find if these factors are dependent on the organisational contexts (industry, size, geographic location and project type).

If you have any questions about this research, or if you would like to receive a summary of the results from this study, please feel free to contact me at gabriela.fernandes@soton.ac.uk.

If you know someone who might be willing to participate in this study, please forward this link https://www.isurvey.soton.ac.uk/6516

Once again thank you very much for your help,

Gabriela Fernandes

Appendix B

Appendix C: Questionnaire Documentation

Email content asking PM association contacts to advertise the survey

Subject: Advertise Doctoral Research Survey **on Improving and Embedding Project Management Practices in Organisations**

Dear [name],

I am a Ph.D. student in the Management School at the University of Southampton. The supervising faculty member for this study is Professor Stephen Ward. As the central part of my research, I am currently conducting **a survey worldwide on Improving and Embedding Project Management Practices in Organisations**. It would be a precious help if you could advertise this survey to your members and invite them to consider taking part.

The survey can be accessed here:

https://www.isurvey.soton.ac.uk/6516

The aim of this research is to develop a framework to help organisations to improve and embed project management (PM) practices in an effective way. While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner.

To develop an understanding of these issues, my study seeks to:

- identify the priorities of organisations when they chose to invest in PM practice improvement;
- identify the key factors that influence the embedding of PM improvement initiatives into organisations;
- identify the main inter-relationships between the key factors to improve and embed PM practices, and
- find if these factors are dependent on the organisational contexts (industry, size, geographic location and project type).

The research methodology comprises four phases. Firstly, based on an extensive literature review and on the researcher's own professional experience, an 'initial framework' to improve and embed PM practices was

produced. Secondly, semi-structured interviews and qualitative data analysis have been conducted in order: 1) to get confirmation for the key factors identified 2) to explore new factors and 3) to reduce the number of factors identified. As a result a 'revised framework' was constructed. Thirdly, a questionnaire survey is being administered, with the objective of getting insights from more people and confirming or not the findings from the interviews. The questionnaire will be also used to identify the main inter-relationships between the key factors, and find if these factors are dependent on the organisational contexts. The last phase, will comprise the consolidation of the research findings, constructing the final 'proposed framework'.

The study has **ethical approval** from Southampton University (project reference: 4911). Please be assured that all responses will remain **strictly confidential** and will be reported only in **anonymous**, summary form in a Ph.D. Thesis and any subsequent research articles. The participants have the opportunity to receive a summary of the results from this study.

If you have any questions or concerns about this research, please feel free to contact me at gabriela.fernandes@soton.ac.uk or phone on +351 934 883 976.

Many thanks in advance for your attention and valuable contribution to my Ph.D. research project.

Yours sincerely,
Gabriela Fernandes
Doctoral Researcher
School of Management
University of Southampton
Southampton, SO17 1BJ
United Kingdom

email: gabriela.fernandes@soton.ac.uk
Phone: +351 934883976

Email content asking individuals to participate on the survey

Subject: Expertise request on project management

Dear [name],

I would like to invite you to take part in a research study on improving and embedding project management practices in organisations.

The study is being conducted by myself, Gabriela Fernandes as part of my Ph.D. research in the Management School at the University of Southampton. The study has received Ethics approval through the University's research governance process (Reference: ERGO 4911). The supervising faculty member for this study is Professor Stephen Ward.

To take this survey simply click on the link below where you will be asked to indicate your consent before continuing with the questionnaire.

Click here to take this survey This link is uniquely tied to this survey and your email address. Please do not forward this message.

The purpose of this study is to develop a **framework to help organisations to improve and embed project management practices** in an effective way. While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner.

This survey is divided into the following parts:

- Part A – Key factors for improving project management practices
- Part B – Key factors for embedding project management practices
- Part C – Project management practices
- Part D – Some characteristics of the respondent and respondent's organisation

Participation in the study is entirely voluntary; you can withdraw from the survey at any point of time, without giving reason and without implications for you. There are no anticipated risks associated with your participation. If you cannot accurately provide an answer or do not feel confident about a question, please tick the box 'no opinion'. All responses will remain confidential and will

be reported only in anonymous, summary form in a Ph.D. Thesis and any subsequent research articles.

Thank you for your help,
Gabriela Fernandes

Doctoral Researcher

School of Management
University of Southampton
Southampton, SO17 1BJ
United Kingdom

email: gabriela.fernandes@soton.ac.uk
Phone: +351 934883976

To opt out of this survey click here

Post content in LinkedIn groups

Please find attached a link to a survey about a **framework to help organisations to improve and embed project management practices**

The study is being conducted by myself, *Gabriela Fernandes*, as part of my Ph.D. research in the Management School at the University of Southampton. The study has received Ethics approval through the University's research governance process (Reference: ERGO 4911). The supervising faculty member for this study is Professor Stephen Ward.

The survey can be accessed here:

https://www.isurvey.soton.ac.uk/6516

The purpose of this study is to develop a **framework to help organisations to improve and embed project management practices** in an effective way. The survey is divided into the following parts:

- Part A – Key factors for improving project management practices
- Part B – Key factors for embedding project management practices
- Part C – Project management practices

- Part D – Some characteristics of the respondent and respondent's organisation

All responses will remain confidential and will be reported only in anonymous, summary form in a Ph.D. Thesis and any subsequent research articles. The participants have the opportunity to receive a summary of the results from this study.

Any issues about the study contact: email: gabriela.fernandes@soton.ac.uk phone: +351 934883976

Examples of PM Associations Advertising the Research Survey

1. Example in a Website

From: Chapter President [mailto:president@pmi-ctt.org]
Sent: 15 April 2013 15:44
To: Fernandes A.G.
Subject: Re: Expertise request on project management until April 28th

Hi Gabriela,

I just want to let you know that we have posted a blurb on the front page of our website about your Project Management research.

(www.pmi-ctt.org) see below

Doctoral Research Survey Input Request

A Ph.D. student in the Management School at the University of Southampton, UK, is conducting a survey, approved by PMI's Research Program. As the central part of her research, she is currently conducting a survey worldwide on **Improving and Embedding Project Management Practices in Organisations**. The aim of this research is to develop a framework to help organisations to improve and embed project management (PM) practices in an effective way. As she states, "While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner."

She has asked our Chapter Executive to post her survey. The survey can be accessed here. She is looking for responses by **Fri, April 28, 2013**.

As CTT members, you are under no obligation to respond to the survey. But if you do, be assured that your responses will remain strictly confidential and will

be reported only in anonymous, summary form in her Ph.D. Thesis and any subsequent research articles. You will also have the opportunity to receive a summary of the results from this study.

Good luck!

Sincerely,
Marc Blanchette
President | PMI-CTT
president@pmi-ctt.org | www.pmi-ctt.org

2. Example of a direct email to the association members

Estimados miembros,

Gabriela Fernandes se encuentra realizando una investigación como parte de sus trabajos doctorales en Gran Bretaña.

"A survey worldwide on Improving and Embedding Project Management Practices in Organisations"

Con el respaldo del PMI Internacional, nos está pidiendo el apoyo para contestar la siguiente encuesta:

- https://www.isurvey.soton.ac.uk/6516

Para mayor información pueden consultar la comunicación que ha tenido con Francisco Herrera, presidente del PMI Sinaloa, con Gabriela.

Buena semana,

3. Example in a newsletter

Survey: Improving and embedding project management practices in organisations

We would like to invite you to take part in a research study on improving and embedding project management practices in organisations.

The study is being conducted by Mrs. Gabriela Fernandes as part of her Ph.D. research in the Management School at the University of Southampton. The study has received Ethics approval through the University's research governance process (Reference: ERGO 4911). The supervising faculty member for this study is Professor Stephen Ward.

To take this survey simply click on the link below where you will be asked to indicate your consent before continuing with the questionnaire.

Click here to take this survey.

The purpose of this study is to develop a framework to help organisations to improve and embed project management practices in an effective way. While the literature on PM provides some advice, organisations need guidance on what PM improvement initiatives should they concentrate their efforts. A related issue is how to facilitate the embedment of these PM improvement initiatives in a sustained manner.

This survey is divided into the following parts:

- Part A: Key factors for improving project management practices
- Part B: Key factors for embedding project management practices
- Part C: Project management practices
- Part D: Some characteristics of the respondent and respondent's organisation

Participation in the study is entirely voluntary; you can withdraw from the survey at any point of time, without giving reason and without implications for you. There are no anticipated risks associated with your participation. If you cannot accurately provide an answer or do not feel confident about a question, please tick the box 'no opinion'. All responses will remain confidential and will be reported only in anonymous, summary form in a Ph.D. Thesis and any subsequent research articles.

Thank you!

Sponsor al PMI Romania Chapter

Partenerii PMI Romania Chapter pe Educatie

Appendix C

Appendix D: ERGO Process Documentation

First approval email from ERGO to the interviews research phase:

Ethics ID: 2830 has been reviewed and approved by your supervisor

ERGO [DoNotReply@ERGO.soton.ac.uk]

Sent:27 June 2012 10:45

To: Fernandes A.G.

Submission Number: 2830
Submission Name: Improving and Embedding Project Management Practices in Organisations
This is email is to let you know your submission has been reviewed and approved by your supervisor.
It has now been sent to the Ethics committee for review.
Comments
None
Click here to view your submission

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Documentation support:

- Research schedule: Interview protocol/ process (in Appendix A)
- Briefing document: "Introducing a study on Improving and Embedding Project Management Practices in Organisations" (in Appendix A)
- Consent form (in Appendix A)
- A frist dratf of the questionnaire
- ERGO application form: Ethics form
- University of Southampton Management School Risk Review

Appendix D

Second approval email from ERGO to the questionnaire research phase:

Research Governance Feedback on your Ethics Submission (Ethics ID:4911)

ERGO [ergo@soton.ac.uk]

Sent:30 January 2013 10:20

To: Fernandes A.G.

Submission Number 4911:
Submission Title Improving and Embedding Project Management Practices in Organisations (Amendment 1):
The Research Governance Office has reviewed and approved your submission

You can begin your research unless you are still awaiting specific Health and Safety approval (e.g. for a Genetic or Biological Materials Risk Assessment) or external ethics review (e.g. NRES).The following comments have been made:

"Amendment Approved"

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Documentation support:

- Briefing document: Email invitation to the participation in the study (in Appendix C)
- Consent form: First page of the on-line questionnaire (in Appendix B)
- Debriefing document: Last page of the on-line questionnaire (in Appendix B)
- Questionnaire (in Appendix B)
- ERGO application form: Ethics form
- University of Southampton Management School Risk Review

Appendix E: Interviewees Characterisation

Nº	Organisation	Gender	Occupation	PM Experience	Education Level	Project Scope	Technical Innovation	Duration	Cost
1	Organisation 1	Female	Director	7 – 9 years as Project Manager	Undergraduate	Quite Different	High Level of Innovation	1– 2 years	50.000 – 250.000 €
2	Organisation 1	Female	Project Manager	10 –12 years as Project Manager	Doctorate	Quite Different	High Level of Innovation	1– 2 years	50.000 – 250.000 €
3	Organisation 1	Male	Project Manager	4 – 6 years as Project Manager	Master's Degree	Quite Different	High Level of Innovation	1– 2 years	50.000 – 250.000 €
4	Organisation 1	Female	Team Member	4 – 6 years as Team Member	Post–Graduation	Quite Different	High Level of Innovation	1– 2 years	50.000 – 250.000 €
5	Organisation 1	Male	Project Manager	4 – 6 years as Project Manager	Doctorate	Quite Different	High Level of Innovation	1– 2 years	50.000 – 250.000 €
6	Organisation 2	Male	Programme or Portfolio Manager	10 –12 years as Project Manager	Post–Graduation	Quite Different	High Level of Innovation	1– 2 years	250.000 – 500.000 €
7	Organisation 2	Male	Programme or Portfolio Manager	4 – 6 years as Project Manager	Undergraduate	Quite Different	High Level of Innovation	6 months to 1 year	50.000 – 250.000 €
8	Organisation 2	Male	Project Manager	4 – 6 years as Project Manager	Post–Graduation	Quite Different	High Level of Innovation	1– 2 years	500.000 – 1.000.000 €
9	Organisation 3	Male	Director	More than 16 years as Project Manager	Master's Degree	Quite Different	High Level of Innovation	1– 2 years	More Than 1.000.000 €
10	Organisation 3	Male	Project Manager	10 –12 years as Project Manager	Undergraduate	Quite Different	High Level of Innovation	3 – 6 months	More Than 1.000.000 €
11	Organisation 3	Male	Project Manager	13 – 15 years as Project Manager	Undergraduate	Quite Different	High Level of Innovation	More than 2 years	More Than 1.000.000€
12	Organisation 3	Male	Programme or Portfolio Manager	10 –12 years as Project Manager	Undergraduate	Fairly Similar	High Level of Innovation	6 months to 1 year	More Than 1.000.000 €
13	Organisation 4	Male	Project Manager	10 –12 years as Project Manager	Undergraduate	Quite Different	Low Level of Innovation	3 – 6 months	250.000 – 500.000 €
14	Organisation 4	Male	Director	More than 16 years as Project Manager	Undergraduate	Quite Different	Low Level of Innovation	6 months to 1 year	50.000 – 250.000 €
15	Organisation 4	Female	Programme or Portfolio Manager	7 – 9 years as Project Manager	Undergraduate	Quite Different	Low Level of Innovation	6 months to 1 year	50.000 – 250.000 €

Nº	Organisation	Gender	Occupation	PM Experience	Education Level	Project Scope	Technical Innovation	Duration	Cost
16	Organisation 4	Male	Project Manager	7 – 9 years as Project Manager	Undergraduate	Quite Different	Low Level of Innovation	6 months to 1 year	250.000 – 500.000 €
17	Organisation 4	Female	Team Member	4 – 6 years as Team Member	Undergraduate	Quite Different	High Level of Innovation	1– 2 years	No Idea
18	Organisation 5	Male	Programme or Portfolio Manager	4 – 6 years as Project Manager	Undergraduate	Fairly Similar	High Level of Innovation	6 months to 1 year	250.000 – 500.000 €
19	Organisation 5	Male	Project Manager	10 –12 years as Project Manager	Master's Degree	Fairly Similar	High Level of Innovation	6 months to 1 year	50.000 – 250.000 €
20	Organisation 5	Male	Programme or Portfolio Manager	1 – 3 years as Project Manager	Master's Degree	Quite Different	High Level of Innovation	More than 2 years	More Than 1.000.000 €
21	Organisation 5	Male	Project Manager	7 – 9 years as Project Manager	Post–Graduation	Quite Different	High Level of Innovation	6 months to 1 year	50.000 – 250.000 €
22	Organisation 5	Male	Programme or Portfolio Manager	10 –12 years as Project Manager	Master's Degree	Quite Different	High Level of Innovation	1– 2 years	250.000 – 500.000 €
23	Organisation 6	Male	Project Manager	4 – 6 years as Project Manager	Undergraduate	Quite Different	Low Level of Innovation	6 months to 1 year	No Idea
24	Organisation 6	Male	Project Manager	4 – 6 years as Project Manager	Undergraduate	Fairly Similar	Low Level of Innovation	6 months to 1 year	No Idea
25	Organisation 6	Male	Project Manager	4 – 6 years as Project Manager	Post–Graduation	Fairly Similar	High Level of Innovation	3 – 6 months	10.000 – 50.000 €
26	Organisation 6	Male	Director	10 –12 years as Project Manager	Post–Graduation	Fairly Similar	High Level of Innovation	Up to 3 months	10.000 – 50.000 €
27	Organisation 7	Male	Project Manager	7 – 9 years as Project Manager	Post–Graduation	Fairly Similar	High Level of Innovation	3 – 6 months	50.000 – 250.000 €
28	Organisation 7	Male	Project Manager	4 – 6 years as Project Manager	Undergraduate	Fairly Similar	High Level of Innovation	3 – 6 months	50.000 – 250.000 €
29	Organisation 7	Male	Director	10 –12 years as Project Manager	Doctorate	Fairly Similar	High Level of Innovation	3 – 6 months	50.000 – 250.000 €
30	Organisation 7	Female	Project Manager	7 – 9 years as Project Manager	Post–Graduation	Fairly Similar	High Level of Innovation	Up to 3 months	10.000 – 50.000 €

Appendix F: Statistical Results

Table AF. 1: Improving construct: Correlation matrix

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25
V1	1.000	.757	.644	.285	.229	.215	.533	.527	.470	.513	.477	.360	.414	.375	.531	.506	.511	.465	.414	.410	.498	.477	.483	.471	.594
V2	.757	1.000	.706	.276	.285	.288	.503	.476	.439	.495	.451	.360	.409	.377	.482	.436	.468	.448	.401	.378	.486	.484	.398	.425	.550
V3	.644	.706	1.000	.267	.299	.392	.427	.447	.428	.439	.459	.376	.415	.293	.434	.413	.409	.425	.372	.345	.417	.386	.391	.388	.448
V4	.285	.276	.267	1.000	.789	.640	.232	.251	.223	.267	.275	.306	.312	.260	.285	.259	.225	.241	.275	.278	.327	.297	.287	.261	.290
V5	.229	.285	.299	.789	1.000	.724	.234	.268	.234	.280	.289	.299	.338	.239	.292	.251	.181	.261	.297	.284	.333	.307	.291	.268	.284
V6	.215	.288	.392	.640	.724	1.000	.245	.284	.243	.269	.314	.272	.308	.197	.258	.218	.181	.279	.293	.264	.331	.323	.290	.214	.207
V7	.533	.503	.427	.232	.234	.245	1.000	.687	.563	.505	.500	.396	.498	.364	.517	.516	.457	.443	.437	.471	.480	.472	.512	.554	.528
V8	.527	.476	.447	.251	.268	.284	.687	1.000	.673	.534	.559	.447	.541	.367	.573	.552	.458	.480	.463	.505	.497	.500	.544	.597	.539
V9	.470	.439	.428	.223	.234	.243	.563	.673	1.000	.571	.598	.415	.564	.374	.562	.540	.438	.479	.444	.450	.550	.560	.523	.600	.521
V10	.513	.495	.439	.267	.280	.269	.505	.534	.571	1.000	.526	.425	.526	.473	.554	.486	.472	.513	.494	.465	.590	.546	.490	.491	.579
V11	.477	.451	.459	.275	.289	.314	.500	.559	.598	.526	1.000	.543	.541	.332	.523	.506	.425	.463	.441	.419	.553	.566	.522	.496	.499
V12	.360	.360	.376	.306	.299	.272	.396	.447	.415	.425	.543	1.000	.631	.374	.541	.446	.443	.426	.357	.397	.466	.456	.421	.437	.446
V13	.414	.409	.415	.312	.338	.308	.498	.541	.564	.526	.541	.631	1.000	.447	.623	.564	.437	.487	.483	.508	.566	.501	.534	.537	.510
V14	.375	.377	.293	.260	.239	.197	.364	.367	.374	.473	.332	.374	.447	1.000	.650	.462	.516	.466	.516	.500	.468	.427	.474	.392	.481
V15	.531	.482	.434	.285	.292	.258	.517	.573	.562	.554	.523	.541	.623	.650	1.000	.588	.556	.546	.550	.561	.596	.553	.589	.560	.574
V16	.506	.436	.413	.259	.251	.218	.516	.552	.540	.486	.506	.446	.564	.462	.588	1.000	.541	.523	.476	.532	.503	.468	.567	.538	.565
V17	.511	.468	.409	.225	.181	.181	.457	.458	.438	.472	.425	.443	.437	.516	.556	.541	1.000	.545	.444	.440	.482	.458	.486	.460	.562
V18	.465	.448	.425	.241	.261	.279	.443	.480	.479	.513	.463	.426	.487	.466	.546	.523	.545	1.000	.599	.567	.496	.452	.519	.452	.549
V19	.414	.401	.372	.275	.297	.293	.437	.463	.444	.494	.441	.357	.483	.516	.550	.476	.444	.599	1.000	.700	.527	.457	.596	.514	.564
V20	.410	.378	.345	.278	.284	.264	.471	.505	.450	.465	.419	.397	.508	.500	.561	.532	.440	.567	.700	1.000	.552	.482	.625	.544	.544
V21	.498	.486	.417	.327	.333	.331	.480	.497	.550	.590	.553	.466	.566	.468	.596	.503	.482	.496	.527	.552	1.000	.776	.569	.530	.577
V22	.477	.484	.386	.297	.307	.323	.472	.500	.560	.546	.566	.456	.501	.427	.553	.468	.458	.452	.457	.482	.776	1.000	.530	.510	.532
V23	.483	.398	.391	.287	.291	.290	.512	.544	.523	.490	.522	.421	.534	.474	.589	.567	.486	.519	.596	.625	.569	.530	1.000	.688	.617
V24	.471	.425	.388	.261	.268	.214	.554	.597	.600	.491	.496	.437	.537	.392	.560	.538	.460	.452	.514	.544	.530	.510	.688	1.000	.684
V25	.594	.550	.448	.290	.284	.207	.528	.539	.521	.579	.499	.446	.510	.481	.574	.565	.562	.549	.564	.544	.577	.532	.617	.684	1.000

Table AF. 2: Improving construct: KMO and Bartlett's Test – All variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.952
Bartlett's Test of Sphericity	Approx. Chi-Square	11741.387
	df	300
	Sig.	.000

Table AF. 3: Improving construct: KMO and Bartlett's – Except V4, V5 and V6

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.960
Bartlett's Test of Sphericity	Approx. Chi-Square	10538.258
	df	231
	Sig.	.000

Appendix F

Table AF. 4: Improving construct: PCA extraction communalities

	Initial	Extraction
V1	1.000	.798
V2	1.000	.833
V3	1.000	.728
V7	1.000	.575
V8	1.000	.661
V9	1.000	.674
V10	1.000	.552
V11	1.000	.639
V12	1.000	.476
V13	1.000	.624
V14	1.000	.632
V15	1.000	.671
V16	1.000	.556
V17	1.000	.539
V18	1.000	.587
V19	1.000	.681
V20	1.000	.676
V21	1.000	.608
V22	1.000	.567
V23	1.000	.637
V24	1.000	.605
V25	1.000	.632

Extraction Method: Principal Component Analysis.

Table AF. 5: Improving construct: Eigenvalues and explained variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.620	52.820	52.820	11.620	52.820	52.820	5.792	26.328	26.328
2	1.281	5.824	58.644	1.281	5.824	58.644	4.876	22.165	48.493
3	1.048	4.765	63.409	1.048	4.765	63.409	3.282	14.917	63.409
4	.881	4.003	67.412						
5	.773	3.514	70.926						
6	.668	3.037	73.963						
7	.612	2.783	76.747						
8	.560	2.546	79.293						
9	.493	2.241	81.534						
10	.477	2.169	83.703						
11	.435	1.977	85.680						
12	.401	1.825	87.505						
13	.358	1.625	89.131						
14	.337	1.531	90.662						
15	.317	1.441	92.103						
16	.305	1.387	93.490						
17	.271	1.231	94.721						
18	.260	1.180	95.901						
19	.256	1.163	97.063						
20	.238	1.083	98.147						
21	.210	.954	99.101						
22	.198	.899	100.000						

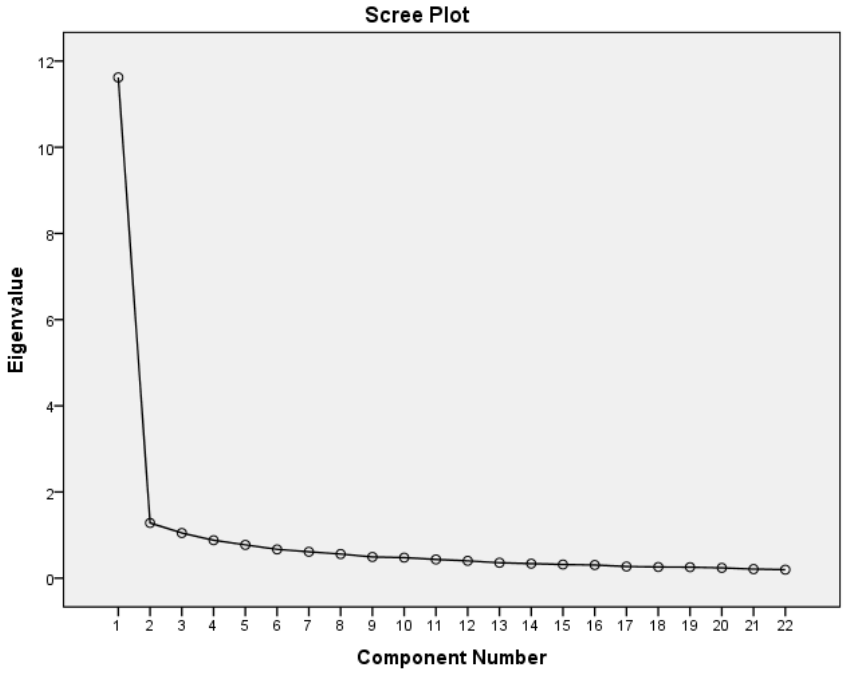


Figure AF. 1: Improving construct: Scree plot

Table AF. 6: Improving construct: Factor score development for each theme ('factor/ component' in FA) and each variable

	Component		
	1	2	3
V1	-.124	-.056	.404
V2	-.148	-.071	.455
V3	-.099	-.120	.434
V7	.172	-.130	.055
V8	.243	-.157	-.008
V9	.278	-.166	-.051
V10	.061	.005	.045
V11	.272	-.184	-.023
V12	.216	-.077	-.100
V13	.212	-.033	-.132
V14	-.220	.367	-.037
V15	.002	.141	-.037
V16	.044	.070	-.017
V17	-.139	.177	.106
V18	-.127	.225	.029
V19	-.147	.322	-.072
V20	-.080	.291	-.130
V21	.108	.027	-.050
V22	.160	-.045	-.039
V23	.050	.138	-.113
V24	.160	.000	-.095
V25	-.041	.106	.072

Appendix F

Table AF. 7: Embedding construct: Correlation matrix

	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52
V26	1.000	.581	.531	.498	.341	.527	.403	.409	.427	.372	.423	.329	.299	.400	.259	.292	.214	.327	.312	.321	.412	.428	.399	.269	.404	.387	.326
V27	.581	1.000	.489	.430	.299	.446	.353	.342	.374	.334	.328	.300	.263	.346	.218	.260	.161	.277	.359	.322	.387	.377	.330	.241	.326	.313	.286
V28	.531	.489	1.000	.682	.320	.450	.459	.422	.492	.447	.536	.426	.340	.515	.256	.360	.194	.347	.328	.348	.438	.494	.449	.276	.512	.431	.408
V29	.498	.430	.682	1.000	.352	.439	.426	.374	.484	.443	.503	.412	.325	.497	.255	.285	.218	.381	.282	.311	.405	.450	.406	.272	.448	.390	.383
V30	.341	.299	.320	.352	1.000	.358	.333	.265	.310	.351	.383	.346	.243	.329	.311	.247	.255	.250	.273	.227	.357	.264	.295	.287	.358	.428	.431
V31	.527	.446	.450	.439	.358	1.000	.537	.474	.554	.461	.504	.438	.344	.423	.298	.310	.263	.407	.389	.411	.514	.504	.458	.317	.488	.498	.413
V32	.403	.353	.459	.426	.333	.537	1.000	.495	.533	.407	.498	.376	.283	.419	.246	.356	.308	.381	.367	.408	.428	.479	.482	.367	.481	.416	.413
V33	.409	.342	.422	.374	.265	.474	.495	1.000	.639	.422	.469	.339	.309	.470	.312	.364	.269	.405	.373	.362	.425	.405	.451	.324	.441	.367	.348
V34	.427	.374	.492	.484	.310	.554	.533	.639	1.000	.516	.561	.425	.336	.512	.318	.359	.257	.449	.366	.407	.522	.519	.493	.339	.540	.489	.435
V35	.372	.334	.447	.443	.351	.461	.407	.422	.516	1.000	.617	.500	.359	.532	.374	.326	.213	.370	.354	.353	.507	.433	.421	.339	.497	.496	.406
V36	.423	.328	.536	.503	.383	.504	.498	.469	.561	.617	1.000	.581	.416	.548	.289	.337	.229	.399	.334	.364	.516	.480	.487	.311	.556	.506	.525
V37	.329	.300	.426	.412	.346	.438	.376	.339	.425	.500	.581	1.000	.375	.518	.335	.350	.268	.349	.304	.349	.468	.403	.404	.372	.508	.499	.474
V38	.299	.263	.340	.325	.243	.344	.283	.309	.336	.359	.416	.375	1.000	.485	.334	.343	.270	.283	.281	.314	.296	.313	.317	.311	.356	.291	.329
V39	.400	.346	.515	.497	.329	.423	.419	.470	.512	.532	.548	.518	.485	1.000	.411	.354	.323	.477	.401	.423	.490	.456	.463	.405	.535	.526	.460
V40	.259	.218	.256	.255	.311	.298	.246	.312	.318	.374	.289	.335	.334	.411	1.000	.485	.381	.369	.400	.393	.361	.270	.337	.407	.357	.350	.350
V41	.292	.260	.360	.285	.247	.310	.356	.364	.359	.326	.337	.350	.343	.354	.485	1.000	.388	.364	.308	.299	.372	.325	.344	.355	.379	.304	.332
V42	.214	.161	.194	.218	.255	.263	.308	.269	.257	.213	.229	.268	.270	.323	.381	.388	1.000	.445	.279	.300	.231	.235	.277	.325	.267	.273	.232
V43	.327	.277	.347	.381	.250	.407	.381	.405	.449	.370	.399	.349	.283	.477	.369	.364	.445	1.000	.386	.390	.456	.419	.406	.357	.380	.382	.353
V44	.312	.359	.328	.282	.273	.389	.367	.373	.366	.354	.334	.304	.281	.401	.400	.308	.279	.386	1.000	.597	.437	.372	.392	.387	.392	.368	.365
V45	.321	.322	.348	.311	.227	.411	.408	.362	.407	.353	.364	.349	.314	.423	.393	.299	.300	.390	.597	1.000	.534	.459	.451	.392	.422	.377	.357
V46	.412	.387	.438	.405	.357	.514	.428	.425	.522	.507	.516	.468	.296	.490	.361	.372	.231	.456	.437	.534	1.000	.627	.541	.426	.529	.547	.470
V47	.428	.377	.494	.450	.264	.504	.479	.405	.519	.433	.480	.403	.313	.456	.270	.325	.235	.419	.372	.459	.627	1.000	.626	.344	.519	.469	.392
V48	.399	.330	.449	.406	.295	.458	.482	.451	.493	.421	.487	.404	.317	.463	.337	.344	.277	.406	.392	.451	.541	.626	1.000	.428	.528	.495	.399
V49	.269	.241	.276	.272	.287	.317	.367	.324	.339	.339	.311	.372	.311	.405	.407	.355	.325	.357	.387	.392	.426	.344	.428	1.000	.398	.357	.359
V50	.404	.326	.512	.448	.358	.488	.481	.441	.540	.497	.556	.508	.356	.535	.357	.379	.267	.380	.392	.422	.529	.519	.528	.398	1.000	.647	.534
V51	.387	.313	.431	.390	.428	.498	.416	.367	.489	.496	.506	.499	.291	.526	.350	.304	.273	.382	.368	.377	.547	.469	.495	.357	.647	1.000	.587
V52	.326	.286	.408	.383	.431	.413	.413	.348	.435	.406	.525	.474	.329	.460	.350	.332	.232	.353	.365	.357	.470	.392	.399	.359	.534	.587	1.000

Table AF. 8: Embedding construct: KMO and Bartlett's Test – All variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.958
Bartlett's Test of Sphericity	Approx. Chi-Square	8622.404
	df	351
	Sig.	.000

Table AF. 9: Embedding construct: KMO and Bartlett's – Except V17

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.959
Bartlett's Test of Sphericity	Approx. Chi-Square	8480.131
	df	325
	Sig.	.000

Table AF. 10: Embedding construct: PCA extraction communalities

	Initial	Extraction
V26	1.000	.693
V27	1.000	.722
V28	1.000	.678
V29	1.000	.630
V30	1.000	.712
V31	1.000	.580
V32	1.000	.593
V33	1.000	.607
V34	1.000	.679
V35	1.000	.564
V36	1.000	.692
V37	1.000	.588
V38	1.000	.625
V39	1.000	.644
V40	1.000	.619
V41	1.000	.535
V42	1.000	.674
V43	1.000	.529
V44	1.000	.660
V45	1.000	.709
V46	1.000	.652
V47	1.000	.627
V48	1.000	.582
V49	1.000	.470
V50	1.000	.628
V51	1.000	.692
V52	1.000	.623

Extraction Method: Principal Component Analysis.

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Table AF. 11: Embedding construct: Eigenvalues and explained variance – 4-theme construct

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.337	41.988	41.988	11.337	41.988	41.988	4.730	17.520	17.520
2	1.547	5.729	47.717	1.547	5.729	47.717	3.954	14.644	32.164
3	1.193	4.419	52.136	1.193	4.419	52.136	3.618	13.400	45.564
4	1.095	4.055	56.191	1.095	4.055	56.191	2.869	10.627	56.191
5	.962	3.563	59.754						
6	.873	3.235	62.989						
7	.770	2.853	65.841						
8	.729	2.698	68.540						
9	.686	2.539	71.079						
10	.654	2.422	73.501						
11	.633	2.344	75.844						
12	.594	2.201	78.046						
13	.586	2.172	80.218						
14	.532	1.972	82.189						
15	.486	1.799	83.988						
16	.461	1.706	85.695						
17	.444	1.644	87.339						
18	.420	1.557	88.896						
19	.412	1.528	90.424						
20	.400	1.481	91.905						
21	.366	1.354	93.259						
22	.341	1.262	94.521						
23	.320	1.187	95.708						
24	.309	1.144	96.852						
25	.299	1.109	97.961						
26	.289	1.069	99.029						
27	.262	.971	100.000						

Table AF. 12: Embedding construct: Eigenvalues and explained variance – 6-theme construct

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.337	41.988	41.988	11.337	41.988	41.988	4.088	15.140	15.140
2	1.547	5.729	47.717	1.547	5.729	47.717	2.736	10.134	25.274
3	1.193	4.419	52.136	1.193	4.419	52.136	2.713	10.050	35.323
4	1.095	4.055	56.191	1.095	4.055	56.191	2.599	9.625	44.949
5	.962	3.563	59.754	.962	3.563	59.754	2.595	9.613	54.561
6	.873	3.235	62.989	.873	3.235	62.989	2.275	8.427	62.989
7	.770	2.853	65.841						
8	.729	2.698	68.540						
9	.686	2.539	71.079						
10	.654	2.422	73.501						
11	.633	2.344	75.844						
12	.594	2.201	78.046						
13	.586	2.172	80.218						
14	.532	1.972	82.189						
15	.486	1.799	83.988						
16	.461	1.706	85.695						
17	.444	1.644	87.339						
18	.420	1.557	88.896						
19	.412	1.528	90.424						
20	.400	1.481	91.905						
21	.366	1.354	93.259						
22	.341	1.262	94.521						
23	.320	1.187	95.708						
24	.309	1.144	96.852						
25	.299	1.109	97.961						
26	.289	1.069	99.029						
27	.262	.971	100.000						

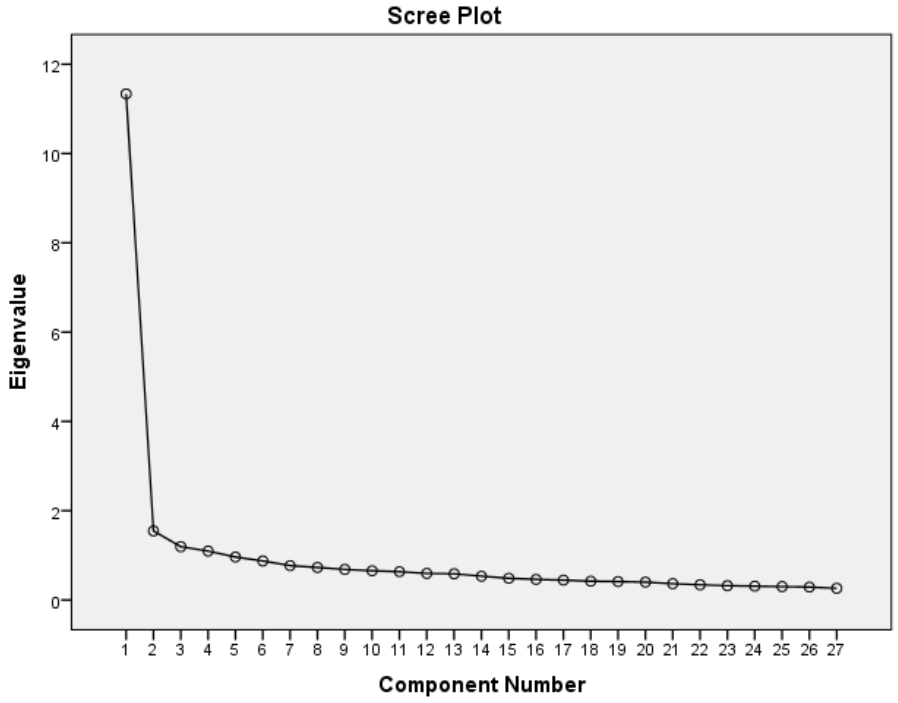

Figure AF. 2: Embedding construct: Scree plot

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Table AF. 13: Embedding construct: Factor score development for each theme ('factor/ component' in FA) and each variable

	Component					
	1	2	3	4	5	6
V26	-.073	-.113	-.025	-.035	.437	.013
V27	-.185	-.105	-.059	.110	.508	-.038
V28	-.014	.167	-.094	-.095	.267	-.077
V29	-.016	.153	-.061	-.157	.265	-.030
V30	-.212	-.261	.541	-.146	.175	.140
V31	.148	-.168	.052	-.025	.117	-.009
V32	.299	-.218	.009	-.114	.002	.083
V33	.342	-.059	-.188	-.138	-.035	.120
V34	.329	-.020	-.090	-.125	-.066	.008
V35	.016	.252	.041	-.036	-.073	-.089
V36	.105	.232	.068	-.142	-.080	-.101
V37	-.077	.272	.152	-.049	-.102	-.055
V38	-.210	.526	-.224	.014	.023	.066
V39	-.039	.327	-.079	-.001	-.048	.004
V40	-.248	.096	.026	.135	-.022	.290
V41	-.034	.075	-.094	-.096	.002	.355
V42	.049	-.180	-.003	-.167	-.035	.532
V43	.180	-.085	-.108	-.041	-.070	.248
V44	-.152	-.084	-.061	.465	.065	-.020
V45	-.061	-.030	-.133	.488	-.017	-.082
V46	.070	-.057	.072	.241	-.069	-.145
V47	.212	-.046	-.085	.164	-.037	-.160
V48	.199	-.065	-.036	.142	-.098	-.075
V49	-.088	-.014	.046	.206	-.089	.128
V50	.076	.047	.172	.012	-.113	-.089
V51	.011	-.076	.376	.014	-.111	-.090
V52	-.081	-.018	.386	-.011	-.081	-.038

Table AF. 14: Improving + Embedding construct: PCA extraction communalities

	Initial	Extraction
V1	1.000	.786
V2	1.000	.816
V3	1.000	.738
V7	1.000	.656
V8	1.000	.728
V9	1.000	.707
V10	1.000	.582
V11	1.000	.630
V12	1.000	.582
V13	1.000	.688
V14	1.000	.656
V15	1.000	.701
V16	1.000	.589
V17	1.000	.529
V18	1.000	.561
V19	1.000	.689
V20	1.000	.663
V21	1.000	.704
V22	1.000	.714
V23	1.000	.662
V24	1.000	.627
V25	1.000	.643
V26	1.000	.665
V27	1.000	.666
V28	1.000	.659
V29	1.000	.600
V30	1.000	.660
V31	1.000	.589
V32	1.000	.556
V33	1.000	.579
V34	1.000	.670
V35	1.000	.548
V36	1.000	.695
V37	1.000	.617
V38	1.000	.600
V39	1.000	.612
V40	1.000	.617
V41	1.000	.576
V42	1.000	.624
V43	1.000	.536
V44	1.000	.597
V45	1.000	.672
V46	1.000	.655
V47	1.000	.640
V48	1.000	.582
V49	1.000	.483
V50	1.000	.644
V51	1.000	.666
V52	1.000	.603

Extraction Method: Principal Component Analysis.

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Table AF. 15: Improving + Embedding construct: Eigenvalues and variance explained

Total Variance Explained

Component	Initial Eigenvalues			Loadings			Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.887	38.545	38.545	18.887	38.545	38.545	6.283	12.822	12.822
2	3.862	7.883	46.428	3.862	7.883	46.428	6.065	12.377	25.199
3	1.642	3.351	49.779	1.642	3.351	49.779	4.935	10.071	35.269
4	1.449	2.957	52.736	1.449	2.957	52.736	2.714	5.538	40.807
5	1.177	2.402	55.138	1.177	2.402	55.138	2.669	5.446	46.253
6	1.141	2.329	57.466	1.141	2.329	57.466	2.279	4.650	50.904
7	1.077	2.198	59.664	1.077	2.198	59.664	2.261	4.614	55.517
8	1.054	2.150	61.814	1.054	2.150	61.814	2.107	4.299	59.816
9	.972	1.984	63.799	.972	1.984	63.799	1.951	3.982	63.799
10	.888	1.812	65.611						
11	.826	1.686	67.296						
12	.780	1.593	68.889						
13	.754	1.539	70.428						
14	.716	1.462	71.890						
15	.683	1.394	73.284						
16	.662	1.351	74.635						
17	.644	1.314	75.949						
18	.613	1.252	77.201						
⋮									

Table AF. 166: Improving construct: Correlation matrix – Portuguese sample

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25
V1	1.000	.759	.652	.300	.183	.231	.528	.539	.420	.552	.505	.395	.509	.454	.592	.560	.560	.470	.490	.505	.576	.530	.576	.488	.606
V2	.759	1.000	.716	.309	.238	.279	.507	.479	.452	.506	.462	.406	.468	.425	.547	.507	.493	.486	.435	.459	.505	.477	.458	.456	.541
V3	.652	.716	1.000	.260	.268	.395	.437	.450	.453	.486	.461	.391	.464	.341	.495	.455	.462	.426	.435	.361	.489	.449	.456	.419	.475
V4	.299	.309	.260	1.000	.730	.624	.170	.256	.252	.282	.308	.264	.307	.259	.266	.238	.216	.219	.311	.283	.334	.356	.314	.314	.310
V5	.183	.238	.268	.730	1.000	.761	.161	.224	.247	.292	.280	.190	.308	.211	.233	.261	.126	.178	.278	.261	.297	.316	.323	.306	.256
V6	.231	.279	.395	.624	.761	1.000	.201	.300	.310	.264	.340	.209	.305	.190	.242	.259	.157	.229	.297	.239	.288	.335	.316	.287	.241
V7	.528	.507	.437	.170	.161	.201	1.000	.630	.514	.528	.470	.350	.467	.371	.517	.457	.456	.442	.427	.464	.462	.434	.466	.520	.523
V8	.539	.479	.450	.256	.224	.300	.630	1.000	.670	.550	.517	.448	.541	.443	.623	.570	.524	.538	.529	.562	.472	.480	.566	.591	.573
V9	.420	.452	.453	.252	.247	.310	.514	.670	1.000	.573	.560	.413	.547	.446	.591	.521	.441	.488	.506	.476	.481	.534	.501	.598	.530
V10	.552	.506	.486	.282	.292	.264	.528	.550	.573	1.000	.582	.521	.587	.572	.627	.581	.570	.544	.539	.548	.641	.587	.589	.563	.660
V11	.505	.462	.461	.308	.280	.340	.470	.517	.560	.582	1.000	.576	.573	.371	.559	.518	.502	.473	.489	.469	.539	.543	.521	.537	.508
V12	.395	.406	.391	.264	.190	.209	.350	.448	.413	.521	.576	1.000	.634	.401	.552	.463	.548	.454	.428	.454	.509	.525	.433	.464	.494
V13	.509	.468	.464	.307	.308	.305	.467	.541	.547	.587	.573	.634	1.000	.474	.620	.578	.466	.487	.519	.547	.590	.505	.523	.549	.538
V14	.454	.425	.341	.259	.211	.190	.371	.443	.446	.572	.371	.401	.474	1.000	.721	.567	.559	.519	.556	.561	.510	.466	.547	.463	.541
V15	.592	.547	.495	.266	.233	.242	.517	.623	.591	.627	.559	.552	.620	.721	1.000	.639	.609	.557	.590	.623	.598	.574	.603	.615	.635
V16	.560	.507	.455	.238	.261	.259	.457	.570	.521	.581	.518	.463	.578	.567	.639	1.000	.574	.554	.546	.553	.547	.493	.553	.542	.599
V17	.560	.493	.462	.216	.126	.157	.456	.524	.441	.570	.502	.548	.466	.559	.609	.574	1.000	.553	.520	.502	.537	.504	.534	.474	.641
V18	.470	.486	.426	.219	.178	.229	.442	.538	.488	.544	.473	.454	.487	.519	.557	.554	.553	1.000	.623	.610	.492	.482	.590	.456	.536
V19	.490	.435	.435	.311	.278	.297	.427	.529	.506	.539	.489	.428	.519	.556	.590	.546	.520	.623	1.000	.736	.531	.495	.676	.585	.635
V20	.505	.459	.361	.283	.261	.239	.464	.562	.476	.548	.469	.454	.547	.561	.623	.553	.502	.610	.736	1.000	.592	.523	.642	.572	.600
V21	.576	.505	.489	.334	.297	.288	.462	.472	.481	.641	.539	.509	.590	.510	.598	.547	.537	.492	.531	.592	1.000	.752	.563	.570	.629
V22	.530	.477	.449	.356	.316	.335	.434	.480	.534	.587	.543	.525	.505	.466	.574	.493	.504	.482	.495	.523	.752	1.000	.531	.535	.547
V23	.576	.458	.456	.314	.323	.316	.466	.566	.501	.589	.521	.433	.523	.547	.603	.553	.534	.590	.676	.642	.563	.531	1.000	.682	.654
V24	.488	.456	.419	.314	.306	.287	.520	.591	.598	.563	.537	.464	.549	.463	.615	.542	.474	.456	.585	.572	.570	.535	.682	1.000	.711
V25	.606	.541	.475	.310	.256	.241	.523	.573	.530	.660	.508	.494	.538	.541	.635	.599	.641	.536	.635	.600	.629	.547	.654	.711	1.000

Table AF. 17: Improving construct: KMO and Bartlett's Test – All variables – Portuguese sample

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.946
Bartlett's Test of Sphericity	Approx. Chi-Square	4919.968
	df	300
	Sig.	.000

Table AF. 18: Improving construct: KMO and Bartlett's – Except V4, V5 and V6 – Portuguese sample

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.955
Bartlett's Test of Sphericity	Approx. Chi-Square	4456.435
	df	231
	Sig.	.000

Table AF. 19: Improving construct: PCA extraction communalities – Portuguese sample

	Initial	Extraction
V1	1.000	.806
V2	1.000	.839
V3	1.000	.769
V7	1.000	.485
V8	1.000	.566
V9	1.000	.580
V10	1.000	.644
V11	1.000	.667
V12	1.000	.615
V13	1.000	.648
V14	1.000	.631
V15	1.000	.702
V16	1.000	.589
V17	1.000	.552
V18	1.000	.594
V19	1.000	.721
V20	1.000	.713
V21	1.000	.621
V22	1.000	.592
V23	1.000	.673
V24	1.000	.610
V25	1.000	.679

Extraction Method: Principal Component Analysis.

Appendix F

Table AF. 20: Improving construct: Eigenvalues and explained variance – Portuguese sample

Component	Initial Eigenvalues			Loadings			Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.213	55.512	55.512	12.213	55.512	55.512	5.629	25.585	25.585
2	1.143	5.194	60.706	1.143	5.194	60.706	5.216	23.711	49.296
3	.942	4.282	64.988	.942	4.282	64.988	3.452	15.692	64.988
4	.896	4.073	69.061						
5	.717	3.260	72.321						
6	.646	2.935	75.255						
7	.584	2.654	77.909						
8	.553	2.513	80.422						
9	.502	2.282	82.704						
10	.440	2.000	84.704						
11	.425	1.933	86.637						
12	.404	1.837	88.473						
13	.359	1.630	90.103						
14	.333	1.515	91.618						
15	.316	1.436	93.054						
16	.289	1.315	94.369						
17	.256	1.164	95.533						
18	.239	1.088	96.621						
19	.204	.929	97.550						
20	.200	.909	98.459						
21	.177	.805	99.264						
22	.162	.736	100.000						

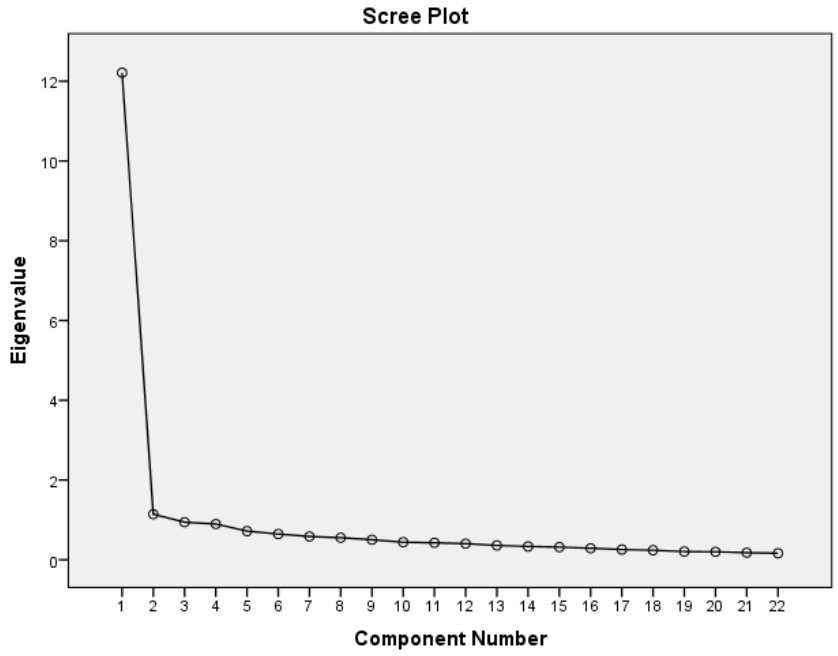

Figure AF. 3: Improving construct: Scree plot – Portuguese sample

Table AF. 217: Embedding construct: Correlation matrix- Portuguese sample

	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52
V26	1.000	.602	.484	.482	.316	.490	.337	.260	.361	.340	.383	.388	.301	.351	.216	.291	.175	.248	.244	.327	.406	.426	.339	.251	.390	.360	.272
V27	.602	1.000	.458	.405	.202	.409	.348	.266	.346	.340	.324	.367	.306	.325	.172	.276	.136	.210	.294	.336	.351	.343	.305	.284	.319	.259	.194
V28	.484	.458	1.000	.695	.267	.405	.425	.330	.452	.484	.503	.441	.299	.422	.198	.280	.154	.265	.254	.389	.449	.486	.448	.300	.464	.388	.353
V29	.482	.405	.695	1.000	.296	.443	.376	.377	.461	.483	.493	.435	.344	.414	.227	.235	.174	.299	.264	.359	.391	.450	.416	.280	.405	.300	.304
V30	.316	.202	.267	.296	1.000	.325	.224	.225	.254	.297	.375	.296	.307	.288	.236	.182	.268	.161	.247	.228	.261	.173	.186	.256	.312	.336	.399
V31	.490	.409	.405	.443	.325	1.000	.464	.440	.580	.427	.490	.403	.380	.402	.308	.391	.218	.316	.276	.396	.475	.482	.378	.280	.430	.404	.326
V32	.337	.348	.425	.376	.224	.464	1.000	.447	.493	.378	.424	.384	.311	.426	.244	.378	.331	.371	.340	.467	.424	.524	.466	.417	.392	.287	.340
V33	.260	.266	.330	.377	.225	.440	.447	1.000	.601	.379	.402	.320	.316	.454	.308	.348	.330	.380	.327	.372	.326	.264	.353	.331	.378	.300	.306
V34	.361	.346	.452	.461	.254	.580	.493	.601	1.000	.562	.557	.416	.405	.518	.319	.375	.296	.457	.403	.440	.485	.518	.451	.314	.521	.441	.372
V35	.340	.340	.484	.483	.297	.427	.378	.379	.562	1.000	.586	.474	.341	.481	.354	.338	.237	.323	.365	.399	.461	.409	.429	.311	.515	.468	.303
V36	.383	.324	.503	.493	.375	.490	.424	.402	.557	.586	1.000	.602	.386	.473	.283	.308	.213	.306	.313	.393	.502	.468	.486	.346	.546	.488	.469
V37	.388	.367	.441	.435	.296	.403	.384	.320	.416	.474	.602	1.000	.364	.485	.270	.273	.285	.304	.265	.377	.442	.419	.359	.413	.519	.475	.491
V38	.301	.306	.299	.344	.307	.380	.311	.316	.405	.341	.386	.364	1.000	.474	.298	.336	.290	.312	.167	.325	.294	.252	.256	.246	.324	.340	.343
V39	.351	.325	.422	.414	.288	.402	.426	.454	.518	.481	.473	.485	.474	1.000	.335	.272	.386	.416	.376	.415	.414	.431	.455	.447	.528	.495	.406
V40	.216	.172	.198	.227	.236	.308	.244	.308	.319	.354	.283	.270	.298	.335	1.000	.539	.393	.408	.354	.396	.410	.284	.373	.377	.321	.372	.277
V41	.291	.276	.280	.235	.182	.391	.378	.348	.375	.338	.308	.273	.336	.272	.539	1.000	.298	.326	.355	.326	.421	.359	.352	.346	.363	.287	.378
V42	.175	.136	.154	.174	.268	.218	.331	.330	.296	.237	.213	.285	.290	.386	.393	.298	1.000	.468	.320	.305	.281	.278	.339	.309	.290	.314	.267
V43	.248	.210	.265	.299	.161	.316	.371	.380	.457	.323	.306	.304	.312	.416	.408	.326	.468	1.000	.415	.411	.431	.424	.405	.360	.389	.385	.333
V44	.244	.294	.254	.264	.247	.276	.340	.327	.403	.365	.313	.265	.167	.376	.354	.355	.320	.415	1.000	.588	.417	.445	.451	.373	.346	.355	.336
V45	.327	.336	.389	.359	.228	.396	.467	.372	.440	.399	.393	.377	.325	.415	.396	.326	.305	.411	.588	1.000	.599	.533	.464	.381	.476	.421	.364
V46	.406	.351	.449	.391	.261	.475	.424	.326	.485	.461	.502	.442	.294	.414	.410	.421	.281	.431	.417	.599	1.000	.655	.509	.443	.525	.520	.400
V47	.426	.343	.486	.450	.173	.482	.524	.264	.518	.409	.468	.419	.252	.431	.284	.359	.278	.424	.445	.533	.655	1.000	.601	.430	.457	.456	.389
V48	.339	.305	.448	.416	.186	.378	.466	.353	.451	.429	.486	.359	.256	.455	.373	.352	.339	.405	.451	.464	.509	.601	1.000	.449	.472	.428	.302
V49	.251	.284	.300	.280	.256	.280	.417	.331	.314	.311	.346	.413	.246	.447	.377	.346	.309	.360	.373	.381	.443	.430	.449	1.000	.376	.330	.328
V50	.390	.319	.464	.405	.312	.430	.392	.378	.521	.515	.546	.519	.324	.528	.321	.363	.290	.389	.346	.476	.525	.457	.472	.376	1.000	.674	.535
V51	.360	.259	.388	.300	.336	.404	.287	.300	.441	.468	.488	.475	.340	.495	.372	.287	.314	.385	.355	.421	.520	.456	.428	.330	.674	1.000	.538
V52	.272	.194	.353	.304	.399	.326	.340	.306	.372	.303	.469	.491	.343	.406	.277	.378	.267	.333	.336	.364	.400	.389	.302	.328	.535	.538	1.000

Table AF. 22: Embedding construct: KMO and Bartlett's Test – All variables – Portuguese sample

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.933
Bartlett's Test of Sphericity	Approx. Chi-Square	3540.110
	df	351
	Sig.	.000

Table AF. 23: Embedding construct: KMO and Bartlett's – Except V30 and V42 – Portuguese sample

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.935
Bartlett's Test of Sphericity	Approx. Chi-Square	3357.389
	df	300
	Sig.	.000

Table AF. 24: Embedding construct: PCA extraction communalities – Portuguese sample

	Initial	Extraction
V26	1.000	.715
V27	1.000	.688
V28	1.000	.648
V29	1.000	.623
V30	1.000	.566
V31	1.000	.609
V32	1.000	.541
V33	1.000	.668
V34	1.000	.744
V35	1.000	.568
V36	1.000	.672
V37	1.000	.577
V38	1.000	.535
V39	1.000	.628
V40	1.000	.670
V41	1.000	.735
V42	1.000	.658
V43	1.000	.545
V44	1.000	.538
V45	1.000	.583
V46	1.000	.680
V47	1.000	.707
V48	1.000	.598
V49	1.000	.498
V50	1.000	.674
V51	1.000	.687
V52	1.000	.609

Extraction Method: Principal Component Analysis.

Table AF. 25: Embedding construct: Eigenvalues and explained variance – Portuguese sample

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.835	40.131	40.131	10.835	40.131	40.131	3.923	14.529	14.529
2	1.715	6.351	46.482	1.715	6.351	46.482	3.638	13.473	28.001
3	1.321	4.893	51.375	1.321	4.893	51.375	3.083	11.419	39.420
4	1.161	4.300	55.675	1.161	4.300	55.675	2.810	10.407	49.827
5	1.033	3.826	59.502	1.033	3.826	59.502	1.789	6.628	56.454
6	0.898	3.326	62.828	.898	3.326	62.828	1.721	6.374	62.828
7	.810	2.999	65.827						
8	.792	2.932	68.759						
9	.781	2.894	71.653						
10	.712	2.637	74.289						
11	.668	2.474	76.764						
12	.655	2.428	79.191						
13	.572	2.118	81.309						
14	.556	2.059	83.367						
15	.515	1.907	85.275						
16	.470	1.741	87.016						
17	.434	1.607	88.623						
18	.415	1.537	90.159						
19	.369	1.366	91.525						
20	.354	1.311	92.836						
21	.329	1.220	94.056						
22	.308	1.141	95.198						
23	.297	1.099	96.296						
24	.295	1.093	97.390						
25	.266	.987	98.376						
26	.234	.865	99.241						
27	.205	.759	100.000						

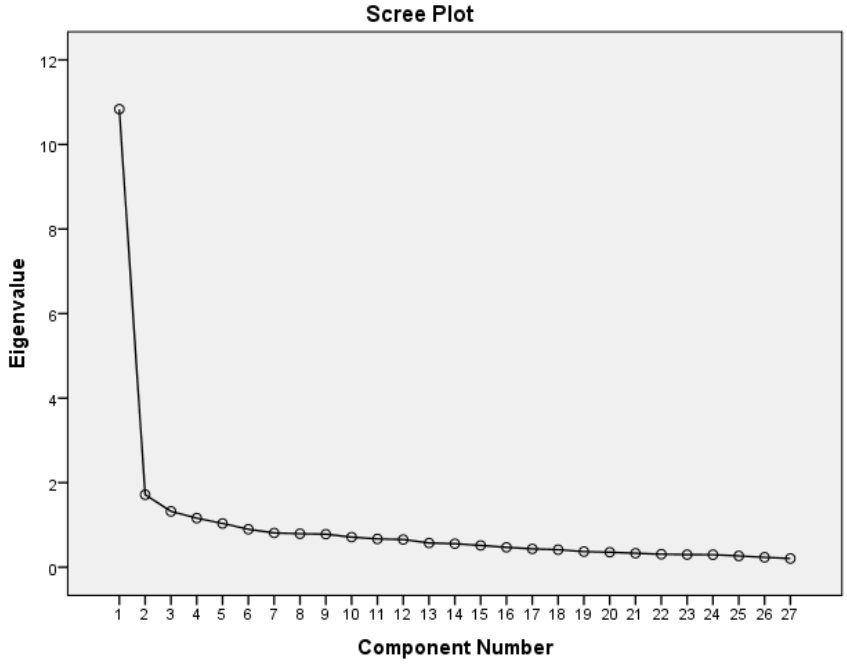

Figure AF. 4: Embedding construct: Scree plot – Portuguese sample

Appendix F

Table AF. 26: Tests of normality of data

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
People & organisational learning	.046	594	.004	.990	594	.000
General management system	.058	594	.000	.985	594	.000
Processes, tools & techniques	.067	594	.000	.976	594	.000
Communication & influence	.040	594	.023	.993	594	.009
Inner context	.042	594	.013	.977	594	.000
Routinisation	.051	594	.001	.987	594	.000
Implementation	.045	594	.006	.983	594	.000
Adopter	.043	594	.011	.980	594	.000
Outer context	.028	594	.200*	.997	594	.318

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table AF. 27: % of Respondents that have selected the 4 or 5 answers to V1

	1. Corporate standardisation of PM process.						
	Engineering & construction	Business services	IT	Telecommunications	Industrial services	Other	Total
1- Very low	6%	2%	0%	3%	0%	4%	19
2- Low	9%	9%	5%	8%	0%	13%	62
3- Medium	25%	20%	18%	28%	38%	19%	165
4- High	33%	27%	39%	32%	42%	35%	271
5- Very high	27%	41%	38%	29%	19%	29%	263
Total % of 4 and 5	60%	69%	76%	62%	62%	64%	780

Table AF. 28: % of Respondents that have selected the 4 or 5 answers to V2

	2. Corporate standardisation of PM tools & techniques.						
	Engineering & construction	Business services	IT	Telecommunications	Industrial services	Other	Total
1 Very low	4%	4%	0%	5%	0%	3%	18
2 Low	14%	8%	7%	9%	12%	16%	79
3 Medium	27%	26%	21%	32%	27%	28%	195
4 High	41%	38%	42%	40%	46%	38%	314
5 Very high	14%	25%	31%	14%	15%	16%	174
Total % of 4 and 5	55%	63%	73%	54%	62%	53%	780

Table AF. 29: % of Respondents that have selected the 4 or 5 answers to V3

	3. Corporate standardisation of PM information system						
	Engineering & construction	Business services	IT	Telecommunications	Industrial services	Other	Total
1 Very low	5%	6%	2%	6%	4%	6%	34
2 Low	16%	9%	7%	9%	20%	15%	84
3 Medium	28%	29%	21%	31%	20%	29%	199
4 High	32%	34%	46%	35%	40%	35%	300
5 Very high	19%	21%	24%	18%	16%	16%	159
Total % of 4 and 5	51%	55%	70%	54%	56%	51%	776

Appendix F

Appendix G: Practical Guidance on the Conceptual Framework Use

Applying the framework for embedding practice

PM Improvemente Initiative (PMII) designation:		Embeddment of the earned value management technique						
1° Step- Factors acknowledge		2° Step	3° Step- Scoring and planning actions during the dessimination process		4° Step- Scoring and planning actions during the implementation process		5° Step- coring and planning actions during the routinisation process	
	TOTAL SCORE		2.97		3.63		3.81	
Embedding Theme	Embedding Factor	Weight	Score (1…5)	Actions to enhance the effect of the factors	ore (1…	Actions to enhance the effect of the factors	ore (1…	Actions to enhance the effect of the factors
Adopter	Perceived usefulness	100%	3		4		4	
	Perceived ease of use	50%	3		2		2	
	Adopter motivation	75%	2		3		3	
	Predisposition for change	50%	1		3		3	
Inner Context	Resources to support change	100%	1		3		3	
	Sponsorship	100%	5		3		3	
	PM maturity	50%	3		3		3	
	Tension for change	50%	5		5		5	
	Absorptive capacity for new knowledge	50%	3		3		3	
Outer Context	Interorganisational PM practices	25%	3		3		3	
	External stakeholder requirement	0%	0		0		0	
	Unstable economic environment	25%	4		4		4	
	Environmental culture	25%	1		1		1	
Communication and Influence (diffusion/ dissemination)	Demonstrating the PMII value	100%	3		5		5	
	Stakeholders involvement	75%	2		3		3	
	Opinion leaders and key facilitators support	75%	5		5		5	
Implementation	Piloting	75%			4		4	
	Gradual implementation	75%			5		5	
	Specific training	100%			5		5	
	Adaptation/ re-invention	100%			3		3	
	Integration with the existent practices	75%			3		3	
	External collaboration	50%			3		3	
Routinisation	Feedback on PM improvement impacts	100%					3	
	PM quality assurance process	100%					5	
	Adopter accountability	100%					5	
	Nature of adoption decision- mandatory	75%					5	

Applying the framework for improving practice

1º Step		2º Step	3º Step	4º Step	5º Step	4º Step
			TOTAL SCORE 2.52	Main actions for handling the PMII in the organsiation Date:01/03/2014	3.21	Main actions for handling the PMII in the organsiation Date:01/09/2014
Improving Theme	PMII	Weight	Score (1...5)		Score (1...5)	
Process Tools and Techniques	Corporate standardisation and tailoring of PM processes	100%	4		4	
	Corporate standardisation and tailoring PM tools & techniques	100%	4		3	
	Corporate standardisation and tailoring PM information system	100%	2		2	
People & Organisational Learning	Provide PM training	100%	1		1	
	Manage PM competences	100%	1		1	
	Develop a culture of learning	75%	5		5	
	Benchmarking to PM assess and continuous improvement	25%	3		3	
	Develop a basic understanding of organisational PM practices among all project stakeholders	100%	5		5	
	Develop awareness of PM value among all staff	50%	3		3	
General Management System	Integrate the PM system with the general management system	25%	3		3	
	Develop supported infrastructure	50%	0		0	
	Develop a project sympathetic organisation structure	25%	3		4	
	PM professionalisation	25%	1		5	
	Establish PM career path for all PM roles	100%	1		5	
	Establish PM practices as internal standards	75%	1		5	

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