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**MEASURING THE BUSINESS SUCCESS OF
ENTERPRISE SYSTEMS PROJECTS**

By

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Submitted to Cass Business School
City University of London

In Partial Fulfilment of the Requirements of the Award of the
Degree of Doctor of Philosophy

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Declaration

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Abstract

Enterprise resource planning (ERP) systems are integrated application software packages that meet most of the information systems requirements of business organisations. ERP, or more simply enterprise systems (ES), have constituted the majority of investment in information technology by global businesses over the last two decades and have had a profound impact upon the way these businesses have been managed. Yet there is not a good understanding of how the business success, as opposed to the implementation project success, of enterprise systems projects can be evaluated. Of the two success concepts, extant literature places more emphasis upon project success rather than business success.

This research is directed at exploring the relationship between planned business success, generally included in ERP project business cases, and subsequent, empirical, post-implementation measures of business success. The study involved the interviewing of 20 key informants from both ERP adopting companies and ERP consulting firms to answer the research question of *'how do businesses evaluate the business success, as opposed to the project implementation success, of enterprise systems?'*

Using 10 *a priori* categories derived from the literature, 100 correlated categories were identified from interview data by use of a three stage coding process; 25 categories were selected from this larger group to identify relationships that were the most pertinent to the central research question.

The key findings of the research were that the strength of the ERP system business case was generally determined by three main categories of business driver; strategic business change, a lower cost business model and business survival. These categories of business driver then determined the criteria for business success applied to the project in post-implementation stages. Where lower cost business models, often involving shared service centres and outsourcing of these centralised functions, were the driver, the business case metrics were more likely to be used for measurement of business success. Otherwise there was generally either a dissociation of benefits estimates in business cases from subsequent success measurement or simply an absence of estimated benefits.

This framework for the evaluation of the business success of enterprise systems has advantages over the delivery of estimated, *a priori*, business benefits because:

(1) The assumptions underlying the initial estimates of benefits will generally be invalidated because of the changed business environment prevailing after the lengthy implementation of a systems project. This makes comparisons with empirical post-implementation measures of business success of reduced value. Further, measures of business success based upon delivered benefits assume a degree of causality between the new ERP system and business benefits. However, it is often difficult to disentangle benefits from new business processes enabled by the enterprise system from benefits derived from other business initiatives.

(2) Actual, realised business benefits of a new IT system are often not measured for organisational and behavioural reasons. For example, there may be a lack of continuity of project stakeholders over the implementation period. Or more simply, people are reluctant to study what are viewed as past and irreversible events.

(3) A final factor is the absence of accounting or other measurement systems to evaluate actual benefits, often the result of the replacement of legacy accounting systems used to estimate the initial planned benefits.

This research also adds considerably to current literature on the implementation of enterprise systems, which has generally studied project success rather than business success because of the relative ease of measurement of project implementation success.

INTRODUCTION

1.1 The enterprise systems phenomenon

For most of the 1970's and 1980's business organisations were content to manage their information systems along narrow functional lines and the vision of a single integrated information system remained a mirage (Markus and Tanis, 2000). But in the late 1980s, vendors began to develop integrated application software to meet most of the information processing needs of business organisations.

These packages became known as enterprise resource planning (ERP) systems and also, more simply, as enterprise systems (ES). By 1998 approximately 40% of all companies with annual revenues of over \$1 billion had implemented enterprise systems (Caldwell and Stein, 1998), the growth being driven by business process reengineering work popularly described by Hammer (1990) and later in the decade, driven by Y2K compliance.

Enterprise systems implemented in the early 1990's have been referred to as first generation ERP systems. More recent developments have been referred to as second or third generation ERP systems. This terminology requires further explanation. The initial development of second generation enterprise systems was to extend the core ERP functionality into customer and vendor sites, for example vendor managed inventory or web based sales ordering, thereby increasing collaboration across business systems. These developments formed part of e-business or e-commerce systems driven by the use of the internet within the business community in the late 1990s. Second generation enterprise systems have been described as maximising benefits, making continuous improvements, and taking advantage of new web-based technologies (Parr and Shanks, 2003).

Third generation enterprise systems is generally vendor terminology that has been used to describe enterprise system solutions for the SME sector which was neglected in the 1990's because of the prohibitive costs of implementation (Adam and O'Doherty, 2003).

The impact of first generation enterprise systems technology in the last twenty years has undoubtedly been much greater than the incremental developments that have led to second and third generation enterprise systems (Markus and Tanis, 2000). This is

not to underestimate the impact of web based technology upon enterprise systems but these developments are difficult to disentangle from the wider phenomenon of the internet and the impact it has had upon business information systems generally.

1.2 The business problem

There is extensive discussion of the business problem in the ERP literature. Peppard et al. (2007) have written about the reasons why benefits from IT investments are not realised and suggested the benefits identified in the opening business case need to have clear accountability and planning for effective realisation of these benefits. Ward et al. (2008) found that 96% of respondents in a major survey of businesses investing in large IT projects completed a business case but 65% of these also indicated that they were unable to identify all the available benefits and 69% reported that they do not adequately quantify and place a value on the benefits for inclusion in the business case.

As a practitioner in the last two decades, I developed an interest in the measurement of the success or otherwise of these large global projects. There were also concerns and observations about the overall governance of these very substantial investments.

These concerns can be expressed as follows. Large organisations implementing enterprise software do not appear to adopt a consistent or rational approach to the success of enterprise system projects. More specifically these organisations expend very different levels of effort in their initial estimation of business benefits and the measurement of actual business benefits after the implementation of the system. Focus is generally on project cost and time overruns, not surprisingly as these variables are more readily measured.

1.2.1 Project success and business success

This emphasis upon project delivery success rather than business success is also reflected in the extant literature on enterprise systems. Extensive research on project success and the critical success factors impacting this success (CSF's) was completed in the first decade of enterprise systems when the phenomenon was less well understood. However, overall there has been far less empirical research into measures of actual business success as opposed to *a priori* studies of planned business success. This reflects the inherent difficulties of measuring the business benefits of ERP

systems post-implementation. Also, the extended timescales of large global implementations make the study of both planned benefits and realised benefits difficult for both project stakeholders and researchers.

The research detailed in this thesis is based upon interviewing key informants with extensive experience of implementation of large, complex enterprise systems. These informants have been able to comment upon both project success and business success and the measures adopted by stakeholders to evaluate both success concepts.

1.3 Aim of the research

The thesis aims to address the above issues in two ways:

Firstly, the overall aim of the research is to develop a conceptual framework for the evaluation of the business success of enterprise systems. A secondary aim has been to clarify extant literature in the IS and ERP success measurement fields discussed above.

The overall population can be regarded as large global information technology projects implemented during the last two decades. The ERP projects cited by the key informants included primarily first generation enterprise systems implemented in the last two decades (see Appendix 6). These projects are better described as programs of multi-site implementations across multiple business applications, product divisions and geographies, often spanning 5-10 years of implementation of an evolving ERP system design (Markus et al. 2000).

1.4 Main findings of the research

The main findings of the research are best expressed as answers to the overarching research question *'how do businesses evaluate the business success, as opposed to the project implementation success, of enterprise systems?'*

(i) Where the business drivers are enabling strategic change or simply business survival, the business success of the ERP project is subordinate to these wider business objectives and business success is evaluated based upon meeting these relatively high level criteria.

(2) Where business benefits are included in the business case, these are generally used primarily for approval purposes and for the planning of multiple benefits realisation projects. However, these planned benefits are difficult to compare to actual, realised benefits because initial assumptions underlying estimated benefits are generally invalidated by a changed business environment post-implementation. One exception is the category of ERP projects where lower cost business models drive the business case, for example shared service centres often outsourced to lower cost providers. In this case, measures of business success can be based upon the planned metrics in the business case and evaluated shortly after implementation of the ERP systems.

(3) However, there is a wide range of organisational factors why businesses often do not measure the business success of enterprise systems projects, from lack of continuity of stakeholders, difficulties in measurement of benefits metrics, or simply a lack of interest in revisiting what are viewed as past and irreversible events.

(4) It might be expected that estimated business benefits would be used to evaluate business success of ERP projects. This would lead to a wide range of categories of business success, based upon the multiple categories of business benefits identified by both researchers and ERP project stakeholders. But this generally does not happen, for reasons stated above. *In the absence of this empirical, objective measure of business success, the frameworks for evaluation of business success in Tables 5-1 to 5-4 gives a higher conceptual level, but valuable, set of measures of business success defined in terms of the underlying business driver for the project.* Of course, stakeholders may decide to use of the many subjective measures of business success; these in turn reduce the incentive to use more objective measures of business success.

1.5 Intended contribution of the research

The intended contribution of this study is to the extant literature relating to enterprise systems which have dominated the investment in information systems by large global organisations over the last two decades. The research complements existing research studies of both IS and ERP system success measurement (DeLone and McLean, 2003; Shang and Seddon, 2003; Peppard et al: 2007, Ward et al: 2008, Gable et al., 2008; Ifinedo 2010). This critique of extant literature is based upon discussion of the dependent variables (project management and business success)

and related independent variables. For example, Critical Success Factors (CSFs) have been extensively studied in the literature by Markus and Tanis (2000). These CSF's can be viewed as a grouping of independent variables that impact the project management success of enterprise systems projects rather than the business success.

The study of this phenomenon pertaining to first and second generation enterprise systems and the huge impact upon the global business organisations who have adopted this technology in the last two decades is an area of research that will be of value in the study of other radical information systems technology that will undoubtedly be developed in the future.

1.6 Structure of the thesis

Chapter 1 provides background regarding the development and use enterprise systems technology and the issues relating to the measurement of the value of these large investments.

Chapter 2 presents an overview of the relevant extant literature in the wider information systems field and the enterprise systems field. The chapter aims to identify emerging knowledge of how businesses use enterprise systems and how success is measured, in both project management and business terms. Clarification of extant literature in the area of critical success factors is provided and an assessment of existing IS success measurement models (DeLone and McLean, 1992; Ifinedo, 2008) is given. An in-depth literature review of enterprise systems case studies was completed to understand the extent to which researchers in the field have been able to study the business success of ERP projects by using case study methods.

A gap in the research relating to the measurement of the business success of enterprise systems projects is identified and used to develop appropriate research questions.

Chapter 3 provides an overview of the selected research method for this study, a field study involving semi-structured interviews with 20 informed participants, together with an analysis of other research methods commonly used in the information and ERP systems fields. In particular, case study and survey methods are examined and reasons given for adopting a different, qualitative and more interpretive research

method. The use 'a priori categories' derived from the literature to 'scaffold' the subsequent data analysis is also described.

Chapter 4 describes the collection, coding and analysis of interview data from the 20 informed participants. Coding is completed in three stages; *a priori*, initial and selective coding (Miles et al., 2013). Interview data includes both units of observation; interview transcripts and project documents provided. 15 key category relationships are identified between the 25 selected categories for further analysis. These relationships are validated by use of ERP project documentation provided by the informants, including business cases, progress reports, post-implementation reviews and external press releases.

Chapter 5 discusses the main research findings. Relationships that were identified between selected categories are evaluated in the context of the extant literature. detailed research findings are illustrated in **Table 5-1 to 5-4**. How these findings address my research questions are discussed in **Section 5.3**.

Chapter 6 concludes by describing the implications for the practitioner and academic communities of each of the main research findings. The contribution to academic research is described in terms of clarification of extant literature in addition to discussion of avenues for further related research in the field of ERP and wider information systems success measurement models. Limitations of the research are identified and suggestions for reducing the impact of these issues upon further research are made.

CHAPTER 2 - LITERATURE REVIEW

The question *'how do businesses evaluate the business success, as opposed to the project implementation success, of enterprise systems?'* was motivated by my observations as an ERP practitioner over the period 1995-2003. The purpose of this literature review is to examine to what extent this motivating question has been addressed by extant literature in the information systems and narrower enterprise systems domains.

The diagram below illustrates the positioning of enterprise systems within the wider domains of business change projects and those enabled by new information systems, which ERP systems have dominated in the last two decades, in terms of size of the investment and the impact upon the way adopting businesses have been managed (Gartner, 2014; Goodhue et al., 2009).

A number of authors have emphasised the importance of further research into the business success of ERP implementation projects (Markus et al. 2000; Markus and Tanis, 2000; Ifinedo, 2008).

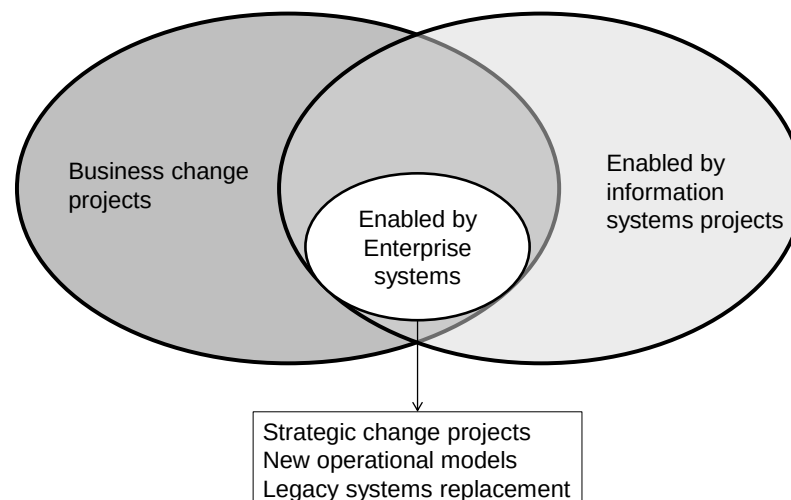


Diagram 2-1: Positioning of ERP projects within wider business context

The structure of this chapter is as follows:

Section 1 Information systems domain

This section discusses extant theory within the wider information systems domain which was developed before the inception of enterprise systems. But, for the last two decades enterprise systems have dominated the development of new information systems within large global businesses, particularly within the energy and consumer packaged goods industries. Because of this, research into large IT projects over the last two decades has been assumed to include a high proportion of ERP projects.

Section 2 The evolution of enterprise systems

This section describes the early development and impact upon the business community of enterprise systems technology.

Section 3 Definition of ERP success concepts

This section clarifies definitions of success concepts, in particular project and business success, concepts that have not always been consistently defined in enterprise systems literature.

Section 4 Business success of enterprise systems

My motivation to complete this research was founded in the phenomenon of the huge investment in ERP technology over the last two decades and the difficulty of evaluating the business success of these investments. This section discusses the extant literature in this field and the different arguments that exist regarding how to evaluate the business success, as opposed to the project success, of ERP projects.

Section 5 Critical success factors (CSF's) influencing enterprise systems projects

Much early literature was directed at understanding the CSF's influencing ERP projects, but the success concept within the acronym varied across different papers, generally being the concept of project success, which was more readily measured. Theory developed by this particular thread of literature is discussed.

Section 6 Organisational impact of enterprise systems

This section discusses the various theories developed about the impact of project organisation upon ERP projects success and also how the design of ERP systems can determine the structure of the adopting organisation itself.

Section 7 Summary of literature and gap relating to business success

This section summarises the extant literature reviewed and identifies a discontinuity or gap relating to business success. An in-depth review of case study research into ERP implementations is detailed to understand whether this method has been able to study business success.

Section 8 Gap in literature and research question

The initial research question is analysed in terms of how the extant literature provides answers and sub-questions developed to reflect discontinuities or gaps in the literature. Targeted research questions are constructed based upon this.

2.1 Information systems domain

Early theory within the information systems domain (Somogyi and Galliers, 1987) suggested that there have been three eras in the evolution of information systems in organisations: DP (simple Data Processing in the 60s/70s), management information systems and strategic information systems (SIS). The increasingly strategic role of information systems during the 1980s is discussed, based upon moving systems into the 'sharp end of the business and creating competitive advantage to the enterprise'. Research by Kettinger et al. (1994) of 30 organisations, to determine whether IT can convey competitive advantage where the strategic use of IT is deployed, concluded that any real advantage in the market place was short lived. McKenney (1995) commented that 'an enterprise system that gives competitive advantage today may not do so tomorrow when competitors catch up and having an ERP system becomes just a cost of doing business'.

Somogyi and Galliers (1987) concluded that 'more and more researchers and practitioners were looking to use technology strategically for the benefit of businesses but it remains to be seen how developers will deliver against these new expectations.' These comments were apposite as it was during the second half of the 1980's that

SAP, a German software house founded by three ex-IBM development staff, were building the foundations of enterprise systems software.

Continuing the theme of strategic information systems, Peppard and Ward (2004) suggested that a new era has been reached where organisations develop an IS ‘capability’. This is discussed in terms of the strategic application of IS/IT competencies.

(The authors of this paper, together with Professor Elizabeth Daniel, have been referred to as the Cranfield group of researchers. There have been a number of influential studies from these researchers during the last decade which have discussed aspects pertinent to my research question).

Peppard and Ward (2004) define capability as the ability of an organisation to exploit IS investments through the delivery of specific business benefits. Sustained investment to develop competencies allow the organisation to exploit the technology, systems and information it has in place and then make further investments which deliver explicit, measurable value through organisational performance improvements. It suggests that one core competence is the ability of an organisation to measure the real outcome of information systems projects.

The authors further suggest that many organisations do not adequately define the processes that derive value from IS investments, for example, processes for formulating strategies, management decision making for IS investments and managing the organisational and business changes required to deliver value. The paper then discusses the application of resource based management theory to IS management by focusing upon the competencies within the IS function.

IS/IT resources are considered by the researchers to be key project resource i.e. users with process knowledge and software to provide process change benefits and a technology landscape to support the required performance of the new information system. IS/IT competencies are the ability of the organisation to mobilise resources to allow implementation of specific projects that convey sustainable business benefits (in the context of the above paragraph). IS/IT capability is discussed as the strategic application of IS/IT competencies. It is suggested that the ability of organisations to make strategic enterprise systems investments and to measure the success of such projects in terms of delivered business benefits is a core IS/IT capability.

These papers discussing the wider field of IT systems became more apposite to ERP systems theory as enterprise systems technology began to dominate technology investment in the two decades from 1995-2015. In particular theory was building that large IT systems, now including ERP systems were strategic by nature and measurement of the business benefits was a core competence of a business, in agreement with Peppard and Ward in the paper cited above.

2.2 The evolution of ERP systems

The first large implementation projects, as opposed to pilot and testing projects, were completed by Exxon and Mobil in the early 1990s. The first ERP specific literature largely originated in the second half of the 1990s when the experience of enterprise systems implementation was sufficiently understood to generate arguments about the value or otherwise of these investments.

Vendors of enterprise systems emphasised the value of the new technology in terms of its impact upon the way the business was managed, generally in terms of allowing new and improved business processes to be introduced. Davenport (1994) emphasised the importance of Business Process Re-engineering (BPR) work at the same time as enterprise systems were being adopted by large business organisations. Much of this redesign of business processes was based upon 'best practice' or other guidelines, often proposed by consultants continuing Hammer's seminal work in this area (Hammer, 1990). The wide business interest in process reengineering in the early 1990s was opportune for vendors of enterprise systems and for SAP in particular. However, the importance of redesigning business processes in the implementation of new IT systems predates ERP technology (Leonard-Barton, 1988; Markus and Keil, 1994).

Business process models embodied in enterprise software structure soon became the standard for BPR work, particularly where vendors had developed industry specific software based upon industry 'best practices'. However, this led Davenport to question the value of enterprise systems some years later (Davenport, 1998). In his paper 'Putting the Enterprise into an ERP system' the author raises issues about the business value of an ERP system. Davenport studied a small number of enterprise systems projects and pointed out the importance of high level management commitment to the project because of the organisational implications of adopting the

ERP business model. Davenport says 'some degree of customisation is possible' when managing the risks of forcing an IS business model onto the adopter organisation. This point is reinforced by Malhotra (1998) in his overview paper of business process redesign. Also Rosemann (2003) has commented that enterprise systems reference models do not include any links to process execution in terms of KPIs. These papers reflected the concerns of both practitioners and the academic community that adopters of enterprise systems were being coerced into radical changes to their existing business processes.

Davenport emphasises the market domination of SAP in the energy, high-tech and semi-conductor industry sectors and says 'such convergence around a single software package should raise a sobering thought in the minds of CEOs: how similar can our information flows and processes be to those of our competitors before we begin to undermine our own sources of differentiation in the market?' Davenport answers his own question later in the same paper by pointing out that the standardisation processes driven by an enterprise system business process model are often restricted to the less customer facing processes, for example finance, HR and other back office functions. Customer relationship management (CRM) applications were only developed as part of the integrated enterprise system in the late 1990s.

So there was often a conflict in the 1990s between process reengineering work completed independently of enterprise systems, often in the years prior to adoption, and BPR work completed as part of the ERP implementation (referred to by practitioners as the blueprint stage). As Davenport argued, 'most companies installing enterprise systems will need to adapt, or even completely rework their processes to fit the requirements of the system' during the implementation phase. It is interesting to read comments made by Gattiker and Goodhue (2005), when the impact of enterprise systems was better understood; 'conceptually ERP systems provide integrated and arguably so-called best practice business processes'. Wagner et al. (2005) discuss the implications of 'best practices being embedded into the software' in terms of the risks of users not being able to question these best practices and the extent to which they may be appropriate for the adopting organisation. Markus and Tanis (2000) defined the chartering phase as 'comparing current business processes with 'reference models' or 'best practices' embedded in enterprise systems software'.

A broader comment on the reasons for adopting an enterprise system was made by Connolly (1999) 'only companies seeking to streamline business processes, to standardise data, or to standardise processes can achieve a positive return on their enterprise system investment'.

2.2.1 Year 2000 compliance

Much of the ERP literature in the years preceding 2000 naturally focuses upon the Y2K functionality of ERP software and the business necessity to operate Y2K compliant software. Markus and Tanis (2000) discuss the phenomenon of 'fast-track implementations to meet the Y2K deadline' but also discuss the separate issue of a two stage ERP implementation strategy; install the new technology, then as a second stage, change business processes and gain the rich functionality benefits 'at leisure'. This is at odds with Davenport (1998) who argued that the implementation of an enterprise system forced new business processes upon an organisation, dictated by the software business model involved and viewed the ERP implementation as a single stage after which it was difficult to change the software configuration.

Y2K compliance was clearly a major influencing factor in the approval process for many enterprise system implementation projects over the period 1995-2000. However, there were also many other business benefits realised from these projects in addition to the Y2K factor. The issue not always made clearly in the literature about Y2K projects is that measurement of these benefits was often not made, either at the estimation phase or subsequently, because *the 'do-nothing'* option was not considered to be feasible and therefore project approval was often made without the need to consider other benefits. The term 'do-nothing option' is common to practitioner literature about information systems and is used to convey the urgency of a systems replacement project, often linked to survival of the organisation, and the term is used frequently in this study.

So theory in this early period of businesses using ERP systems was directed at the impact of the new technology upon how ERP systems are implemented and the impact upon business processes of the adopting organisation. There were concerns about 'forcing' processes within the software business models upon organisations with possibly different requirements. The use of ERP systems to satisfy Y2K needs was well understood.

2.2.2 More recent literature

Research into ERP systems over the last decade has naturally matched the development of second and third generation ERP systems and more recently has studied two particular technology developments:

- (1) The increasing commoditisation of ERP systems and benefits of this for the SME sector.
- (2) The introduction of new generations of ERP technologies such as cloud technology.

Haddara and Zach (2011), in a review of ERP systems in the SME sector comment that there is 'close to saturation of ERP adoptions in large enterprises' and recommend further research that might benefit the SME sector. In terms of ERP use within Europe, Eurostat (2015) figures state that the percentage of all EU enterprises using ERP software applications reached 31% in 2014, a 10% increase over 2010. Progress was expected amongst SME's (26% using ERP systems).

In terms of the use of new technologies by ERP vendors, Cloud ERP has been defined as an approach to enterprise resource planning (ERP) that makes use of cloud computing platforms and services to provide a business with more flexible business process transformation (WhatIs.com, 2015).

Recent literature has emphasised the SaaS (software as a service) aspects of cloud computing. For example an extract from ZDNet (2014); 'The traditional view of ERP as an integrated, end-to-end process suite sourced from a single vendor has been under increasing pressure in the last 10 years because many organizations have faced challenges with the cost and complexity of maintaining these solutions ...and have struggled to keep pace with vendor-driven upgrade cycles. The emergence of cloud-based business applications has dramatically increased this pressure in the last five years, and now ERP leaders see large elements of the ERP footprint being challenged and even replaced by cloud 'upstarts' in areas such as talent management (Oracle Taleo Cloud Services, SuccessFactors) e-procurement (Ariba, Coupa), travel and expenses management (Concur, Infor) and more'.

Literature covering the impact of first generation ERP system technology has not surprisingly declined in volume substantially over the last decade and, in particular

studies of the business success of ERP systems. The literature on cloud technology and other forms of SaaS emphasises the reduction in TCO (total cost of ownership) of ERP systems. This would suggest that the cost/benefit equation of ERP implementation has become more favourable as a result. Overall, it seems to have been accepted that ERP systems are now a standard component of the information systems architecture within large business organisations and the need to question the value of investments in enterprise systems is generally absent from both practitioner and academic literature. Because of this, literature in the ERP domain over the last few years has not contributed a great deal towards our understanding of the value of enterprise systems, compared to the literature over the first decade of experiences of adoption of the technology.

2.3 The definition of ERP success concepts

Much of the extant ERP literature refers to the success of ERP projects and many papers detail research into ‘critical success factors’ that influence the success of ERP projects. But as Markus and Tanis (2000) comment, ‘the definition and measurement of success are thorny matters; first, success depends on the point of view from which you measure it. People mean very different things when talking about the success of enterprise systems’. Markus goes on to make the point that perceptions of success differ across the ‘constellation’ of project stakeholders (senior management, project sponsors, project managers and consultants). Constellation is a descriptive term encapsulating well the lights that shine and fade during a complex systems project. Nelson (2005) agrees with Markus that project success is ‘in the eye of the beholder.’ At any point in time, a project may receive an entirely different opinion on success, and ‘it’s unlikely to be a binary one’.

Perceptions of success, whether project management or business success inevitably vary according to the stakeholder, whether vendor, consultant, project manager or business user of the ERP system (Markus and Tanis, 2000). However, it is reasonable to say that perceptions of business success vary more than project management success because of the subjectivity issues that are generally present in measures of business success.

The wider domain of project management literature helps to clarify the issues of success definitions. The measurement of project success is perhaps an ‘illusion’ (De

Wit, 2002) where a project has the multiple objectives of multiple stakeholders. De Wit makes the distinction between project management success (delivery criteria such as time, budget and quality) and wider business success, and also says 'good project management can contribute to project success but cannot prevent failure.' Similarly, even bad project management may not prevent success. Cooke-Davies (2002) also makes the distinction between success criteria (measures by which success or failure of a project will be judged) and success factors (those inputs to the management of the project that lead directly or indirectly to the success of the project or business).

The literature describing research into CSFs that impact ERP projects do not often discuss the definition or measures of 'success' included in this acronym. In most of the papers in this category it appears that project success has been primarily based upon the necessarily subjective judgment of the particular stakeholders engaged by the researchers. But this is understandable; there was a very reasonable assumption that project success was a necessary prerequisite for business success. Theory about the causality between the two success concepts is not well developed; researchers have tended to study one or other of the two separate, distinct success concepts.

For example, Hong and Kim (2001) comment that ERP implementation success is evaluated by project team members in terms of time, budget and system performance; in other words, project management success. They continue by saying that ERP implementation success was measured during their study in the above terms but also the 'failure to achieve expected benefits' was taken into account. In discussing limitations of their study, they comment that they did not study factual outcomes of success in the research because of the difficulties of obtaining data from the organisations studied. This implies that the researchers were able to research factors impacting project management success but measurement of planned benefits was not completed because of lack of available data.

Nelson (2005) argues the importance of evaluating project success from multiple dimensions and suggests three process based measures of 'project success'; delivery to time and budget and meeting technical parameters, and three outcome based measures of success; whether the product was used, whether the project prepared the organisation for the future and whether the project improved the efficiency or effectiveness of the organisation (termed value). This paper is helpful in the sense

that it differentiates between project management and business success but does not describe measures of business success: stakeholder groups rated the outcomes across 15 projects but without detailing how 'value' was operationalised.

2.3.1 Conceptualisation of success

Project success has been discussed in some detail by Markus and Tanis (2000) within the project implementation phase. These outcomes can be measured with relative ease, for example delivery to time, budget and planned technical parameters.

Business success has been discussed by a number of authors and is often based upon different categories of business benefits, some of which may have been planned and documented in an initial business case, some less easily correlated with the ERP system itself; in other words some business benefits could have been achieved by improvements to the legacy systems. Four valuable studies in this field listed below:

(1) *Building better business cases for IT investments* (Ward et al., 2008). (Figure 2: classifying benefits by their degree of explicitness).

This paper includes a classification of business benefits based upon their degree of explicitness; financial (high) quantifiable, measurable and observable benefits (low) are related to the type of business change. The three types of business change are: do new things, do things better and stop doing things. These categories of *a priori* benefits, if readily measured by businesses adopting ERP systems, would provide empirical measures of the business success of enterprise systems.

(2) *Managing the realisation of business benefits from IT investments* (Peppard et al., 2007) Figure 1: benefits dependency network (BDN).

This paper provides a valuable framework showing the linkage between IT (ERP) systems and the enablement of business benefits. This benefits dependency network (BDN) is of value to change management project managers of enterprise systems implementations and shows how IT (ERP) systems can enable business benefits and uses the high level concepts of business drivers and investment objectives to help explain different types of implementation project. The framework allows IT investments to be driven by investment objectives (business demand) rather than IT supply (IT enablers) by following the analysis from right to left as shown below in Diagram 2-2.

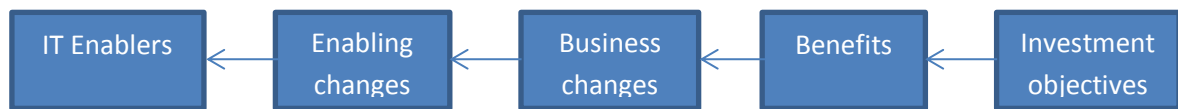


Diagram 2-2: Example of benefits dependency network

Source: Peppard et al., 2007

(3) Enterprise system experience cycle (Markus and Tanis, 2000)

The authors propose a 4 stage framework for an ERP project and detail performance metrics and possible outcomes of each stage including the ‘onwards and upwards’ phase where it is suggested that most business benefits are realised. Each phase is detailed in terms of key actors, typical activities, common errors or problems, typical performance, metrics and possible outcomes. Possible outcomes of phase 4 include ‘formal or informal assessment that investment has been unsuccessful or that project has achieved goals and /or unexpected benefits. This study is helpful in proposing temporal aspects to the evaluation of business success; it is more likely to be measurable in Phases 3 and 4.

(4) A comprehensive framework for assessing and managing the benefits of ERP systems (Shang and Seddon, 2003)

Shang and Seddon (2003) have proposed some dimensions of ERP system benefits (operational, managerial, strategic, IT infrastructure and organisational). They suggest that ‘these categories of benefit could be used as a technique for measuring the dependent variable in studies that try to assess the impact of factors that influence ERP system benefits’. This study aligns well with my research insofar as benefits are classified under headings (strategic, operational and managerial) that I have termed business drivers later in this paper (as strategic business change and lower cost business models).

These papers show that researchers in the IT/ERP project field have a consistent understanding of the concept of business success but the issue of causality between the enterprise system and the categories of business benefit remain less clear. If explicit business benefits enabled by the enterprise system included in the opening business case were then measured in the ‘onwards and upwards’ phase of Markus and Tanis (2000), then this would have provided a clear method for the evaluation of

business success. But these studies did not attempt to make comparisons between estimated, *a priori*, benefits and delivered benefits post-implementation.

In summary, the dependent variable of project success and the factors influencing this were more clearly defined and measured. However, business success remained a concept open to wider, often more subjective interpretation. But substantial literature relating to the enablement of different categories of business benefit was converging after ten years of ERP project experience, exemplified by the above papers. The emphasis of this research was upon the *a priori* benefits in business cases or planned implementation projects to enable benefits rather than on post-implementation benefits. As a result, the empirical evaluation of business success of enterprise systems projects was an aspect generally absent from research into enterprise systems projects.

2.3.2 Information System success measurement models

Researchers' interest in the reasons for the success or failure of information systems projects owes much to the DeLone and McLean (1992) study of IS success measurement models. This research is generally based upon trying to establish relationships between system constructs or dimensions and deals with lower level success concepts than the business success concept which is central to this study.

For example, Ifinedo (2010) is a relatively recent paper that clarifies the relationships between the constructs or dimensions of an ERP system. Ifinedo investigated the relationships amongst six constructs in a respecified ERP system success measurement model developed from prior frameworks (Gable et al., 2008). This model was, in turn, was based upon the widely accepted IS success measurement model developed by DeLone and McLean (1992) - the 'D&M model'.

Ifinedo comments that the assessment of post-implementation success of ERP systems has not been sufficiently researched. Seddon (1997) noted that 'many firms do not conduct rigorous evaluations of IS investments because they lack the knowledge to do this'. 'Research in the area of ERP systems success measurement is just beginning to evolve' (Gable et al., 2008).

Sedera et al. (2006) surveyed 27 public sector organisations to research the nature of different categories of stakeholders in ERP projects and to allow a better

understanding of measures of success. This study emphasised the importance of measuring ERP system success from a multiple stakeholder viewpoint. Ifinedo comments that whilst other researchers have studied interrelationships amongst CSFs during the implementation stage (Akkermans and van Helden, 2002), their study is the first to review 'ERP success dimensions beyond the implementation stage'.

Ifinedo goes on to comment upon the overall concept of ERP implementation success. The author goes on to say that the respecified, extended (from the earlier models referred to above) ERP systems success model is composed of subjective and perceptual measures; 'Objective measures, where the system has enabled organisational effectiveness, are difficult to quantify and obtain from organisations'. The author states that perceptual measures are easy to collect from organisations but recognises the shortcoming that people sometimes 'may not say what they mean or say what they do not mean' (Markus and Tanis, 2000).

Ifinedo does suggest that ERP systems constitute a particular class of information system and therefore the D&M IS success model may not be appropriate, a reasonable comment as the D&M model was developed before the introduction of ERP technology.

I would argue that ERP technology has had such a major impact upon the performance of adopting organisations that specific measures are required to measure ERP system success as opposed to generic IS success. Ifinedo (2010) states that research in the specific area of ERP systems success measurement is just beginning to evolve, in agreement with this point.

Gable et al. (2008), cited by Ifinedo (2010), examines the concept of information systems success in multiple dimensions and comments that there has been little consensus on appropriate measures of IS success over three decades, impeding establishment of a cumulative research tradition. Melville et al. (2004) comments 'studies examining the association between information technology and organisational performance are divergent in how they conceptualise key constructs and their relationships'.

I would reemphasise the distinction between project management success and business success rather than Ifinedo's distinction between subjective, perceptual measures and objective measures (which form part of the IS measurement models).

Project management success, as I have discussed earlier, can be measured with relative objectivity in terms of the delivery of an enterprise system to planned timescales, budget and technical parameters. Measures of business success are necessarily more subjective and perceptual, as suggested by Ifinedo and the comment is made that the reason for this is that objective measures of success such as increased organisational effectiveness are difficult to obtain from ERP adopters. Whether these adopting organisations are able to complete empirical studies of these measures of success is a further issue in the discussion.

2.3.3 Dependent and independent variables of IS success

The terminology of the IS success measurement model research work is based upon IS constructs or dimensions and does not extend to discussion of business success as a dependent variable. This is perhaps because the causality between particular constructs is not viewed as being well established within this field of research.

However, the CSF related field of ERP research discussed earlier has demonstrated the role of certain CSFs as independent variables (groupings of ERP system constructs) in impacting the project management and business success of ERP projects.

There is some inconsistency within these models that affect their value in terms of understanding IS success. Firstly, there is a mix of higher level, macro concepts such as organisational impact, one measure of business success, with lower micro level constructs such as workgroup impact. Secondly, the models contain a mix of constructs or dimensions which are both independent variables (for example, dimensions such as the service quality of a software vendor which may influence IS success) and also dependent variables (for example, organisational impact which is one measure of IS success).

However, it is reasonable to categorise certain system constructs or dimensions as either dependent or independent variables based upon the inherent nature of the construct. For example, a construct that is a system outcome such as user satisfaction would be a dependent variable, whereas software vendor support, as studied by Ifinedo (2008), would be categorised as an independent variable. A further example of an established independent variable with a causal relationship to ERP project management success would be high quality project management (Somers and Nelson,

2001). In support of this, Gibson (2004) has commented, based upon survey research methods, that 70% of IT projects aimed at enabling business change do not live up to expectations, the problems stemming from both senior and project management failure.

This research, directed at a better understanding of the evaluation of the business success of ERP projects, has findings that indicate that there are often wider strategic reasons for adoption of an ERP system. However, measures of achievement of these strategic goals are not discussed in the IS success measurement models because of the focus upon system constructs or dimensions that are defined at much lower, micro level.

Success in the context of the achievement of strategic goals would be measured by implementation of a business strategy that is enabled by ERP information systems. The implementation of such a business strategy, in terms of measures of success, overrides any of the success measures discussed above in relation to variations of the D&M success measurement model and the constructs upon which they are based.

2.3.4 Project management and business success

I have discussed the concept of business success of enterprise systems rather than project management success, a distinction emphasised throughout this paper. The level of causality between the two dependent variables is an area of discussion not covered in this paper.

Literature relating to IS success measurement models, as illustrated earlier, has been extended to enterprise systems. This field of research has generally interpreted success as project management success and has focused upon the relationships between multiple success constructs such as system quality, information quality and workgroup impact. Each of the two separate dependent variables, project management success and business success, may be viewed as having large numbers of independent variables depending on the grouping or categorisation of these variables. For example the CSF related field of ERP literature has managed to work with about 15-20 CSFs (groupings of independent variables that impact project management success). Whether these same groupings of independent variables have a similar impact upon impact business success has not been widely discussed, perhaps because of the explicit assumption that project management success conveys business success.

Nelson (2005) conflates these issues in his paper 'Project Retrospectives: Evaluating project success, failure and everything in between'. The author suggests three process related criteria: time, cost and product (technical parameters) and three outcome related criteria: use, learning and value. The term value is an interpretation of the concept of business success. The author then goes on to identify examples from survey research of projects that were viewed as successes and failures based on the above grouping of criteria. ERP practitioners have used a simplistic four square diagram to illustrate the same point:

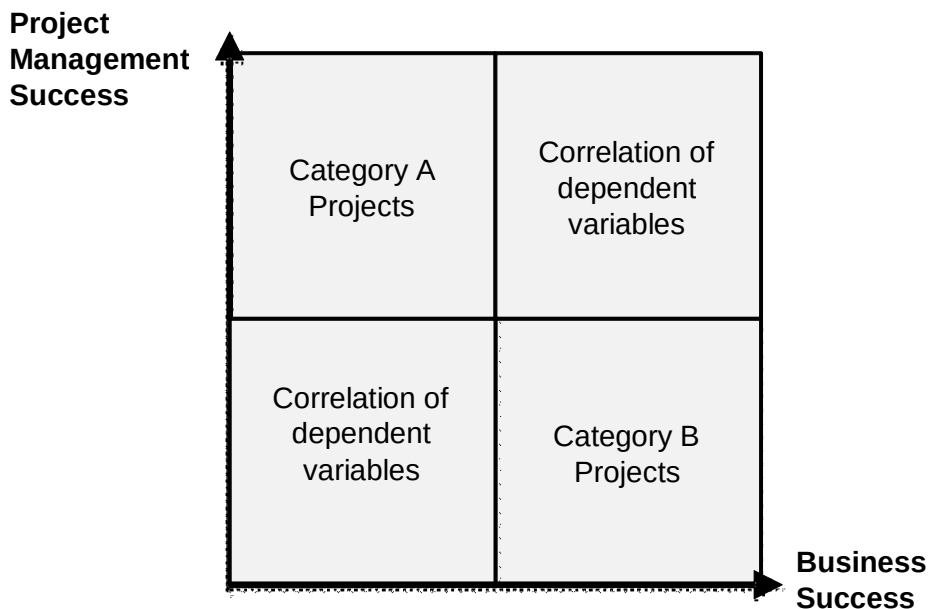


Diagram 2-3: Project management and business success

Notes:

- (1) Category A projects would be characterised by high project management success: delivered to time and budget and technical specifications, but where savings on resources have had a negative impact upon design and functionality of the enterprise system, resulting in low business success.
- (2) Category B projects would be characterised by low project management success criteria: overruns on time, cost and technical specification (i.e. higher user system response times) but where the increased resource allocation has resulted in increased business success.

Much of Gartner's research and other practitioners work has focused on variations of the above basic analysis; generally focussing upon how to migrate completed projects into the two right side quadrants. One field of research that does include the above

discussion of project success criteria is the wider research into business project success measurement. An example is Shenhar (2001) 'Project Success: A Multidimensional concept'. The author states four major distinct success dimensions: project efficiency, customer impact, direct business and organisational success, preparing for the future. The authors stated that importance of the dimension varies according to the level of technological uncertainty involved. Shenhar discusses the distinction between project management and business success in the wider context of business projects but in the same terms that I have used earlier to discuss enterprise systems projects.

2.4 Research into the business success of enterprise systems

Researchers' interest in the reasons for the success or failure of large information systems projects has increased in the last decade because of the very high levels of investment required and the high public profile of both successful and failed projects. This led to a number of studies that were not restricted to the project success concepts discussed earlier but were directed at understanding the wider business success of enterprise systems projects.

Two key papers were published in 2000:

- 1) 'The Enterprise System Experience - From Adoption to Success' (Markus and Tanis, 2000)
- 2) 'Learning from adopter's experiences with ERP: problems encountered and success achieved' (Markus et al. 2000)

In the first paper Markus and Tanis (2000) describe reasons for adopting ERP systems and also provide perspectives on ERP system success, recognising four stages of the project from a success recognition standpoint ; the chartering, project, shakedown and the 'onward and upward' phases. The addition of the chartering phase is emphasised in this paper and, because any business case activity would normally be included in this initial phase, I have used this four-stage framework, illustrated below in Diagram 2-4, in discussions of the use of business case metrics as measures of the success of enterprise systems projects. Reasons for adopting ERP systems are categorised as technical (solve Y2K problems and reduce IT costs) and business (accommodate business growth, improve and standardise business processes across multiple locations).

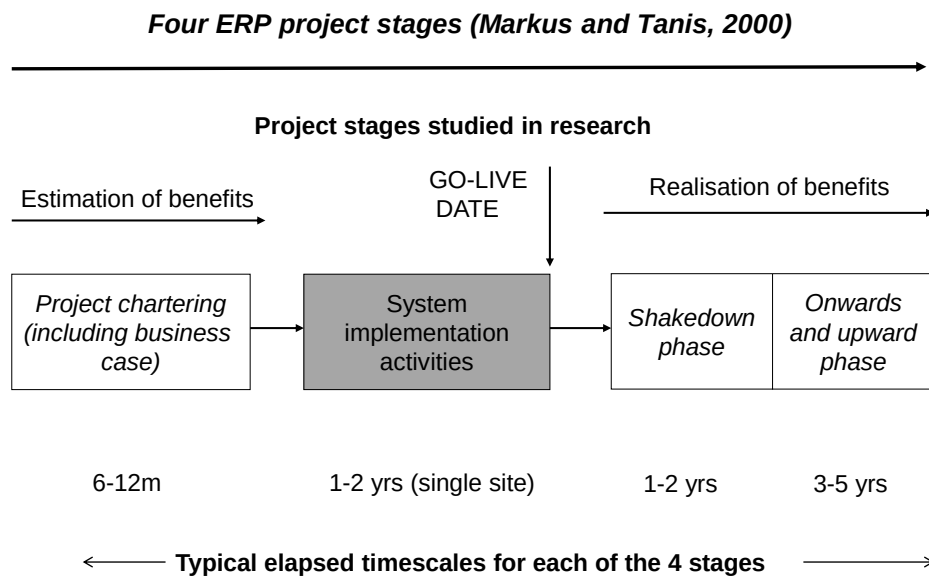


Diagram 2-4: Four stages of an ERP project

In the second paper Markus et al. study three basic research questions that were asked of 16 ERP adopting organisations:

- 1) How successful are companies at different points in time in their ERP projects?
- 2) How are these different measures of success related?
- 3) What problems do ERP adopters encounter and how are these problems related to outcomes?

Their findings detailed the project stages of an ERP project and illustrated the ERP project experience of the research team. The paper, in particular, illustrated the complexity of measuring the perceived success of ERP projects. The connections between starting conditions, problems experienced and outcomes in enterprise systems projects were not viewed to be deterministic. This paper emphasises that further research was required to understand problem recognition and resolution behaviours and how they interact to affect outcomes and also that ERP project experience was a key factor in allowing the authors to interpret the complex project data generated by the case study approach

Markus and Tanis (2000) have recommended further research into the ERP ‘project charter’ phase which includes the processes for estimating benefits for business case

approval and how these benefits might be subsequently measured, issues central to my motivating research question.

The same authors do try to answer the question of how to define the success of an enterprise system and discuss success as an independent variable and go on to discuss theories as to why ERP success occurs. The authors build upon an emergent process theory (Soh and Markus, 1995) to develop their framework because 'emergent process theories account for mutual influences between the organisation and its environment'. To elaborate, Soh and Markus proposed a process theory about how IT creates business value. According to this process theory, there are three stages in the process that IT creates business value in organizations: IT conversion process, IT use process, and competitive process. A number of factors influence successful completion of these stages. One of them, organisational culture, has been regarded as being among the most crucial. Markus and Tanis (2000) commented that this earlier framework of 1995 needs to be modified in two important ways; the outcome variable needs to be changed from business value to an 'optimal success' concept and the initial, project chartering phase needs to be included in the model.

Gattiker and Goodhue (2005) discuss organisational impacts after the go-live phase and the shake-out phase has occurred. They support the arguments of Markus and Tanis (2000) that benefits of ERP projects are often derived over longer timescales and are dependent upon organisational changes rather than technology. This research (Gattiker and Goodhue, 2005) was based on a questionnaire survey of over a hundred manufacturing plants. The authors test the theory that ERP will have a better 'fit' when interdependence between sub-units of an organisation is high and differentiation between sub-units is low. The authors comment that most literature completed before 2005 suggests that most ERP research has focused upon software selection and implementation and not upon ERP post-implementation impacts.

Wagner et al. (2005) reviewed six ERP papers in each publication to understand the contextual influences on ERP system design, implementation, use and evaluation. All papers were based on longitudinal research (historical and real-time) and attempted to capture the dynamics of ERP based process improvement; 'There is a need to examine the ways ERP systems shape and are shaped by individual group interests and preferences as well as organisational and societal structures and cultures'. These papers indicated the difficulties of the academic community in understanding the

nature of the ERP phenomenon and in particular, the idea that a new technology could be viewed as driving fundamental changes in the organisation structures of the adopting businesses.

Continuing the development of theory regarding the impact of ERP systems, the question of the business rationale for IT investments, including ERP projects, was discussed (Ward et al., 2008) based on an earlier survey of over 100 European organisations (Ward et al., 2007). The researchers surveyed 100 European organisations to understand the use of business cases for IT investments. The response could be summarised in terms of extensive dissatisfaction with their ability to measure business benefits.

Furthermore, Ward et al. (2008) detail a six-stage approach to developing business cases and subsequent accountability for IT investments and relate the use of this approach in selected projects to the success of the project. On the basis of the above mentioned survey it was reasonably concluded that 'organisations that adopted our approach were more successful in delivering value from their IT investments'.

This paper, together with other studies by the Cranfield group of researchers in the last decade, have clarified the nature of the business success of enterprise systems, how planned business benefits in a business case can be best categorised and accountability for these benefits provided, but also emphasised the difficulty organisations have in actually measuring benefits in the upwards and onward phase; 'it was found that 'only 20% of business organisations surveyed were satisfied that they carried out an evaluation and review of business benefits sufficiently well'. The analytic theme of examining post-implementation measures of benefit was continued by Chen and Chou (2009). The authors commented 'we will focus upon the post-implementation phase because many firms have used ERP over a period of several years and the success of the initial phase does not necessarily lead to benefits later'. But a firm level survey was then conducted to ask respondents how environmental and conducted factors impacted project success. Like many similar survey research studies, the researchers were reliant upon subjective measures of success for their study. Objective measures of success, for example reductions in staff numbers in back office functions or reduced inventory levels do not seem to have been readily available to researchers using survey methods, a problem for researchers noted by Ifinedo (2008). So, although the Cranfield papers referred to above developed theory

about the *a priori* business success of ERP systems, the operationalisation of these business benefits and measurement post-implementation was proving difficult to study by survey research or other methods.

Authors also began to focus upon the difficulties of implementing ERP systems in the last decade as the ERP 'honeymoon' ended. Goodhue et al. (2009), in a paper titled 'Addressing business agility challenges with enterprise systems', completed interviews with 15 firms and asked how 57 different business agility challenges had been tackled. In the majority of cases firms had been only been able to adopt solutions by changing the complex core system, using add-ons that the ERP vendor supported. Rettig (2007) argued that ERP software has not delivered on the promise to deliver full integration of complex business processes while remaining flexible to adapt to changing business needs. He states that ERP systems have introduced high risks, uncertainty and a high level of complexity. Thus the development of theories of business success was tempered by studies that raised questions about the regularity of such success.

Swanson (2003) surveyed 90 information system managers across a range of businesses implementing enterprise systems and concluded that estimated business benefits were a 'key success correlate' above other reasons for adoption cited by participants. Also, the willingness to take advantage of an ERP package's functionality was said to be predictive of implementation success. This aligns with comments discussed earlier from research by Davenport (1998) where the author emphasises the risks of not using the business processes built into the enterprise system software business model.

Nelson (2007) studied 99 major IS/IT projects using survey methods during 2006 in terms of 'what went wrong' using the four categories (McConnell, 1996) of people, process, product and technology in order to classify major mistakes. This meta-retrospective of the projects studied found that only 4% were categorised as technology mistakes, with business process mistakes as 45%. This study reinforces the argument that technology is very much commoditised whereas process design (as reflected in configuration of ERP software) is a key success factor in ERP projects. This comment is based on the reasonable assumption that the majority of the 99 projects studied by Nelson at this time would have been ERP projects.

Peppard et al. (2007) have carried out extensive research into the planning and realisation of the business benefits of IT investments including large ERP projects. They comment that many large organisations have little interest in measuring benefits post-implementation; more emphasis is placed upon adherence to project timelines and cost budgets. In other words, emphasis was upon measures of project management success rather than business success of enterprise systems projects.

Research into the business success of ERP systems raises the challenge of examining longer-term benefits rather than the benefits identified from shorter-term post-implementation review studies. Using the four stages of an ERP life cycle identified by Markus and Tanis (2000), there is a gap in the literature regarding the evaluation of business success during the 'onward and upward' phase, in addition to the 'shakedown' phase. In other words, theory about the operation of ERP systems and the planning and realisation of business benefits generated was well advanced; however, studies to evaluate this business success from a stakeholder viewpoint were less developed.

Peppard and Ward (2004), as discussed earlier, use a resource based management view to define IS capabilities and competencies. The researcher suggests that the ability of organisations to make strategic ERP investments and to measure the success of such projects in terms of delivered business benefits is a core IS competence. But the authors do not discuss how 'delivered business benefits' can be readily measured.

Ross and Beath (2002) 'Beyond the business case; new approaches to IT investment' interviewed 20 US businesses regarding their approaches to IT investment. Senior managers stated they allocated funding for initiatives perceived as strategic without any supporting business case. Peppard et al. (2007) do not comment upon the evaluation of the business success of enterprise systems projects but emphasise the role of the business case in delivering particular benefits areas through use of a BDN (benefits dependency network). The researchers argue that benefits are frequently overstated to gain approval for the investment and few companies engage in post-implementation reviews because they recognise that many benefits have been overstated and are unlikely to be achieved. They discuss how project management criteria dominate judgements of project success.

Referring again to the paper 'Building Better Business Cases for IT Investments' (Ward et al., 2008), a wider role for the business case is proposed in terms of managing the realisation of the estimated benefits in the business case. In a survey of over 100 European businesses they found that 96% of respondents in a major survey of businesses investing large IT projects completed a business case but 69% reported that they do not adequately quantify and place a value on the benefits for inclusion in the business case. Further, 65% of these also indicated that they were unable to identify all the available benefits

Markus and Tanis (2000) argue that no single measure of enterprise system success is sufficient for all the concerns an organisation's executives might have about the enterprise system experience. Instead a balanced scorecard of success metrics derived from the two operational phases, project shakedown and 'upward and onward' is required. This argument can be interpreted as the success concept being inclusive of both project and business success concepts.

They continue 'further work to develop our understanding of the difficulties of measurement of the business success of enterprise systems would be valuable, particularly to investigate the extent to which organisations use a rational and structured approach to the evaluation and measurement of business success'. The authors articulate a discontinuity or gap in the literature, present in 2000, regarding the business success of enterprise systems that does not seem to have been fully addressed in the next decade.

Rettig (2007) has commented that 'the ERP honeymoon has ended' but this was more a comment upon the saturation of global process industry sector companies by enterprise systems products, than a comment upon the business success of ERP systems. Goodhue et al. (2009) argued that ERP systems have not delivered on their promise to deliver fully integrated application systems and cites the complexity and resultant high cost of operating ERP systems

But these papers, critical of enterprise systems, were in the minority and by 2010 it was generally accepted that ERP systems were the standard technology for large global businesses, in particular for process based industries such as energy, consumer packaged goods and increasingly finance service industries (Haddara and Zach, 2011).

There was a good understanding in 2010 of how ERP systems worked and the best ways to implement them; indeed the CSF thread of ERP literature virtually ended with Holland and Light (2008) who started to study the different implementation strategies for ERP systems. There was also a good understanding of the importance of rigorous business cases for these large investments and how to estimate the business benefits of ERP systems (Peppard et al., 2007) but, as I have emphasised earlier, empirical studies of the delivery of these *a priori* benefits were rare. Furthermore there was still an explicit assumption in the literature that project success equated to business success.

More recently, Ward and Daniel (2013) pointed out that in an earlier survey of over 200 European companies only 30% of projects delivered the expected benefits. Their paper did not detail how the respondents to the survey were able to evaluate whether the expected benefits had been delivered but the publication shows the continuing interest in the issue of the business benefits of IT/ERP investments and how these can be evaluated. Indeed the impact of cloud technology upon ERP systems, discussed earlier is conflated with the benefits dependency network (BDN) of Ward and Daniel in a recent paper studying the benefits of cloud computing investments (Greenwell et al. 2014).

The literature discussed above illustrates a degree of inconsistency of definition of success concepts in the context of enterprise systems projects. In other words, it is often not clear whether the success concept is project or business success. However, the thread of literature now discussed, which has studied the impact of CSFs can be generally interpreted as studying project management success, although there is an implicit assumption that this is a determinant of business success.

2.5 Critical success factors influencing the implementation of ERP systems

As the understanding of the enterprise systems phenomenon developed during the 1990s, the attention of researchers and practitioners first turned to questions of how to successfully implement the new technology and gain the supposedly rich benefits proposed by the vendors. As a result much literature was directed to the study of the 'critical success factors' that influenced these very large projects.

The concept of a critical success factor (CSF) has been present in business literature since the early 1960s, being defined by McKinsey practitioners as a factor 'key to a business achieving its corporate mission'. This concept was refined by Rockert (1979) to reflect key factors influencing the success of technology projects, such as user involvement. However, Rockert did not distinguish between project delivery success and business success.

Holland and Light (1999) provided an early example of CSF based research which studied the impact of 12 CSFs, divided into strategic and tactical factors (Slevin and Pinto, 1987). The authors place particular emphasis upon evaluation of legacy systems as they 'encapsulate the existing business processes, organisation structure, culture, and information technology'. In one of their case studies 'Threads' the influence of legacy systems was viewed as a 'dynamic multi-dimensional construct.' The influence of legacy systems was later discussed by the same authors in the context of implementation strategies (Holland and Light, 2008). ERP implementation strategy is discussed as a strategic factor and alternative strategies including implementation by process area, business area, or for global companies, by geographic area, are cited as key options. This analysis contrasts with most ERP / IT literature which does not try to establish a relationship between the nature of the ERP project and the relevant CSF's, or indeed other independent variables.

They based their research upon eight ERP case studies using mostly semi-structured interviews to gather project data over a timescale from initial planning to the integration of the systems into the organisation. 'Threads' and 'Statco' were the two cases highlighted. In Threads (Holland and Light, 1999) the authors discuss changes to the project scope over six years but it is not clear whether interviews were conducted over this extended timescale. There are no comments about the subsequent, post-implementation measures of success. In Statco there was a fast-track implementation strategy to solve Y2K compliance issues and the business appears to have adopted the business process model to drive common processes through the organisation, not using the legacy systems as an influence upon the design and software configuration work.

The main output of the research was a series of questions that they recommended to future ERP implementers to consider as part of their project planning processes to improve project success. The paper preceded much research into CSFs and ERP

implementations and provided early theory about the factors influencing project success and the way in which enterprise systems are implemented.

Somers and Nelson (2001) studied the impact of 22 critical success factors upon ERP projects as part of a research project that used survey methods and reached conclusions as to which of these CSFs were more relevant to the success of the project (as perceived by the survey respondents). This collation of CSFs was based upon a review of IS literature, the success factors being identified from 110 case studies. The authors state 'CSFs can be viewed as situated exemplars that help extend the boundaries of process improvement, and whose effect is much richer if viewed within the context of their importance in each stage of the implementation process'. The authors do not clarify the definition of the success term within the CSF acronym, the assumption being perhaps that project success equates with business success.

Pursuing the argument of success factors, Willcocks and Sykes (2003) discuss the role of the CIO and IT functions in enterprise systems projects and identified eight 'critical enabling factors' for ERP projects to 'stand a chance of succeeding'. The research appears to be largely based upon previous research papers in this area. Kumar and Kumar (2003) studied 'critical management issues' by surveying ERP adopters and confirmed a number of the CSFs identified earlier by Somers and Nelson (2001). Akkermans and Van Helden (2002) also capitalised upon the CSF list developed by Somers and Nelson (2001) and conducted research based on a single case study to understand how these success factors affected each other in a reinforcing manner. They were found to be highly correlated. Hong and Kim (2001) discuss the concept of 'organisational fit' as a valid CSF in 34 ERP projects and conclude that the absence of this CSF has contributed to the high failure rate of many of the sample projects studied.

The approach of studying a small number of extreme cases was adopted by Scott and Vessey (2002) who researched the Dow Corning and FoxMeyer ERP implementations (the former was successful, the latter not so) and tried to explain differences in the implementation approach in terms of six key influencing factors.

Factors influencing successful ERP implementations have been further discussed (Brown and Vessey, 2003). They included five main success factors: involvement of top-management, veteran project managers, use of external third parties to fill

expertise gaps, effective change management and a 'satisficing' mindset. This paper reflects the accumulated experience of practitioners and consultants which was now beginning to provide case study and other empirical project data for academic research purposes.

Plant and Willcocks (2007) 'Critical success factors in international implementations: a case research approach' was based on just two cases. The 22 CSFs of Somers and Nelson (2001) were tested in these two cases. But again the success definition in these critical success factors was implicitly project measurement success.

This early thread of ERP/IT research was valuable in developing theory about the nature of ERP projects and the range of factors, essentially groupings of independent variables that influenced the outcome of these projects. At this stage there was no emphasis upon the size of ERP project being studied, whether they were global projects involving roll-out of a central design or SME sector projects; as a result there was little discussion of possible relationships between the many dimensions of ERP implementations and the success outcome.

2.6 Organisational impact of enterprise systems

This thread of ERP literature includes two distinct areas of discussion; firstly the impact of the organisation of the project team and stakeholders upon the success of the project and secondly the impact of the ERP implementation upon the organisation of the adopting business organisation.

The organisational issues impacting the success of ERP projects have been discussed by researchers in the Cranfield research group referred to earlier (Ward et al., 2005). The authors studied two key dimensions; the project team's management approach and stakeholders' modes of behaviour. They also commented that relatively little is known about how an ERP project team can address organisational issues and how this can affect the success of ERP implementation projects. But this work certainly advanced the understanding of different types of stakeholder behaviour during ERP projects and the influence upon project success.

Organisational issues in ERP projects were also studied by Markus et al. (2000). The authors discuss the complexities of multi-site ERP implementations and emphasise the importance of taking a strategic view of the implementation planning rather than

adopting the most suitable technical path. Mabert et al. (2003) has studied the impact of organisational size on enterprise systems implementations in the US manufacturing sector and the key finding was that the nature of benefits varied according to size of the adopting business; larger companies reported improvements in financial measures whereas smaller and medium sized companies showed better performance in manufacturing and logistics areas.

Based on empirical experiences and study of practitioner ERP research published by Gartner and Forrester in the last decade it can be argued that there was a reasonably good understanding of both the organisational issues referred to above. In relation to the first issue; the organisation of the project team and stakeholder management was an integral part of the implementation methodologies used by ERP consulting firms. The second issue, the impact of enterprise systems upon the organisational entity, was also well understood. For example, the configuration of SAP software involved a detailed mapping of the SAP business model (which includes multiple levels of organisational entity) onto the adopter organisation and this 'gap analysis' was a key part of the design blueprint of the new process and organisational model to be implemented.

The association of organisational issues and the success of ERP projects were well understood by the year 2000 within the practitioner community after almost a decade of ERP implementations, but this was based upon a relatively small number of ERP adopters, perhaps 30-50 organisations. This gap between practitioner experiences and academic research into enterprise systems is referred to in other parts of this review but is widely discussed in the wider management research literature; (Mintzberg, 1996, Starkey and Madan, 2001, Pfeffer and Fong, 2002, Bennis and O'Toole, 2005; Van De Ven and Johnson, 2006, Shapiro et al. 2007).

2.7 Summary of literature and gap relating to business success

To summarise this literature review so far, theory regarding IT projects in the early 1990's, before the introduction of enterprise systems, has been briefly discussed, including the argument that IT projects are now of a more strategic nature than hitherto. It should be emphasised that the assumption has been made that research into large IT projects over the last two decades has been largely based upon

enterprise systems because of the dominance of this new technology within the business sector compared to, for example, custom systems development projects.

Success concepts have been discussed and in particular the distinction between project success and business success. The operationalisation of success concepts and the contribution in this field by the Cranfield research group and by Markus et al. (2000) and Markus and Tanis (2000) has been emphasised. The extensive thread of literature that followed the IS success measurement model research of DeLone and McLean (1992) was viewed as dealing with the success concept at a lower level, for example IS constructs such as user satisfaction within a particular application area. This valuable research thread has been extended to ERP systems by Ifinedo (2008) amongst others, but has not dealt with the higher level concept of business success as viewed by project stakeholders.

Extant theory regarding business success was discussed within the four stage ERP project framework of Markus and Tanis (2000). The Cranfield research group provided substantial theory regarding how business benefits are most appropriately defined in the business case for IT/ERP projects and how these benefits can be realised through implementation tools such as a benefits dependency network (BDN). Further theory was advanced by these researchers regarding how the business case framework can improve the likelihood of business success of the project. But it was recognised that many business organisations do not complete empirical studies, post-implementation, of the business benefits of an ERP project, whether these benefits have been quantified in the original business case or not (Ward et al., 2008). This apparent failure to evaluate business success has been observed by different researchers: Markus and Tanis (2000), Markus et al. (2000), Peppard et al. (2007) and Ward et al. (2008). In this latter paper it was found that 'only 20% of business organisations surveyed were satisfied that they carried out an evaluation and review of business benefits sufficiently well'. Yet earlier theory (Peppard and Ward, 2004) suggested that 'a core competence of business organisations was the ability to measure the outcome of IS projects'. In summary, there was extensive research as to how the *a priori* business success of ERP projects could be evaluated in Stage 1 – the project chartering phase of Markus and Tanis (2000), but much less research and theory about how businesses measured empirical business success *a posteriori* (in

Stage 4 – the onwards and upwards project phase). This last comment applies whether business benefits metrics were included in any business case or not.

So, in the two decades there has been substantial development of theory about the planned business success of ERP projects and how estimated benefits could most effectively realised. However, there has been less empirical study of how business success is in fact evaluated by the adopters of enterprise systems once the implementation has been successfully completed as a project. *It is this discontinuity or 'gap' in ERP research over the last two decades that has provides the opportunity for the research in this study.*

2.7.1 Case study research into business success

This discontinuity in ERP research raises the question as to why researchers have apparently not often included in their studies the evaluation of business success post-implementation. One answer might be that the research methods used have not been able to address the issue for longitudinal reasons. To explain this comment, the evaluation of business success, based upon the literature reviewed above, would involve a degree of comparison between original business drivers or objectives of the project and subsequent outcomes, involving for large global programs a timescale that may extend over five years.

Clearly, a large complex ERP project will necessarily involve changes in scope and business requirements as the project progresses and it could be argued that starting assumptions about project scope and business benefits are unlikely to be valid over the lifecycle of the project because of a changed business environment. Either way, a longitudinal study of an ERP project that involved research completed at the planning or project chartering stage and later research into the measurement and realisation of planned business benefits would require a case study approach that, for a global ERP project, might necessitate a research involvement of perhaps 3-5 years.

This relationship between the research discontinuity or gap and methods used could be interpreted as practical difficulties for ERP researchers in completing longitudinal case studies of ERP projects. For this reason, a more in-depth review of ERP case study literature was completed to understand whether this interpretation was correct. In other words, is this discontinuity in the literature because ERP researchers have

been unable to complete case study research into business success over such a protracted timescale?

A summary of ten ERP case studies have been reviewed to attempt to answer this question. Table 2-1 below details the authors of the research, the nature of the project, the research findings and to what degree a comparison was made between initial project objectives and outcomes.

	<i>Authors</i>	<i>Case setting</i>	<i>Focus of study</i>	<i>Longitudinal aspect</i>	<i>Findings / success criteria</i>
1	<i>Ward et al. (2005)</i>	<i>Global provider of telephony services(CTel)</i>	<i>Impact of project organisation and stakeholder management issues upon success</i>	<i>Two separate projects studied; one global ERP roll-out and second smaller service management application project. End-to-end case studies.</i>	<i>Organisational issues more critical than technical in delivering business success. Smaller project more successful.</i>
2	<i>Peppard and Ward (2005)</i>	<i>Life insurance company</i>	<i>How to unlock investment from IT (CRM) projects</i>	<i>Project not studied post-implementation</i>	<i>Estimated return on investment insufficient but no study of actual ROI.²</i>
3	<i>Holland and Light (1999)</i>	<i>8 case studies of different companies</i>	<i>Study of CSF's influencing project success</i>	<i>All case studies -- only during implementation stages – no interviews post implementation</i>	<i>Measures of success all relate to project success criteria</i>
4	<i>Somers and Nelson (2001)</i>	<i>110 case studies selected from ERP literature</i>	<i>CSF's identified from case studies</i>	<i>All cases were projects in progress or completed</i>	<i>Measures of success all relate to project success criteria</i>
5	<i>Ross and Beath (2002)</i>	<i>30 companies implementing ERP systems were used as case studies</i>	<i>Study focussed upon how to incorporate e-business systems into their ERP systems and whether business case was made.</i>	<i>Questions related to business case stage and not entire lifecycle of project</i>	<i>Result was businesses did not make business case for 'strategic projects'</i>

	<i>Authors</i>	<i>Case setting</i>	<i>Focus of study</i>	<i>Longitudinal aspect</i>	<i>Findings / success criteria</i>
6	<i>Adam and O'Doherty (2003)</i>	<i>SME Case study (ABC communications)</i>	<i>Case study only focussed upon Y2K issues and 'business excellence strategy'. Findings then used to survey 14 companies.</i>	<i>Questions did not include project or business success</i>	<i>No criteria for business success discussed in studies</i>
7	<i>Nelson (2005)</i>	<i>57 companies given questionnaires by MBA students</i>	<i>Questions asked about perceptions of success of project –'retrospectives'.</i>	<i>Study did not clarify how respondents measured either project or business success</i>	<i>No criteria for business success discussed in studies</i>
8	<i>Chien and Tsaur (2007)</i>	<i>3 Case studies used to create survey</i>	<i>Study of whether certain system dimensions impact business value</i>	<i>Longitudinal dimension of case studies not stated</i>	<i>Survey of 600 end users did not cover measures of business success</i>
9	<i>Scott and Vessey (2002)</i>	<i>2 case studies: Fox Meyer and Dow Corning</i>	<i>Study of risks in ERP implementation projects</i>	<i>Study of extreme outcomes in projects ie post-implementation</i>	<i>No study of business success or related criteria for success</i>
10	<i>Peppard, et al. (2007)</i>	<i>European paper manufacturer</i>	<i>Improve benefits realisation from IT/ERP projects by use of BDN (benefits dependency network)</i>	<i>Study was of Stages 1-3 of project not post-implementation delivery of benefits</i>	<i>No study of actual benefits realised compared to planned benefits</i>

Table 2-1: Listing of selected literature based upon a case study method

2.7.2 Main findings of case study research

It is salutary to remember Benbasat et al. (1987) when a researcher is discussing IS case studies. 'A case study examines a natural phenomenon in its natural setting, employing multiple methods of data collection; the boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used'.

There do not appear to be consistent criteria for defining a case study in the IS/ERP literature. Case studies range from single longitudinal studies of an ERP implementation incorporating the complete system lifecycle from planning to post-

implementation activities to much less comprehensive studies where 'multiple methods of data collection' are interviews with more than one project representative and perhaps only one project stage is studied.

This in-depth review of case studies has tried to identify enterprise system case studies that have included the ERP lifecycle processes that associate with my research interests relating to the initial business case and subsequent empirical studies of the benefits delivered. This requires a case study of longitudinal dimension covering the initial project planning phase and post-implementation activities to measure the business success of the project. Such studies, certainly for ERP implementation projects in global companies, would generally require over five years of engagement and it is not surprising that case study research has rarely encompassed this timescale. Where studies of post-implementation business success have been attempted they have generally been completed using survey methods where project stakeholders, often respondents who were not involved in the original planning phase, have expressed their subjective views of business success. As discussed earlier, information related to objective measures of business success, such as financial benefits derived from reduced inventory and staffing levels or the operation of shared service centres, has not often been readily available to researchers, perhaps because of the sensitivity of placing competitive business advantages in the public domain.

In summary, the main points arising from this in-depth review of enterprise systems literature are as follows:

- 1) The literature does include a wide range of case studies of ERP projects where ERP business cases have been available for study; these business cases have generally included estimates of planned benefits from the post-implementation stages of shakedown and the 'onward and upward' (Markus and Tanis, 2000). Generally, the emphasis of these studies has been the processes for effective realisation of these benefits through rigorous planning detailed in the business case, rather than the empirical study of benefits post-implementation.
- 2) So these benefits metrics have rarely been used to measure the business success of the ERP project in the same ERP project case study. Where the research has included both ERP case studies and a survey phase, these benefits metrics have not been included in questions to respondents of the survey, because of the

longitudinal issues referred to earlier. In other words, there have been very few case studies identified where business case metrics have been used in survey or other research methods to measure the business success of the project as perceived by different stakeholders. I use the term longitudinal to refer to study of the ERP implementation lifecycle at different points in time.

- 3) The practical difficulties of completing research of ERP projects covering the entire project lifecycle from planning to post-implementation and measurement of business success, generally requiring an engagement of over five years have made a case study approach difficult to complete, certainly by a PhD student.
- 4) As a result, measures of the business success of ERP systems, based on the ERP case studies available in this field, have been generally been subjective measures derived from survey respondents or interviewees rather than objective measures such as realised benefits arising from reduced inventory levels or operation of shared service centres.
- 5) In summary, based upon this review of ERP case study literature, a case study approach has not been able to answer the question of how to best evaluate the business success of ERP projects, as opposed to the project implementation success.

2.8 Gap in literature and research question

Returning to my overall research question, my studies have been motivated by the broad question of why businesses implementing enterprise systems do not adopt a more structured approach to the evaluation of the business success of these investments. The research question is more simply stated as ***'How do businesses evaluate the business success, as opposed to the implementation project success, of enterprise systems?'***

In Sections 2.7 and 2.8 of this Chapter I have discussed at length extent literature regarding the evaluation of the business success of enterprise systems and an apparent discontinuity or 'gap' in the literature studied. In summary, in the last two decades there has been substantial development of theory about the planned business success of ERP projects and how planned business benefits might be realised. However, there has been less empirical study of how business success is in fact subsequently evaluated by the adopters of enterprise systems. It is this discontinuity

in ERP research over the last two decades that has provides the opportunity for the research in this study.

This discontinuity or gap in the literature allows the construction of more targeted research questions:

(1) How far do organisations estimate the business benefits from enterprise systems as part of the business case presented for project approval and are these pre-implementation benefits measured to evaluate success in the post-implementation stage of the project as well?

Answer from literature review: Yes, business cases for enterprise systems do generally include estimates of planned business benefits. However, these estimates are very rarely compared with realised business benefits because of the difficulties of the empirical study of benefits post-implementation by case study research or other research methods.

(2) Why do business organisations not measure actual, realised business benefits of enterprise systems and compare these to the estimated benefits in the business case as a measure of business success?

Answer from literature review: Business organisations do not generally evaluate the business success in this way for a wide variety of reasons, from lack of continuity of project stakeholders to changes in the business environment which invalidate the assumptions upon which benefits estimates are based.

(3) How then is the business success of enterprise systems measured and are these measures related to the dimensions of the enterprise project being studied?

Answer from literature review: Evaluation of business success of enterprise systems post-implementation is often a subjective process, as opposed to project management success, which can be readily measured by reference to objective criteria such as timescale, budget and technical parameters. The measures of business success are rarely related to the dimensions of the particular enterprise system project, whether subjective or more objective measures.

So, my more explicit, targeted research objectives are as follows:

(1) Why do businesses generally not use initial estimates of business benefits, generally included in a business case, to evaluate the business success of ERP implementation projects?

(2) How then is the business success of ERP systems evaluated on an empirical basis?

(3) How can measures of business success be related to the different characteristics of ERP projects? (for example, the size of the adopting organisation and the implementation strategy adopted).

Chapters 3 and 4 now detail the research method selected to address these questions and the analysis of research data generated.

CHAPTER 3 - METHOD ADOPTED

This chapter describes the choice of method, an interpretive, qualitative method based upon the interviewing of key informants, defined by Bryman (2008) as ‘someone who offers the researcher, usually in the context of conducting an ethnography, perceptive information about the social setting, important events and individuals’.

Section 1 This section summarises the main research methods available to the ERP researcher and the basis for my choice of method.

Section 2 discusses quantitative research methods and reasons for not adopting such an approach.

Section 3 discusses the benefits of an interpretive, qualitative approach.

Section 4 discusses my choice of interviewing 20 key informants and the processes followed to select interviewees and complete the interviews.

Section 5 compares the interview processes with guidelines for conducting IS research interviews (Myers and Newman, 2007)

Tables 3-1 and 3-2 show the list of interviewees and the questions included in the interview protocol.

3.1 Range of research methods considered

Before discussing various methods used by researchers in the field of enterprise systems, it is helpful to define some of the methods used to clarify the subsequent arguments and my final choice of method.

Ethnography: An ethnographic study requires ‘total immersion over an extended period of time in the culture or setting involved, observing behaviour, listening to conversations and asking questions’ (Bryman, 2008).

Field study: Field research or fieldwork is the ‘collection of information outside of a laboratory, library or workplace setting. The approaches and methods used in field research vary across disciplines’ (Bryman, 2008).ee

Case study: 'A case study (IS case studies) examines a natural phenomenon in its natural setting, employing multiple methods of data collection; the boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used' (Benbasat et al., 1987).

Participant observation: 'Research in which the researcher is immersed in a particular social setting for an extended period of time, observing behaviour, listening to conversations and asking questions. It usually includes interviewing key informants and studying documents. As such it is difficult to distinguish from an ethnography' (Bryman, 2008).

Survey: Survey research comprises a cross-sectional design in relation to which data are collected predominantly by questionnaire or by structured interview on more than one case, at a single point in time, in order to collect a body of quantitative data in connection with two or more variables, which are then examined to detect patterns of association (Bryman 2008).

Semi-structured interview: This typically refers to a context in which the interviewer has a series of questions that are in the general form of an interview guide but is able to vary the sequence of questions. The questions are frequently more general in their frame of reference from that typically found in a structured interview schedule (Bryman 2008).

My literature review has shown that there have been qualitative and quantitative methods, or a mix of both methods, used by researchers into enterprise systems. The qualitative researchers have used predominantly field research, often involving interviews of ERP project participants and stakeholders or case studies with a longitudinal dimension. Often these qualitative studies have provided hypotheses that have been further studied through survey based methods as part of the same research paper. Some ERP systems research has been limited to a study of extant literature with related conclusions and recommendations for future researchers.

I have studied in some depth a case study approach to answering my research questions in Chapter 2 (sections 2.7.1 and 2.7.2) and concluded that the longitudinal nature of my research questions, as opposed to my planned research, would not be answered by a case study approach. Quantitative research methods in the IS/ERP field are discussed below and rejected for reasons discussed.

My choice of an interpretive, qualitative method, involving analysis of rich data provided by semi-structured interviews of 20 informed participants and the project documentation provided is explained in Section 3.4 of this chapter.

3.2 Some quantitative methods in IS research

Survey methods are the most commonly accepted quantitative method in the IT/ERP domain for theory testing.

Typical response rates for 'remote survey' research in the ERP field have generally been in the range 5-10%. I use the term 'remote surveys' to describe survey methods where there has been no prior engagement with the respondents and no informed participants in the businesses surveyed. These 'remote' surveys (often without key informants) completed by academic researchers are generally either not completed by respondents or completed with a less than studied response. Practitioner research surveys by Gartner, for example, or by a vendor for a technology product used by the organisation, attract a higher response rate (Gartner's executive program includes over 4,000 CIO's and senior IT executives and response rates have averaged over 50% over the last decade (Gartner report, 2011).

It is understandable, however, that surveys without informed participants are widely used; the resources required to arrange informed participants in, for example a European survey of even 50 businesses, would be beyond the available resources of most researchers.

The research field of IS success measurement models initiated by Delone and McLean (1992) has been primarily based upon survey based research where the relationship between particular IS system constructs and project success is investigated at a point in time. The dependent variable of IS success is inconsistently defined, emphasising the point made earlier in this paper that project management success and business success are very different concepts with necessarily different, but not mutually exclusive, multiple independent variables. Sabherwal and Chowa (2006) observe 'despite considerable empirical research, results on the relationships between constructs related to IS success are often inconsistent'.

In their influential survey based research (Gable et al. 2008) as many as 485 qualitative impacts were identified by content analysis and studied using survey

analytical techniques. This serves to illustrate the complexity of the constructs that support the concept of IS success, whether project management or business success. But the point of reiterating this aspect of the extant IS literature is to emphasise the ready availability of IS project data available to the researcher through survey methods and the risk that this availability does not necessarily associate with the reliability or validity of data.

Ifinedo (2008) has discussed the difficulty of obtaining empirical data from business organisations regarding the business benefits derived from IS projects. I would suggest that confidential and sensitive data regarding the results of large technology projects is rarely provided to outside organisations unless there is a clear benefit from such cooperation. 'Organisations need to be very clear about how they will benefit from involvement with the researcher' (Darke et al. 1998).

However, survey based research in the IT/ERP domain may be the only method available to test hypotheses generated from qualitative analysis and therefore has been used extensively to study CSF's that impact ERP success (Somers and Nelson, 2001). Also, even with relatively low response rates, statistically meaningful interpretations can be obtained from the data provided from surveys.

3.2.1 Event- based ERP research

There have been a number of event-based research projects to understand the impact of ERP projects upon an organisation's financial health. Primarily these research projects have studied the impact of the announcement of ERP investment activity upon stock prices or other published financial data (Roztock and Weistroffer, 2007; Nicolaou, 2004). Hitt et al. (2002) have also used stock market data in their research and suggested that financial markets reward ERP adopters with higher valuations in the short-term. They comment that there is little large sample statistical evidence on the benefits of ERP implementations and propose future research on the longer-term impact of enterprise systems. Dehning and Richardson (2002, 2005) also evaluated research based upon event-based studies of IT investment announcements. They believe that IT managers should think in terms of both industry and company specific effects of IT investments. Clearly there is abundant, readily available, data on stock price movements and their proximity to announcements of ERP investment projects but I have concerns about the interpretation of the stock market data used, and these

concerns are reflected in the five serious limitations recognised by the authors of the above studies. In conclusion, I decided against the use of the range of qualitative methods used in IS/ERP research based upon the above arguments.

3.3 Benefits of adopting an interpretive, qualitative approach

There are clear benefits from adopting an interpretive rather than a positivist approach and some of these factors are discussed below:

- 1) a positivist research approach in the IS field involves evidence of formal propositions and the literature review does not provide such propositions; indeed there is a clear discontinuity in the literature regarding my research question as to how organisations evaluate the business success of ERP projects. Further, a positivist approach would involve quantifiable measures of variables, and hypothesis testing (Orlikowski and Baroudi, 1991); these are not evident in extant theory relating to my central research question.
- 2) IS research can be classified as interpretive if it involves knowledge of reality gained through social constructions, and it attempts to understand phenomena through the meanings that people assign to them (interviewees with key informants in this research).
- 3) Interpretive methods of research in IS are ‘aimed at producing an understanding of the context of the information system, and the processes whereby the information system influences and is influenced by the context’ (Walsham, 1993). These aims accord with my research question about the measures of the business success of an enterprise system in the sense that the research necessitates study of the influences in both directions.
- 4) Klein and Myers (1999) have discussed an interpretive field research approach in information systems research and emphasise the value of this approach compared to studies based upon social science models. Myers and Newman (2007) have discussed the value of qualitative interviews in IS research and suggested guidelines for conduct of these interviews.

These arguments led me to consider a particular field study approach where enterprise systems project data that aligned with my research questions was provided

by semi-structured interviews with key informants and by project documentation, a predominantly qualitative, interpretive research method.

Sarker et al. (2013) has reviewed recent qualitative studies in information systems research and the author comments: 'Indeed, qualitative research is now seen as a legitimate enterprise in much of the IS research community, and this is evident from the representation of this form of research in leading, mainstream conferences and in prominent journals that had, in the past, been (or were seen to be) reluctant to publish this form of work'.

Johnson and Harris (2002) have suggested that where the particular phenomenon of interest is one where there is little extant knowledge, then the research question itself is more likely to be loose – i.e. there is insufficient knowledge of variables and relationships for these to be tested. Instead the purpose of the research is to uncover important constructs, variables and what the relationships might be and, in effect help build theory. This research is likely to be qualitative and the data collected in an open ended loose-fashion. This further supports my choice of a qualitative field study approach.

Singh and Dickson (2002) have described characteristics of an ethnographic research method in a business context as follows:

- 1) *There is observation of a particular phenomenon of interest within a business context* (for example, my discussion of specific ERP projects with multiple informants engaged in the project management and study of current project documentation)
- 2) *The research seeks explanations and theories rather than testing existing theories, in other words exploratory research.* This approach shares with grounded theory the purpose of understanding research phenomena through iterative comparisons of data and theory. I do not feel it appropriate to enter the complex area of what or what does not constitute grounded theory research but certainly my research approach is exploratory, interpretive research that aims to develop hypotheses for further examination and there is iteration between my research findings and the extant theory in relation to my research question.

- 3) *The researcher works with small populations.* This characteristic applies to my research method of interviewing a limited number of expert practitioners (selected through my 'networked consulting' or chain sampling approach).
- 4) *The researcher completes a description of the research phenomenon in the context of the whole environment.* I have placed the research questions central to my studies (related to the measures of the business success of ERP projects) in the wider, holistic setting of the ERP project lifecycle in Diagram 2-4 earlier and used this 'end-to-end' process model in describing my research findings.

3.4 Use of key informant interviews as research method

These points make ethnographic research quite attractive. However, practical reasons dictated the use of key informants rather than a full-fledged ethnographic study. As Bryman (2008) has discussed, an ethnography method requires 'total immersion over an extended period of time' in the culture or setting involved. It might be argued that my practitioner experience involved total immersion in the ERP project culture in the period 1995-2005, but this was not completed in a formal research setting and therefore cannot be considered a valid description of my method. Further, an ethnographic study requires participant observation over a period of time; my key informant interviews do not meet this requirement. For these reasons, although my research method has many characteristics of an ethnographic study, in terms of the characteristics of Singh and Dickson (2002) discussed above, it is better described as interpretive research using multiple key informant interviews.

I have discussed the benefits of a qualitative, interpretive field study as a method to answer my research question and address related research objectives. Further I have considered an ethnographic method and rejected this for reasons explained earlier. The use of key informants during a field study has clear advantages to this researcher; these were discussed earlier but emphasised as follows:

- 1) The researcher has ready access to key informants based upon his business contacts as a practitioner.
- 2) The timescales for completing a field study interviewing 20 key informants, would be achievable within the PhD program time constraints.

- 3) This approach fits well with the exploratory nature of my research and the longitudinal dimension of my research questions.

3.4.1 Field study using key informants

A field research approach where the sources of enterprise systems data were based upon the interviewing of key informants (the expert practitioners), together with access to ERP project documentation has obvious advantages to this researcher:

- 1) The researcher has ready access to such expert practitioners based upon his business contacts and networks.
- 2) The timescales for completing a study including, for example 20 key informants, would be achievable within the PhD program constraints.

This approach fits well with the exploratory nature of my research, the longitudinal dimension of my research questions and accords with the increasing use of purely qualitative research within the information systems field (Sarker et al., 2013).

But to classify my research approach as simply an exploratory field research study would not do justice to the more detailed methods and techniques adopted. Sarker et al. (2013) has emphasised that recognisable labels have the advantage of authors and readers having consistent expectations and without such a label research can be more difficult to understand. The author in the same paper makes an interesting and valid point; ‘qualitative researchers tend to focus on the social and behavioural issues, often with technology being no more than the context, as in IS offshoring or virtual team development. Failure to focus on the unique contributions associated with technology can lead IS researchers to lose their comparative advantage as compared to other social science researchers’ (Markus and Benjamin, 1997). Orlikowski and Iacono (2001) have addressed the issue of lack of focus upon the IT artefact by IS scholars. Their view was that, based upon a review of articles in the journal ‘Information Systems Research’ over a ten year period, conceptualisations of the IT artefact were primarily ‘nominal’ i.e. absent from the articles.

ERP technology has been far more than a context in my research and has allowed me to frame more explicit research questions as a result of a literature review that studies the impact of a radically new technology upon business organisations.

Conceptualisations of the IT artefact are certainly not absent in the sense discussed above.

This method is now described by detailing the selection of interviewees (3.4.2), development of the interview protocol (3.4.3), the completion of the field interviews (3.4.4) and finally some limitations of retrospective interviews (3.4.5).

3.4.2 Selection of key informants

To select key informants to interview, I discussed with ex-colleagues in consulting firms if they would be willing to be interviewed and discuss my research agenda. Further, I asked a selected number of these colleagues from IBM (although some had since moved to other consulting firms such as Deloitte, KPMG and Accenture) if they would allow me to interview their current ERP consulting clients. This informal 'bottom-up' approach was met with a high level of cooperation and I have referred to this as a 'networked consulting approach' to gaining access to ERP project data. This method of identifying key informants is common to qualitative field research studies of organisations (Singh and Dickson, 2002). Informants are requested to identify other informants who represent the community (in my research, the ERP practitioner community). This technique has also been referred to as chain sampling (Coyne, 1997).

In this stage of my research 20 ERP practitioners were interviewed. 16 were consultancy directors from IBM, PwC, KPMG, Deloitte and Accenture and 4 were project managers engaged in large ERP implementation programs in M&S, Vodafone and Unilever (2). One interview (of the M&S project director) was completed by the IBM consultant because of time constraints.

The 16 consultants typically had experience of 10-15 ERP projects over the period 1995-2010 where they had been directly engaged as the project manager or in a more advisory consulting role. SAP software was the dominant software product and accounted for over 80% of the projects cited (Oracle being the other product). This reflects the market dominance of these two vendors over this period.

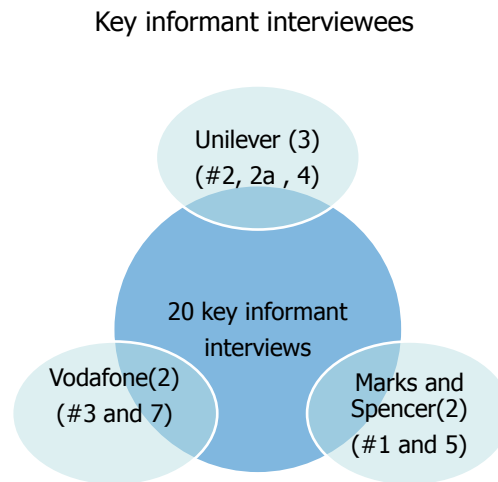
The current practice leaders of the ERP consultancies of IBM, PwC, Deloitte and KPMG were amongst those practitioners interviewed, having reached these positions through extensive ERP project management and consulting experience since the

inception of enterprise systems technology in the early 1990's. These key informants are listed below in Table 3-1 and provided a rich source of data when discussing my interview protocol.

Key informant #	Organisation	Position	Relationship with researcher
1	M&S	Project director	Not known previously
2	Unilever	Global director for enterprise systems meta-data	Contact from 1990s consulting work
2a	Unilever	European finance director/project director	As above
3	Vodafone	Project director for EVO project	Not known previously
4	PwC consulting	ERP consulting director	Business partner
5	IBM	ERP consulting director re M&S	Colleague /business partner
6	IBM	As above but discussion of other projects than M&S	
7	KPMG	ERP consultancy director	Known from professional work
8	Deloitte	US partner in ERP practice	Colleague/business partner in PwC
9	Warner Lambert	Project consultant	Business partner
10	Johnson & Johnson	Project consultant	Colleague/business partner
11	Cadbury Schweppes	Project consultant	Colleague/business partner
12	IBM	ERP consulting director	Colleague/business partner
13	PwC	ERP practice leader	Colleague/business partner
14	City University	ERP consultant	Contacted via Cass supervising professor
15	KPMG	ERP consulting director	Colleague/business partner
16	IBM	ERP consulting director	Colleague/business partner
17	British Gas/IBM	Project director/ consulting director	Introduced by consulting contact
18	Accenture	ERP consulting manager	Not known previously
19	IBM	ERP consulting manager	Not known previously
20	PwC	ERP consulting manager	Not known previously

Table 3-1: Details of interviewees - key informants

Diagram 3-1 below shows the overlap between consultants who worked in the 3 business organisations and the 4 project managers involved in these organisations.



Note:

- 7 interviewees discussed primarily the completed implementation projects within the 3 businesses
- 13 interviewees discussed multiple projects based upon consulting experience

Diagram 3-1: Key informant interviewees

3.4.3 Development of an interview protocol

My interview protocol (see Table 3–2) was based upon my literature review and the *a priori* categories which allowed the development of a relatively explicit research agenda for discussion with participants. These *a priori* categories, referenced to my literature review, and which formed the basis for my interview protocol are listed in Chapter 4 (Table 4–1). The derivation of the interview protocol from the *a priori* categories is shown in Appendix 7. Nunes and Al-Mamari (2008) emphasise the value to the PhD student researcher of the initial literature review in the data collection and analysis processes. ‘Having the literature review and the resulting emergent theory explicitly considered at the beginning, will enable the apprentice researcher to make use of reflexivity from an early stage, as well as, having to address explicitly the impacts of *a priori* theory on the early stages of the iterative process of data collection and analysis’.

The questions in the interview protocol were familiar to all the practitioners interviewed in the sense that they were questions that have pre-occupied the ERP practitioner community since the inception of enterprise systems in the early 1990s. Indeed all of the practitioners interviewed had a good knowledge of practitioner literature on these issues (Gartner, Forrester and Panorama, for example). Nunes and Al-Mamari (2008) argue that if extant theory may be used during data analysis and literature on similar contexts can be considered a ‘slice of data’ as in grounded theory (Glaser and Strauss, 1967) then this same literature can be used at the start of the inductive process. The interview protocol is shown below as Table 3–2.

(1) Please detail the characteristics of the ERP project under discussion. For example, 1st generation ERP project or incremental project at organisation with existing ERP platform, industry release, range of processes, geography (single site or roll-out of central ERP design). (2) What key business factors influenced the decision to implement the ERP system? Were these strategic in nature (new business model, outsourcing of common processes across multiple businesses etc.) or were there specific and measurable business benefits estimated within any business case that was written? (3) How was the project approved? If a business case was prepared to what extent were estimates of project costs and benefits included? (4) What other options than the selected ERP system were considered? What would have been the consequences of doing nothing and leaving the legacy systems in place? (5) In terms of project management criteria was the implementation considered successful? (6) After the ERP system was live, how were any planned benefits managed in terms of realisation and was there any accountability for benefits estimated in the original business case? How were these benefits related to business benefits estimated in the business case? (7) Were any retrospective reviews of the ERP project completed internally or by external parties? Did these reviews attempt to measure benefits delivered by the project? (8) How was the project perceived by stakeholders in terms of either project management or business success? (9) What level of continuity was there amongst different categories of stakeholders across various stages of the project? (10) What major lessons have been learned by the organisation for use in future ERP implementations?
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Table 3–2: Interview protocol

3.4.4 Completion of field interviews

Interview processes followed are summarised below:

- 1) the ten question interview protocol in Table 3-2 was submitted to the interviewee 1-2 weeks before the interview.
- 2) interviews were taped and transcripts provided shortly after interviews for comment. Generally interviews were 60-120 minutes in duration and transcripts 4-6 pages in length; there were often iterations to agree transcript content. Again, as Singh and Dickson (2002) point out in relation to qualitative management research, taped and transcribed interviews have the benefit of inclusivity rather than subjective selectivity, important if the study has not been tightly defined, as there may be hidden linkages to underlying phenomena.
- 3) each interviewee provided extensive project documentation without any formal request from the interviewer.
- 4) notes were also made after each interview regarding the more sensitive points about the experience, for example, the level of cooperation, the empathy of the interviewee, and so forth.

Generally, interviewees were happy to debate the transcripts and ensure my research data was accurately recorded. I think this debate has improved the reliability of the interview data.

An example of an interviewee questioning the accuracy of my transcript is given below. The interviewee was reminded that 'notes' were in fact a transcript of a recorded interview but I was happy to accept the new interview data.

KI#2A: *To an extent. It was more a case of major restructuring of factories across Lever Europe and countries had to operate an IT system to support this change. P&G were building a single SAP system in Paris but that was their way of doing things. One advantage of using SAP is that organisations can take different design approaches to reflect their different organisational philosophies. I left the LE project and was involved in a financial consolidation project where 2-3 years were wasted on a Coda based project that was not fit for purpose - SAP should have been used instead.*

Richard. Your notes have let you down. *The Financial Controller's (Financial Director of Unilever) had two functions – gathering information for the central control of the business plus its analysis and running the accounts payable for the joint head offices. The consolidation project was partially to provide external reporting for Unilever. It had been developed using Matplan and Foxpro as a data capture front end. Matplan was spread sheet like and flexible in some ways but not good when one decided to move reporting units about. And we were using old versions of the s/w that were no longer supported. Its replacement used some very fancy bespoke software developed by IBM which at the end of the day was not fit for purpose. The other half of the Controller's dept (Financial directors Dept) used CODA for financial accounting in HO. We needed to replace the system because of capacity constraints etc. and despite the then widespread use of SAP elsewhere in Operating companies, Amazingly HO decided to continue with a new version of Coda on Unix.*

I have referred to the paper 'The qualitative interview in IS research: Examining the craft' (Myers and Newman, 2007) earlier in my literature review. This paper highlights some of the risks of qualitative interviewing in information systems research and recommends guidelines to be followed to reduce these risks.

Because I have earlier argued that 'remote surveys', where there is generally a low level of involvement of the participant with the researcher, perhaps contribute less to enterprise systems knowledge than those surveys with a high level of involvement, I thought it would be helpful to the reader to compare my own interviewing methods against the guidelines of Myers and Newman to ensure that I was not making the same errors as other information systems researchers using qualitative interviewing techniques. These guidelines, and the extent to which they were adhered to, are discussed in section 3.5. Firstly, however, I have pointed out the limitations of retrospective interviews.

3.4.5 Limitations of retrospective interviews

Clearly there are limitations of retrospective interviews in terms of the ability of the participants to accurately recall details of events (ERP implementation projects) from the past.

De Vaus (2006) defines retrospective studies as those collecting data about past events and comments that they rely on the ability of participants' ability to recall detail from the past. In this context I would comment, to support the accuracy of the key informants' ability to recall such data, as follows:

- 1) over 90% of the ERP implementation projects cited (see Appendix 6) were completed in the last ten years
- 2) many of the comments made about such projects were supported by project documentation provided; for example, a statement that a particular ERP business case contained business benefits metrics was supported by a copy of the business case in question
- 3) in the case of the 3 ERP projects recently completed, there were multiple informants and it was possible to reconcile any conflicting accounts of the project.

3.5 Upholding guideline for conducting IS research interviews

In this final section I thought it would be sensible to compare my overall interviewing approach with the guidelines for conducting IS research interviews proposed by Myers and Newman (2007). This also has the benefit of further examining the limitations of retrospective interviews.

Guideline 1 Situating the researcher

Of the 20 interviews, I had already met many of the interviewees and discussed the enterprise systems research that I was completing and had asked if they would participate in the interview. Most interviewees were very cooperative and asked about the other interviewees and the timing of any research outputs. I would say that I had a professional friendship with five of the interviewees but I do not feel this in any way compromised my position. They were very interested in the research topic and often professed to having asked the research questions themselves and not having reached any consistent answers. I have no reason to believe that they would not have provided the same interview data to any other researcher. In terms of the organisations that provided ERP project data, only Unilever had been a consultancy client in my professional career. I have reported these relationships in my interview notes and any

implications these relationships might have for bias or lack of objectivity in the interpretation of my interview data.

Guideline 2 Minimising social dissonance

This guideline refers to the argument that social distance between the researcher and the interviewee may reduce disclosure. As indicated above, this was certainly not a barrier in my interviews. Generally the interviewees came from similar professional and social backgrounds to the researcher so this guideline was adhered to. Age was perhaps an issue in the sense that the interviewees were generally 10-20 years younger than me but I do not believe this influenced the level of disclosure and might perhaps have enhanced it.

Guideline 3 Representing a variety of voices

This guideline is directed at avoiding biases such as the 'elite bias' by including a variety of subjects at different organisational levels. This was possible in the discussion of the 3 specific ERP projects where 2-3 people with differing stakeholder interests were interviewed but not in the subsequent practitioner interviews. Generally the interviewees were senior, experienced ERP practitioners from management consulting firms. This, as stated previously in this and other chapters, was a deliberate selection of interviewees to obtain extensive and longitudinal experience of the lifecycle of enterprise systems projects to provide insight into my research questions.

Guideline 4 Everyone is an interpreter

This guideline alludes to the issue of interpretation and the risk of subjectivity within the comments expressed in interviews. I have been aware of this risk and believe my interview approach and protocol adopted have reduced this to an acceptable level of risk within this field of information systems research.

Guideline 5 Use of models (such as mirroring) in questions and answers

I have taken care not to impose 'my researcher's world view' upon interviewees by, for example, asking leading questions (but see extract below). My practitioners would not have allowed me to impose views given their strong interest and understanding of the research agenda involved.

Extract from transcript of interviewee KI#13

RJ: Going back to my point about project management success and business success, how in your experience are business case benefits used to measure business success? Perhaps in certain cases they are just a one-off set of figures and dissociated from the project after the approval process?

KI#13: That is a leading question, but I agree with your point, probably 90% of business case benefit estimates are archived and forgotten.

Guideline 6 Flexibility

This guideline refers to the question of improvisation from an interview script to react to the subject's response. I think that I was able to do this during interviews (but see extract below, which I do not believe was repeated in other interviews) and generally allowed deviation from the research question agenda unless there were time constraints and there was a danger of not completing the full agenda or list of questions.

KI#18: RJ: Your views of measures of business success as opposed to project delivery success?

Aviva was a part ERP and other IS components project and there were issues of governance here in the sense that there was inadequate accountability for delivery of benefits. If you factor in benefits to managers' budgets for example, there is more chance of getting benefits estimated in the business case. But again there is the cause and effect problem. You need strong business ownership or benefits just 'run into the sand'. Once the 'circus leaves town' there is less incentive to realise and measure benefits if governance is low.

Guideline 7 Confidentiality of disclosures

This issue was necessarily dealt with formally in all interview preparatory guidelines and transcripts. Since the time of the interviews, which were completed in 2010/2011, I have discussed disclosure of the identity of businesses, interviewees and project documentation with participants. The consensus has been that only the identity of interviewees is an issue in terms of inclusion of the above detail in this thesis.

Four of the experts interviewed were currently engaged in the project management of ERP implementation projects in global business organisations; Marks and Spencer (M&S), Vodafone and Unilever, although there was an ongoing program of

implementation projects; some completed projects were discussed in addition to projects currently in progress.

3.6 Research ethics

I have referred earlier in this Chapter to how informed participants were selected and how interview transcripts and project documentation were discussed with interviewees but this Chapter would not be complete without a summary of the research ethics adopted.

3.6.1 Confidentiality

It was made clear, in initial introductory telephone conversations, in the written introductory section to the interview protocol and finally in the opening introductory comments of the researcher during the taped interview, that the identity of the informed participants and their organisation would remain anonymous in all research documents. The reaction was that the interviewees all felt that the organisation could be named (many of the consultancy organisations perhaps saw this as a form of indirect marketing) but that they, personally, should remain anonymous. This latter comment was related to the fact that many interviewees expressed the view that they were commenting on the protocol based on their personal experience, rather than expressing a corporate position.

3.6.2 Agreement of interview transcripts

This area has been discussed at length in section 3.4.4 and will not be repeated.

3.6.3 Consent to use of project documentation

A wealth of documentation was provided by all interviewees as discussed in Section 4.3 relating to validation of interview data through use of project documentation. Generally the consulting organisations provided documents related to the proposal stage of the ERP project in question and these could perhaps be viewed as marketing material. They were more than happy to allow the identity of, for example, IBM or KPMG to be disclosed. Where the documents disclosed the name of their client the consent fell into two categories:

(1) where there were two participants involved in the same project, as was the case for M&S, Vodafone and Unilever, the participant from the client provided the consent to use project documentation. This consent was oral (but taped) and not requested in writing. There was generally very little sensitivity about confidentiality perhaps because many of the documents were already in the public domain anyway (for example, press releases and documents provided to software user groups).

(2) where the documents were provided solely by an informed participant (these were ERP consultancy organisations) and named their client, assurance was given that there was no sensitivity around the use of the documents in an academic paper. However, in view of the fact that there was no written authorisation from the client, these client names have now been anonymised.

CHAPTER 4 - CODING AND ANALYSIS OF DATA

4.1 Summary of coding and data analysis stages

A summary of stages of work completed to code and analyse interview data is shown below in Diagram 4-1:

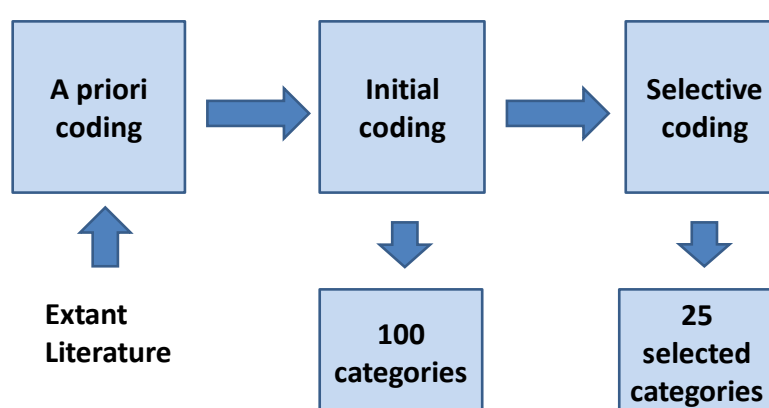


Diagram 4-1: Overall process for coding interview data

***A priori* coding**

Ten *a priori* categories (APC) derived from literature and research questions (Table 4-1) have been used as provisional codes (Miles et al., 2014) and this process is explained and supported by appropriate references from the literature.

Initial coding

Details of the initial coding process used to generate 100 categories (see Table 4-2) from the 10 *a priori* categories are described.

Selective coding

The selective coding process used to select 25 key categories is described and the listing of these categories is shown in Table 4-4. Illustrations of selected categories from interview text are shown in Appendix 3. The frequency of occurrence (regularity) of the selected categories across all interview data is shown in Appendix 2 and summarised in Table 4-3.

4.1.1 Use of *a priori* categories

My use of *a priori* categories is supported by the following references from literature on qualitative research:

- (1) The provisional (*a priori*) coding method is described by Miles et al. (2014) as a 'start list of researcher generated codes based upon prior research that is appropriate for qualitative studies that build on previous research'.
- (2) Goetz and LeCompte (1981) comment that *a priori* categories may be based upon an initial constructive phase of analysis where 'conceptual categories embedded in the social phenomena have been discovered'. I suggest that my literature review and the development of an explicit research question and underlying questions represent such an initial analysis phase.
- (3) Glaser and Strauss (1967) refer to the literature review as 'a slice of data' and which the authors say can be regarded as form of *a priori* coding.
- (4) Nunes and Al-Mamari (2008) in a study titled 'Inductive approaches: Using *a priori* coding in information systems research' comment 'this literature review process should therefore produce *a priori* theory that reflects the cumulative knowledge in the field on the phenomenon being studied, i.e. generic *a priori* categories that are strongly expected to be relevant in the discussion, explanation and understanding of that phenomenon'.
- (5) The use of *a priori* categories to 'scaffold the apprentice researcher during inductive data analysis' (Nunes and Al-Mamari, 2008) also aligns with the views of Orlikowski and Iacono (2001). The latter authors have argued there is insufficient ('hidden') presence of the IT artefacts in qualitative research into information systems and too much emphasis upon the impact of information systems upon social

behaviour. My method of using *a priori* categories, based upon a review of IS literature and the explicit nature of my research question about the ERP phenomenon, has ensured the influence of this particular IT artefact.

(6) The use of *a priori* categories also has much in common with ‘in vivo coding’ described by Miles et al. (2014) as ‘using words or short phrases from the participants own language in the data as codes’.

(7) The *a priori* categories used in this study formed the basis of the interview protocol and so would necessarily be present, together with correlated categories, in the participants’ responses. An *in vivo* code is described by Strauss (1987) as ‘deriving from the natural language of people in the social context being studied’ (Bryman, 2008).

The *a priori* categories, together with their origin within information technology and enterprise systems literature, are shown below in Table 4-1.

<i>A priori category</i>	<i>Literature reference(s) which is origin of category</i>	<i>The context of reference which was cited</i>
1 ERP systems implementation projects	<i>Majority of IT and ERP literature over last two decades</i>	Literature generally cites particular case studies or surveys and in many cases relates the dimensions of the ERP project (for example, size and scope of business applications and implementation strategy) to the issue under study.
2 Objectives of ERP projects (generally stated in business case)	<i>Markus and Tanis (2000), Peppard and Ward (2004)</i>	Paper discusses multiple reasons for adopting enterprise systems in terms of business objectives. Ability to state clear objectives and measure IT system benefits in a business case is viewed as a key capability of a business organisation.
3 Contents of business cases	<i>Ward et al. (2008)</i>	Paper titled 'Building better business cases for IT investments'. This study includes definition of different categories of business benefit for inclusion in business case and concludes that businesses with more robust business cases are more successful in delivering value from IT investments.
4 Planned system benefits	<i>As above</i>	The above paper also provides typology for classification of planned system benefits; financial, quantifiable, measurable and observable benefits.
5 Reasons for not using business case metrics	<i>Ward and Daniel (2013)</i> <i>Markus et al. (2000)</i>	This paper discusses use of benefits metrics for project approval rather than to measure business success of project. Paper entitled 'The Enterprise System Experience - From Adoption to Success' discusses measures of success that are independent of business case metrics.
6 Reasons for not measuring benefits	<i>Nelson (2005)</i>	Nelson discusses a variety of reasons why a retrospective view of project benefits is not completed, based on 357 responses from large IT project participants.
7 Delivery of benefits	<i>Peppard et al. (2007)</i>	Paper argues that use of a benefits dependency network (BDN) improves successful delivery of planned benefits and cites case studies to support findings.
8 Project management success	<i>Multiple studies completed in 1990's to establish CSF's (see section 2.5 of literature review).</i>	Papers discussed in this section research the groupings of independent variables (CSF's) that impact the dependent variable of project implementation success. There is explicit assumption that this success concept determines business success.
9 Objective measures of business success	<i>Shang and Seddon (2003)</i>	'A comprehensive framework for assessing and managing the benefits enterprise system' classifies benefits from ERP systems as operational, managerial, strategic, IT infrastructure and organisational.
10 Subjective measures of business success	<i>Markus and Tanis (2000), Nelson (2005)</i>	Nelson agrees with Markus that success is 'in the eye of the beholder.' At any point in time, a project may receive a different opinion on success and 'it's unlikely to be a binary one'.

Table 4–1: Derivation of *a priori* codes from literature

4.1.1.1 Benefits of using *a priori* categories

In summary the benefits of using *a priori* categories are:

- (1) extant theory is introduced at an early stage in the inductive process of coding interview data
- (2) *a priori* categories are used to structure the interview protocol discussed with the informed participants and there is therefore an increased convergence of interview responses with extant theory
- (3) from a practical standpoint of completing research and writing a PhD thesis the use of *a priori* categories 'avoids the compulsion to code everything that emerges from the data as relevant to the study' (Nunes and Al-Mamari, 2008).

Consequently, the a priori categories and extant theory of how the business success of enterprise systems can be measured have largely determined the approach to the processes used for coding and analysis of data from the interviews of the 20 informed participants

4.1.2 Initial coding

It is clear from the literature on qualitative analysis that there are multiple, constantly evolving methods of analysis of qualitative data both in the information systems domain and the wider domain of management theory. Miles et al. (2014) have commented 'Qualitative research may be conducted in dozens of ways' and describe 20 particular research genres available to researchers.

The authors continue 'some qualitative researchers still consider analysis to be an art form and insist on intuitive approaches to it. We do not really know how the researcher got from 1000 pages of field notes and transcriptions to the final outcomes, as sprinkled with vivid illustrations as they may be'.

My approach of using *a priori* categories to code interview data to generate almost 100 initial categories and then applying specific criteria to select a smaller number of selected categories explains a large part of the process of 'moving from large binders of interview data to final outcomes, as 'sprinkled with vivid illustrations as they may be'.

4.1.2.1 Terminology adopted

I have used the word coding to describe the overall process of analysis of interview data but also to describe the ‘tagging’ of words, phrases, sentences and paragraphs included in interview transcripts.

So, for example the *a priori* category C (business cases) was used to code or tag (in the absence of the use of qualitative data analysis software) ‘chunks’ of data that varied in size from words to paragraphs.

These correlated categories are similar to the dimensions of constructs included in the construct tables described by Miles et al. (2014) as a method of displaying the variability of a central construct. This approach also accords with the process of data condensation (Miles et al., 2014) described as the process of selecting, focusing, simplifying, abstracting, and/or transforming the data that appears in the full body of written-up field notes.

During the coding processes I have used the word *correlated* to describe groupings of categories rather than the word *related*. Related categories and relationships have been reserved as terminology to infer for example, causal relationships between categories.

4.1.2.2 Use of *a priori* categories for initial coding

Strauss and Corbin (1990) describe initial coding as ‘ the procedure of selecting the core category, systematically relating it to other core categories, validating those relationships, and fitting in categories that need further refinement and development’.

My working method was therefore relatively straightforward; the 10 *a priori* categories and similar, correlated categories were identified in the interview transcripts by simple manual colour coding. Working tables were maintained throughout the process to show the location and frequency of the *a priori* categories and the increasing number of correlated categories. Charmaz (2006) states ‘new codes may be generated by combining initial codes. The data is then re-explored and re-evaluated in terms of these selected codes’.

So, where, for example six areas of data were coded as being correlated to the *a priori* category C (business case), then business case became a category and the six business

case categories were viewed as correlated categories within this category. Examples of these correlated categories were:

- Contains business objectives / business driver (C31)
- Business cases for large global projects (C32)
- responsibility for the preparation (C33)
- timing of preparation (C34)
- use of public sector guidelines for business cases (C35)
- non-executive director involvement (C36)
- inclusion of benefits estimates (C37)
- use of business case for approval purposes only (C38)
- disconnect between business case and implementation project (C39)
- incremental ERP projects often require more rigorous business cases (C40)

The above can be regarded as dimensions of the category of business case.

4.1.2.3 Use of each *a priori* category

It should be emphasised that the interview protocol was derived directly from the 10 a priori categories as shown in Appendix 7. As a result the informants' responses to questions in the protocol closely followed the sequence of a priori categories.

How initial categories were correlated with each *a priori* category is now described:

***A priori* category APC-A (the enterprise implementation project)** was readily correlated with categories A₁ (dimensions of the project), A₅ (implementation strategy adopted) and A₁₀ (the ERP software implemented).

***A priori* category APC-B (the ERP project objective or business driver)** was readily correlated with different types of business driver that interviewees discussed; those that enabled new business strategies (B-17) , and where the enterprise system business case was often subsidiary to the wider strategic business case, those that allowed new lower cost operational models to be introduced (B-20), often aligned with outsourcing of these business functions, those that were simply necessary to allow the business to survive – the 'do-nothing option' (B-24) and finally those where the enterprise system allowed Y2000 compliance (B-27).

The other *a priori* categories followed the lifecycle of an ERP implementation.

A priori category APC-C (business cases) provided 10 correlated categories, most of which can be regarded as dimensions of the business case such as timing, responsibility and contents as discussed above.

A priori category APC-D (reasons for not using business case metrics) was correlated with 5 categories (D41-D45). These reasons for not using business case metrics were supported by extant literature in this field of research, as outlined in Table 4-1.

A priori category APC-E (estimated system benefits) was readily correlated with the many different estimating methods and comments on responsibility for preparation and use of these metrics.

A priori category APC-F (the reasons for not measuring benefits) were frequently discussed, although interview transcripts had to be closely studied to interpret whether the interviewee was referring to estimated benefits in the business case (if one was written) or realised benefits that were estimated during or post-implementation.

A priori category APC-G (the delivery of business benefits) provided many correlated many categories, some correlated to the nature of the benefits (quantifiable or otherwise), others correlated to the timescale involved. So, this *a priori* category, the delivery of benefits, generated other categories that provided temporal and organisational dimensions to the benefits from each of the business drivers itemised in APC-B.

A priori category APC-H (project management success) led to multiple categories mostly concerned with project planning and project management issues and also provided temporal and organisational categories correlated to project success.

A priori category APC-K (objective measures of business success) led to five correlated categories, including for example, the delivery of planned benefits in the business case, which reflects earlier categories generated by *a priori* code APC-B, objectives of ERP projects

A priori category APC-L (subjective measures of business success) generated over 10 different measures. The distinction between objective and subjective

measures of success was based primarily upon the use of empirical data or observations as objective measures.

The 100 initial categories and their correlation with the *a priori* categories are shown below in Table 4-2.

<i>A priori</i> category (APC)	Correlated categories	Cat. #
A	ERP implementation projects (25 cited as examples during interviews and in project documentation (see Appendix 7)	
	Dimensions of project	A1
	Size of ERP project	A2
	Timescale of implementation	A3
	Scope of business applications implemented	A4
	Implementation strategy adopted	A5
	Sequence of implementation i.e. sequentially or 'big bang'	A6
	Geography or business division scope of project	A7
	Standard data and business processes from use of single instance	A8
	Pilot projects	A9
	ERP software used	A10
	Software vendor	A11
	Selection process	A12
	Industry software release used	A13
	Other software integrated into solution	A14
	E-commerce software integrated into ERP solution	A15
	More componentisation of ERP software in last decade	A16
B	Objectives / business drivers of ERP projects	
	Enabling new business strategy	B17
	Timing of implementation	B18
	Using new ERP release can give competitive advantage	B19
	New lower cost operational models	B20
	Timing of implementation	B21
	Shared service centres use ERP	B22
	Shared service centres precede outsourcing program	B23
	Doing nothing not an option	B24
	Legacy systems 'not fit for purpose'	B25
	Above described as 'burning platform'	B26
	Year 2000 compliance	B27
	Timing of implementation	B28
	Y2K or other compliance projects often obscure other business benefits	B29
	Y2K projects often used as umbrella for approval of other ERP projects	B30
C	Business cases	
	Contain objectives / business drivers	C31
	Large global ERP projects with powerful business drivers require less bottom-up justification	C32
	Responsibility for preparation	C33
	Timing of preparation	C34
	Public sector organisations have to follow standard government IT business case format	C35

A priori category (APC)	Correlated categories	Cat. #
	Non-executive directors asked to give benchmarks for business case	C36
	Include benefits estimates	C37
	Used for approval	C38
	'Disconnect' between business case and implementation program	C39
	Often incremental ERP projects ie BI and CRM require more rigorous business cases	C40
D	Reasons for not using business case metrics	
	No stakeholder continuity	D41
	Range of stakeholders	D42
	Lack of accountability	D43
	Accountability of business managers and external parties	D44
	No reliable metrics in business case	D45
E	Estimated system benefits	
	Tangible and intangible benefits	E46
	Business information (BI) systems provide intangible benefits	E47
	Use of ROI criteria	E48
	More simple years payback of investment used to assess value	E49
	Assign responsibility for delivery of benefits	E50
	Process owners given responsibility	E51
	Used by consultants to justify their fees	E52
	Evaluated by pilot project	E53
F	Reasons for not measuring actual benefits	
	No benefits estimated in business case	F54
	Changed business environment	F55
	Business merged after ERP project	F56
	Project cancelled or aborted	F57
	Lack of incentive	F58
	No measurement method	F59
	Inadequate accounting system	F60
G	Delivery of benefits	
	Responsibility assigned in business case	G61
	Responsibility assigned later in project lifecycle	G62
	Timing of benefits delivery	G63
	Benefits of enabling wider business strategy are aligned with timing and success of business strategy	G64
	Benefits of new operational models (ie outsourcing of business processes) measurable post-implementation	G65
	Benefits of urgent 'cannot do-nothing' projects immediate	G66
	Benefits of compliance projects are immediate (ie Y2K	G67
	Causality between project and benefits	G68
H	Project management success	
	Implementation plans within business case	H69
	Effective project management	H70
	Use of management consultants	H71
	Multiple consulting firms makes accountability unclear	H72
	Use of systems integrator to take overall responsibility	H73
	Project director from business	H74
	Corporate governance process	H75
	Stakeholder commitment	H76
	Business process owners appointed	H77
	Delivers business success	H78

<i>A priori</i> category (APC)	Correlated categories	Cat. #
	Timing of evaluation	H79
	Different measures of success, budgeted cost, delivery to time and technical parameters	H80
	Total cost of ownership (TCO)	H81
	Change control processes	H82
	Scalability of pilot project	H83
K	Objective measures of business success	
	Delivery of planned benefits in business case	K84
	Retrospective reviews	K85
	These reviews often part of overall quality management systems	K86
	'In-flight reviews' more common than retrospective reviews	K87
	Fewer lessons now learned as ERP experiences increase	K88
L	Subjective measures of business success	
	Project delivered on time	L89
	No business disruption	L90
	Used as showcase project	L91
	Used as basis for software release development	L92
	Users 'happier with new system' when surveyed	L93
	Survey reports systems 'better than legacy systems'	L94
	Seems to have delivered benefits but these were not measured	L95
	Consultants used for further work	L96
	Easier to produce business information	L97
	Project manager promoted	L98
	Press releases	L99
	Project promoted by ERP software vendor	L100

Table 4-2: Identification of categories from the *a priori* categories

4.1.3 Selective coding

As a result of the initial coding, almost 100 categories (Table 4-2) above were developed from the 10 *a priori* categories detailed in Table 4-1.

However, it would have been impractical to work with this number of categories within my PhD research timescales. Charmaz (2006) distinguishes between two main forms of coding; initial coding and selective or focused coding. Initial coding 'tends to be very detailed and is intended to generate as many ideas and hence codes as possible to encapsulate the data'. Selective or focused coding requires decisions about which initial codes (of the 100 categories in this study) are seen as most revealing about the data. This means that some, if not many codes will be dropped'. Charmaz continues 'focused decisions are about which initial codes make the most analytic sense to categorise your data incisively and completely'. Following Charmaz' coding

process, the decision about which codes to select for further study was based upon two main criteria: (1) the frequency of occurrence across all interviews and (2) the relevance to my research question.

(1) The frequency of occurrence (regularity) of the selected category within the 20 interviews is illustrated in the 'data summary' table' in Appendix 2 and summarised in Table 4-3 below.

Selected category	Frequency across 20 interviews above	Selected category	Frequency	Selected category	Frequency
A	20	C ₃₁	14	F ₅₅	8
A ₁	20	C ₃₇	11	F ₅₈	8
A ₅	13	C ₃₈	9	F ₅₉	8
B	13	D	9	G	13
B ₁₇	14	D ₄₁	8	H	10
B ₂₀	13	D ₄₃	7	K	11
B ₂₄	10	D ₄₅	7	K ₈₅	10
B ₂₇	8	E	13	L	10
C	16	F	9		

Table 4-3: Summary of regularity of selected categories

(2) The relevance to my research question was examined by reference to the 4 stage model of an ERP implementation proposed by Markus and Tanis (2000) shown in Diagram 4-2 below. This model has been utilised by leading enterprise system researchers in the ERP domain. Significant relationships between selected categories were more likely to emerge from further analysis of interview data if the temporal nature of the categories was within the three stages of the lifecycle that were the focus of the research; the project chartering or planning phase, the project shakedown and 'onwards and upwards phases' of the model included in Diagram 4-2 below (Stages 1, 3 and 4) Categories that related to the project implementation itself (Stage 2 within the model) were regarded as less likely to be relevant to my research questions as project success which was not an area directly within the scope of my research.

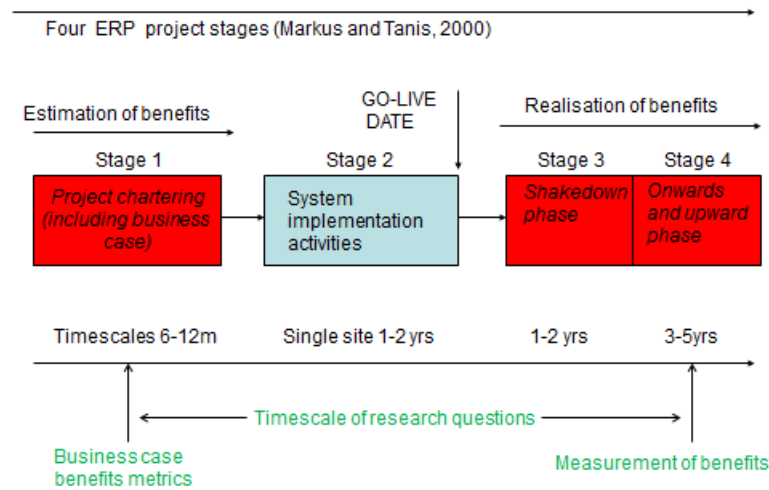


Diagram 4-2: ERP implementation lifecycle model

4.1.3.1 Selective coding of the 100 initial categories

Consequently the 100 correlated categories in Table 4-2 were studied in terms of the frequency of occurrence within interview transcripts and also their relevance to my research questions about the evaluation of business success by reference to the ERP lifecycle model above.

More explanation of the criteria used for selection and rejection of initial categories are now discussed in turn by each *a priori* category.

A priori category A* (ERP implementation projects)** was coded to give correlated categories; A-1 and A-5 were selected as key dimensions of the ***a priori category A and lower level categories rejected. ***A priori sub-category A-10***, the ERP software used, was regarded as a project implementation category and rejected from further analysis because such categories were outside the scope of my research question.

***A priori category B* (objectives of ERP projects)** allowed four key business drivers to be identified, correlated categories B17, 20, 24 and 27. These four categories were selected for further analysis on the basis of relevance to my research question, inclusion in the project chartering phase of the above model, and also frequency of occurrence within the interview transcripts.

***A priori category C* (business cases)** generated 10 further categories but categories C31, C37 and C38 were judged as being 'the most common codes (based upon the

regularity of categories across all interview data) and those which are seen as most revealing about the data' (Charmaz, 2006).

A priori categories D to L generated further categories **D41 to L100** linked to the 'shakedown' and 'onwards and upwards' stages of the project lifecycle, the two post-implementation stages 3 and 4. These two stages include all activities both to complete implementation of benefits realisation projects (Peppard and Daniel, 2008) and to assess the business success of the enterprise system. Depending upon the geographic scale of the implementation, these two stages may occupy 3-5 years. In terms of the categories of business case or business driver involved, these dimensions were generally seen by interviewees as determining the timescales needed to evaluate the business success of the ERP implementation. For example, where the business driver was to enable a wider global business strategy, such as global product sourcing, the evaluation of the success of the strategy might require over five years but the success of the enabling ERP system was seen as subsidiary to the success of the wider business strategy, as long as there was no disruption to the business. Criteria for project management success were applied to the ERP implementation in these circumstances; delivery to time, budget and technical parameters. Whereas if the business driver was the enablement of a new, lower cost operating business model, the timescales for evaluation of the business success were much shorter-term, business case metrics related to planned cost savings being compared to actual realised cost savings. For business survival or Y2K compliance the timescales for evaluation of business success were even shorter.

So, to continue the discussion of selection of categories grouped by *a priori* category;

A priori category D (reasons for not using business case metrics) generated 5 further categories of which 3 were selected for further analysis. Category D44, the accountability of business managers was considered subsidiary to category D43, a more general lack of accountability (as a reason for not using business case metrics).

A priori category E (estimated system benefits) was selected for further analysis as a recurring category across most of the interviews and a category with a clear empirical relationship with other *a priori* categories.

A priori category F (reasons for not measuring benefits) generated 5 further categories of which 3 were selected. 2 categories were rejected on the basis of being

subordinate to the *a priori* category. For example, category F56, business merged after completion of the ERP project, was viewed as subordinate to category F55, a changed business environment.

***A priori* category G (the delivery of benefits)** generated 7 further categories, including temporal dimensions of earlier categories relating to the achievement of ERP business objectives, included in categories B17-B30. Category G63 related to the timing of delivery of benefits.

***A priori* category H (project management success)** was widely discussed, evidenced by the large number of correlated categories (15). However, only the higher level category was selected for further analysis for reasons given at many earlier points in this paper; project success was not central to my research question, as opposed to measures of business success.

***A priori* category K (objective measures of business success)** was selected for further analysis, together with retrospective reviews (K85) on the basis that these reviews might contain detail of realised project benefits.

***A priori* category L (subjective measures of business success)** was not selected for further analysis. As stated earlier, there have been very many comments from the 'constellation' of stakeholders' (Markus and Tanis, 2000) about the business success of ERP projects and few of these generally subjective comments can be regarded of value in terms of further analysis to determine relationships of significance.

4.1.3.2 Regularity of selected categories

The regularity of selected categories shown in Table 4-3 across the 20 interviews was, to an extent, determined by the interview protocol but also by the informed participants' experience of the enterprise system lifecycle.

For example, The increased frequency of selected categories **A to C** (pre-implementation categories) across the interviews is perhaps because interviewees were able to comment more easily upon the concrete, more objective categories such as business case drivers and contents; whereas selected categories (**D to L**) relating to post-implementation events, such as judgements of business success, involved more subjectivity and interviewees were less forthcoming in discussing these categories. Examples of subjective judgements of business success would include, for example,

users being 'happier' with the new system or business information being 'easier' to produce with the legacy systems.

4.1.3.3 Listing of selected categories

The final list of selected categories is shown in Table 4-4 below and includes all the 10 *a priori* categories together with 16 other selected categories.

Selected categories A to L	Initial category ref in Table 4-2
25 ERP projects cited as examples during interviews and in project documentation	A
Dimensions of project	A-1
Implementation strategy adopted	A-5
Business cases or drivers	B
Enabling new business strategy	B-17
New operational models	B-20
Do-nothing option	B-24
Year 2000 compliance	B-27
Contents of business cases	C
Contains above drivers	C-31
Includes benefits estimates	C-37
Used for approval only	C-38
Reasons for not using business case metrics	D
No stakeholder continuity	D-41
Lack of accountability	D-43
No metrics in business case	D-45
Planned system benefits	E
Reasons for not measuring actual benefits	F
Changed business environment	F-55
Lack of incentive	F-58
No measurement method	F-59
Delivery of benefits	G
Project management success	H
Objective measures of business success	K
Retrospective reviews of ERP projects	K-85
Subjective measures of business success	L

Table 4-4: Listing of selected categories

The author felt it to be helpful to illustrate the selected categories, and certain categories not selected, by providing intuitive phrases and paragraphs from the interview extracts, placing the category in the context of the transcript. These are provided in Appendix 3. Because of the relatively standard terminology of IT project managers and ERP consultants, similar language was used by interviewees to discuss the *a priori* categories and there were generalities across the transcripts of many category descriptions.

4.2 Identification of relationships between selected categories

As mentioned earlier, I have used the word ‘correlated’ to discuss the way in which the *a priori* categories were linked to other categories rather than ‘related or relationship’. The word relationship has been used for relationships (for example, cause-effect relationships) identified directly from interviewees statements and also theoretical relationships derived from the literature.

4.2.1 Identify most significant relationships

Those relationships that had the highest degree of regularity and significance across all sets of interview data are summarised in Table 4-5 and Table 4-6. Many relationships were rejected as not being significant, criteria for this being relevance to the research question. For example, the interview transcripts contained many comments on to what extent project management success (H) impacted upon business success (K and L) but these possible relationships were not considered for further study because of the complexity of the issues involved in the level of causality between these categories, an issue I have discussed in Section 2.3.4 of Chapter 2, my literature review.

4.2.2 Classification of category relationships

I have classified significant relationships between selected categories as ***pre-implementation and post-implementation*** in order to show how relationships related to the ERP implementation lifecycle, in the same way as selected categories were validated against this lifecycle. So, for example the business case drivers and relationships with other categories have been classified as ***pre-implementation*** relationships, whereas, for example, the many reasons why business case metrics were not used to evaluate business benefits or why retrospective project reviews were not completed, have been classified as ***post-implementation relationships***.

4.2.2.1 Pre-implementation relationships

The four business drivers for an ERP implementation (B17, B20, B24 and B27) were discussed during interviews as being correlated with evaluation of success of the project by the various stakeholders. Where enablement of strategic change was a

business driver, successful implementation of the strategy determined the business success of the new IT system. Likewise the other three business drivers were closely related to the evaluation of business success of the enterprise system. Interviewees emphasised that each ERP implementation project was unique and these categories of business driver often were overlapping and not mutually exclusive but generalisations could be made and these are discussed in Chapter 5, which details my research findings in more depth

Relationship #	Selected categories		Selected categories	
R-1	B	Business case driver	B17	Implementation of strategic business change
R-2	B	Business case driver	B20	Operation of lower cost business model
R-3	B	Business case driver	B24	Doing nothing not an option
R-4	B	Business case driver	B27	Compliance with Y2k needs
R-5	C	Business case contents	C37	Planned benefits are in business case
R-6	C	Business case contents	C38	Metrics used to gain approval

Table 4-5: Significant pre-implementation category relationships

In summary, the selected category B and the above correlated categories are central to my studies in the sense that they both provide a category of business case and, as a result, categories of an enterprise systems implementation project.

4.2.2.2 Post -implementation category relationships

Relationships between selected categories in the post-implementation phase (R-7 to R-15) tended to involve a higher level of subjectivity (for example, why or how certain activities took place and who was considered responsible). Whereas pre-implementation activities, and therefore relationships, were well documented in business cases or other planning documents, this was less the case with post-implementation activities. This explains why the validation of category relationships by project documentation (in Section 4.3) was completed primarily with pre-implementation project documents. For example, interviewees were willing to be critical of project events during interviews but these comments were not often found in project documents made available to the researcher. Perhaps the exception were

retrospective reviews K85 completed by consultants, extracts from of which have been included in Appendix 5 to validate relationships involving retrospective reviews.

The most significant post-implementation relationships are shown in Table 4-6 below are now briefly discussed. Relationship R-7 between selected category, D (Reasons for not using business case metrics) and D41 (Lack of continuity of stakeholders) was identified across many interviews and is self-explanatory; however, D was cited as the outcome of many other post-implementation issues. Relationship R-8 between selected categories D and D43 (Lack of accountability) was a similar relationship to R-7 (Lack of continuity).

Relationship R-9 between D and D45 is self-evident – no business case metrics prevents use of metrics. The absence of business case metrics for the enterprise system was frequently cited across interviews where the business case for the enterprise system was enabling of a new global business strategy and the costs of the new IT system and the ‘separate’ business benefits were viewed as being subsidiary to the success and the wider benefits of the global strategy implementation.

Relationships R-10 to R-12 related to retrospective reviews and three main issues; planned system benefits E, a changed business environment F55 and the lack of incentive to complete F58.

Relationship R-13 between selected category F (Reasons for not measuring actual business benefits) and F55 (Changed business environment) was based upon frequent comments during interviews and perhaps reflected the fact that a changed business environment made assumptions behind the calculations of planned benefits in any business case of questionable value. Relationship R-14 between selected category F and F58 (Lack of incentive) is also self-explanatory. Relationship R-15 between selected category F and F59 (No measurement method) is difficult to assess in terms of whether the relationship reflects the reluctance of project stakeholders to make the effort to compare pre- and post-implementation performance measures (often referred to as KPI's) or whether the accounting systems were simply unable to measure improvements resulting from the implementation of the ERP system. A summary of post-implementation category relationships are shown in Table 4-6 below:

Relationship #	Selected categories		Selected categories	
R-7	D	Reasons for not using business case metrics	D ₄₁	Lack of continuity of shareholders
R-8	D		D ₄₃	Lack of accountability
R-9	D		D ₄₅	Absence of metrics in business case
R-10	K85	Retrospective reviews	E	Planned system benefits
R-11	K85		F ₅₅	Changed business environment
R-12	K85		F ₅₈	Lack of incentive
R-13	F	Reasons for not measuring actual benefits	F ₅₅	Changed business environment
R-14	F		F ₅₈	Lack of incentive
R-15	F		F ₅₉	No measurement method

Table 4-6: Significant post-implementation category relationships

4.2.2.3 Use of initial categories in the analysis of relationships

The 10 *a priori* categories were used in the coding process to generate almost 100 categories which were correlated with these provisional categories. *Although only 25 categories were selected for further analysis, in terms of category relationships, other correlated categories have been used, where appropriate, to provide more detailed, richer, narrative in discussing the relationships.* For example, processes in the ERP implementation lifecycle would include, for example, categories B (business cases), G (delivery of benefits) and H (project management success). Correlated categories would generally include timing and organisational responsibility for these processes. These temporal and organisational categories can be regarded as dimensions of the category selected and provided more explanation of the category relationships.

The relationships R-1 to R-15 and use of these temporal and organisational responsibilities are discussed further in Chapter 5 and shown in Diagram 4-3 below.

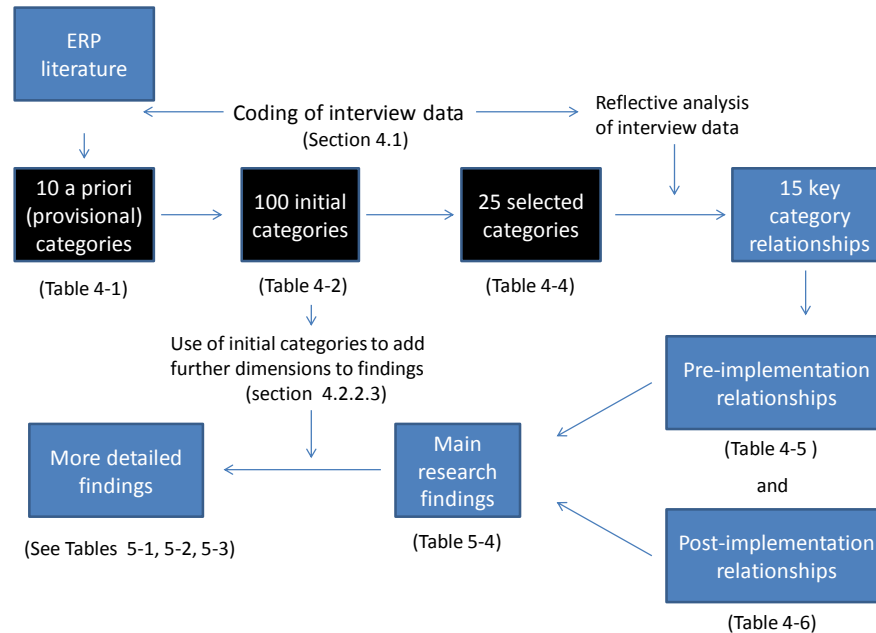


Diagram 4-3: Links between interview data and research findings

4.2.3 Support for relationships from interview extracts

Both pre- and post-implementation relationships have been illustrated by multiple extracts from the 20 interviews with key informants. These extracts are attached in Appendix 4 and selected phrases have been colour coded to indicate which particular relationship is supported. An example is given below from the interview with key informant #5 which supports relationships **R-5** and **R-6**.

Interview extract 1 (KI #5 in Table 3-1)

RJ: Following your interview with WS, it would be valuable to have your views as consultant to the M&S project about my research agenda. Can we begin with the approach to approving and measuring the business success of the BFP project?

PM: So the business case was completed in detail and benefits identified to cover these costs ie IT and people cost savings (R-5). The benefits of the enabled projects downstream, so to speak, were not detailed in the business case. There was a plethora of old legacy systems and many of these were replaced by BFP. The business case was therefore marginal but adequate for approval by the business (R-6).

There are 16 different interview extracts included in Appendix 4; many of these have been used to illustrate multiple relationships and are summarised in Table 4-7 below.

Interview extract #	Key informant reference # (Table 3-1)	Category relationship(s) supported by extract in Appendix 4
1	4	R-5 , R-6
2	1	R-1, R-3
3	8	R-4, R-2, R-5
4	7	R-3, R-9, R-13
5	17	R-3
6	16	R-12
7	2	R-11
8	6	R-13, R-14 and R-15
9	8	R-7, R-2,
10	1	R-6, R-14
11	13	R-9
12	15	R-4
13	5	R-13
14	16	R-8, R-10
15	19	R-14
16	17	R-12

Table 4–7: Summary of interview extracts in Appendix 4

4.2.4 Projects with multiple key informants

Table 3–1 in Chapter 3 provides details of the 20 key informants and the organisation for which they worked at the time of the interview. Key informants (KI# 1-7) were involved in three organisations (M&S, Unilever and Vodafone) where enterprise systems had been implemented and two of the key informants had been involved in (1) a business project manager and (2) an external consulting role. Table 3–1 and also Diagram 3-1 illustrate this overlap and multiple sources of interview data regarding 3 particular ERP projects (this position arose because of the researcher’s initial research method of completing 3 ‘pilot studies’ in ERP adopting organisations to test the interview protocol).

Particular effort was made to contrast the categories arising from these interviews (KI #1 to KI#7) and identify discrepancies, and as importantly, to identify confirmatory but independent sources of a particular category. By way of illustration, extracts from

interviews with key informants who had both been involved in the M&S enterprise system implementation are shown below.

Interview notes with BFP project director at M&S, November 2010 (KI #1)

Can we discuss what post-implementation reviews (PIR) M&S complete and whether these deal with delivery of benefits?

To widen context, M&S IT have 'operating model', a project management methodology which includes a PIR process -- completed at end of each phase

But BFP is too complex (3 releases -- many implementations) for this type of PIR. It is however subject to audit reviews (by PwC also); SAP also do their quality review.

With FTP, as first big ERP project we did a PIR and this resulted in two pieces of work to improve infrastructure for ERP operation.

Did this review look at benefits?

WS: No not with FTP.

Is benefits review a formal part of PIR whether SAP or other projects?

WS: Well, we are currently making changes in this area. The operating model was IT delivery only with little review of business benefits. It was seen to be job of business sponsor, not IT, to deliver benefits. There is recognition that some evaluation of benefits (as set out in project charter) is needed in PIR / operating model processes. 'We are getting better at it'.

There is little incentive after big spend to examine and revisit the justification after the event?

WS: 'Agreed. It's like going over your own homework' 'If business is OK after big IT projects, then questions don't get asked'

Interview notes with IBM director re M&S, November 2010 (KI #5)

PM: M&S are unlikely to complete post implementation review (PIR); retailers work on weekly cycle and it is not in their culture to complete retrospective reviews of activities 2-3 years previously. Projects are 'part of the landscape' and the business moves on ..

RJ: But the operating model mentioned by WS included the PIR process, was this in fact completed?

PM: Well, this is difficult to do for M&S, there are too many moving parts (i.e. original business case assumptions will necessarily be invalidated) You need a baseline of the do-nothing option. M&S have experienced large swings in profit in recent years and starting a 2-3 year ES project in a downturn would increase apparent business success!

RJ: Going back to the question of PIR's what project reviews do take place then?

PM: Well, clearly M&S and other large organisations need due diligence reviews as part of governance over projects where the spend rate is as high as \$1m per month. One simple reason is they need these if something goes wrong. EXCO regard these big ES projects as a 'moneypit' and there are different layers of review. It is rather invidious though as you can always find something wrong as an outsider looking at other parties' projects.

SAP, for example, will be concerned with technical issues rather than achievement of business targets.

Comments: It can be seen that there are conflicting comments about the extent to which M&S complete post-implementation reviews (PIR), but the relationship R-11 between selected category K85 (retrospective reviews) and selected category F55 (changed business environment) is consistent across both sets of data.

4.3 Validation of category relationships

The inductive analysis of interview data (my first unit of observation) has resulted in identification of 15 significant relationships between selected categories listed earlier in Table 4-5 and 4.6. These relationships are expressed in terms of my unit of analysis, the implementation of an ERP project.

I have now used my second unit of observation, project documentation provided by interviewees, in order to validate these 15 relationships. This was only possible where relevant documents were provided; clearly documents relating to Y2000 compliance were not provided because of the elapsed time since completion of this category of project.

4.3.1 Validation by use of ERP project documentation

4.3.1.1 Method used for analysing project documentation

The 20 key informants interviewed provided a wealth of project documentation from ERP projects in which they were currently engaged (in the case of both the business project managers and engaged consultants). A wider range of documentation was provided by the ERP consultants, who generally had experience of over 10 separate company ERP implementations. These documents aligned longitudinally with the main implementation processes, from initial business cases and implementation plans to project meeting notes, progress reports and finally post-implementation reviews.

Bryman (2008) has proposed three methods of interpreting documents; qualitative content analysis, semiotics and hermeneutics. Qualitative content analysis comprises 'a searching out of underlying themes in the materials being analysed'. Altheide (1987) outlined an approach termed 'ethnographic content analysis' where the researcher is constantly revising the themes or categories distilled from the examination of documents. Both Bryman and Altheide emphasise that '*qualitative analysis involves applying predefined categories to the analysis*'. This summarises my

approach to using project documents as validation of predefined category relationships.

The project documents that were my second unit of observation were not subject to the inductive coding processes that I have detailed earlier in this chapter. These documents were used to support relationships between 'predefined categories' that were obtained from interview data, my primary unit of analysis. In this sense, project documents were used as a method of data triangulation, the validation of established category relationships by extracts from secondary data. The project documents were not subject to the coding processes described earlier because they were regarded as secondary data and also because the sheer volume of documents handed to me by interviewees would have made a full inductive analysis impractical (in one interview I was given a book).

In summary my approach to the analysis of documents was as follows:

- (1) project documentation was sorted into folders that followed the chronology of the enterprise systems lifecycle, from business case and other planning documents through to project implementation documents and then post-implementation documents.
- (2) the coding of interview data provided selected categories for further analysis to determine relationships that were likely to most revealing in the context of my research questions. These 15 key relationships have been described as pre-implementation and post-implementation relationships (see Table 4-5 and Table 4-6).
- (3) project documentation was then selectively analysed to identify phrases or paragraphs that correlated to the particular category relationship under study. So, for example, where the category relationship was R-6, between C (business cases) and C38 (metrics used to gain approval), documents relating to business cases were examined to identify content that supported the above relationship. Post-implementation review documents were studied likewise for document support for relationships R-10 to R-12 between retrospective reviews and other related categories. This provided the primary method of integrating interview and documentary data.

4.3.1.2 Limitations of project documents provided

Bryman (2008) has written 'people who write documents are likely to have a particular point of view they want to get across'. The author continues 'members of different groupings (within a business organisation) expressed through the documents certain perspectives that reflected their positions in the organisation'.

The majority of the informed participants were management consultants engaged by the ERP adopting business. This grouping primarily provided documentation that was 'jointly' prepared by the consultant and the client. In many cases the documents were part of business proposals to obtain consulting work on a competitive basis and included estimates of the business benefits of the ERP implementation project (which almost always exceeded the costs of the project, including the consultant's fees). Clearly it was in the interests of this grouping to stress the business benefits, whether strategic or operational, of the project and their associated involvement. Likewise, where external post-implementation reviews of an ERP project were completed these often recommended the further use of external consulting support. As a result, caution was necessary in interpreting documentation provided by these practitioners because of the above factors.

Other points should be emphasised regarding the scope and use of project documents provided:

- (1) The researcher made no request, either before or during interviews with informants, for supporting documentation. The informants freely provided documents that they felt would be helpful to the researcher, rather than being asked to provide documentary evidence of responses to the protocol.
- (2) Informants did not provide documents that supported all the 15 category relationships; for example, business cases that were driven by Y2K compliance were not supplied for obvious chronological reasons.
- (3) Documents that related to the project implementation (Stage 2) were acknowledged but not subject to the same level of analysis as other documents because this stage was largely outside the scope of my research question and identified category relationships. However, extracts from Stage 2 documents have been included in Appendix 5.

4.4 Supporting extracts from project documentation

It was thought to be helpful to the reader to summarise project documents in terms of the context of the document that supported the category relationships R-1 to R-15. These are summarised in Table 4-8 below and are referenced to document extracts in Appendix 5.

Document reference	Nature of document	Project phase related to document (as defined in Diagram 4-2)	Category relationship illustrated
Document # 1	M&S business case discussing strategic benefits of ERP project	Project chartering phase (1)	R-1, R-3 and R-9
2	Vodafone business case slide discussing lower cost business model through business transformation	Project chartering phase (1)	R-2
3	Press release covering strategic benefits from use of SAP software by Unilever	Project chartering phase (1)	R-1
4	Implementation progress report	Project implementation phase (2)	n/a
5	As above	Project implementation phase (2)	n/a
6	As above	Project implementation phase (2)	n/a
7	Project document discussing project benefits and realisation of benefits	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-5
8	Joint document from major UK retailer and Oracle re benefits of new procurement system	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-2 and R-5
9	Value diagram showing areas of benefits from ERP system	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-2 and R-5
10	Post-implementation review	Onwards and upwards phase (4)	R-11 and R-14
11	Post-implementation review documents	Onwards and upwards phase (4)	R-6
12	Post-implementation review documents	Onwards and upwards phase (4)	R-8
13	Email correspondence with Unilever	Onwards and upwards phase (4)	R-1, R-11 and R-12
14	Post-implementation review documents	Onwards and upwards phase (4)	R-10 and R-15

Document reference	Nature of document	Project phase related to document (as defined in Diagram 4-2)	Category relationship illustrated
15	Post-implementation review documents	Onwards and upwards phase (4)	R-8
16	Post-implementation review documents	Onwards and upwards phase (4)	R-7 , R-10 and R-15

Table 4-8: Summary of interview extracts in Appendix 5

Chapter 5 now discusses detailed findings of my research which are partly founded upon these category relationships.

CHAPTER 5 - RESEARCH FINDINGS

This Chapter sets out the findings of the research study and places these findings in the context of extant literature, in terms of the 15 significant relationships between selected categories listed in Tables 4-5 and 4-6, separated into pre-implementation and post-implementation categories.

Section 1 first discusses the category relationships relating primarily to pre-implementation processes (**R-1 to R-6**) within enterprise systems projects.

Section 2 discusses relationships described as post-implementation processes (**R-7 to R-15**).

5.1 Category relationships in pre-implementation phase (R-1-R-6)

5.1.1 Relationships between categories related to the business case driver

In summary, there has naturally been a wide spectrum of business cases for ERP systems over the last twenty years. There are business cases included in a project charter that include very detailed estimates of ERP system costs and benefits together with project plans and deliverables of each project phase. At the other end of the spectrum the business case has been limited to brief slide presentations giving a cursory justification for the new system. There is anecdotal evidence (KI#10) that a European tyre manufacturer approved an ERP implementation (with an estimated cost of over \$50m) purely on the basis that ATP functionality would increase sales in 3000 garages by an estimated 3-4%. In between these extreme examples of course are the majority of business cases which are completed by project sponsors before the project funding is approved.

So there are perhaps as many types of business case as there are organisations who have implemented an enterprise system but across the variations, regularities can be found. It is clear that business cases reflect the key business drivers for the adoption of ERP technology. These business drivers can be categorised as follows:

- 1) New business strategies
- 2) New lower cost operating models
- 3) Where 'doing nothing is not an option' (including Y2K compliance)

Both (1) and (2) have generally involved standardisation of business processes and data to some degree. But this standardisation has generally been a means to an end rather than a distinct business driver (for example, harmonised product coding as a necessary step to centralise sourcing facilities).

These compelling reasons for adopting an ERP system are interrelated, overlapping and certainly not mutually exclusive. But generally one of the above business drivers could be viewed as dominating the decision by senior management to invest in enterprise systems.

The relationships between Category B and B17, B20, B24 and B27 are now discussed in the context of the interview data and the extant literature relating to enterprise systems.

5.1.2 Strategic business change (R-1)

Firstly in the 1990's, and to a lesser extent in the last decade, global and regional businesses implementing new business strategies often adopted an ERP system to support and enable the operation of new business models. These new models generally included strategic, market and customer driven changes that required standardised business processes and information systems across geographies where business had previously been carried out on a country-by-country or regional basis. In these situations, the business cases for the ERP systems were generally completed as part of the overall business strategy (which naturally dominated the overall program), but were sometimes completed as a separate exercise, or often just not completed at all. The Lever Europe SAP project (cited by KI#2a) is a good example of such a strategic project which enabled massive business change across Lever Europe businesses during the 1990s and which is an ongoing global program (The 'One Unilever' program described in document extract #3). Davenport (1998) summarised the position; 'having studied more than 50 businesses with enterprise systems, I can say with some confidence that companies deriving the greatest benefits from their systems are those that viewed them in primarily in strategic and organisational terms: they stressed the enterprise not the system'. A broader comment upon the reasons

for adopting an enterprise system was made by Connolly (1999) ‘only companies seeking to streamline business processes, to standardise data, or to standardise processes can achieve a positive return on their enterprise system investment’.

The above relationship is shown in tabular form below as Table 5–1.

Category of business driver	Estimates of benefits in business case	Timescale for realisation of benefits	Criteria for business success of ERP system
Strategic business change			
(1) Global business strategy is enabled by the ERP system and has large benefits compared to costs of new ERP system.	Variable – generally success of business strategy overrides any separate estimates of ERP system benefits.	Business strategy implementation dictates timescales for benefits. This can vary according to regional or global scale of the strategic change.	*Success of new business strategy. *Project management (delivery) success. *No business disruption from new system
(2) Business strategy is single business division, enabled by ERP system	Separate benefits of ERP system, for example, IT costs savings vs legacy systems.	Business strategy implementation dictates timescales for benefits.	*Success of new business strategy. *Project management (delivery) success

Table 5–1: Strategic business change as business driver of ERP project

5.1.3 New lower cost business models (R-2)

Enterprise systems have also allowed standardised business processes and standard data structures across multiple business units to be introduced (the processes often based upon the so-called ‘best practices’ embedded in the ERP software business model).

This, in turn, has allowed centralisation of back-office processes (such as finance, HR and procurement) and supply chain processes within shared service centres or

regional distribution centres (RDC's) and, taken further, outsourcing of these centres to lower cost service providers. These benefits were generally documented in the business case because of the tangible cost savings derived from these new operating models. Also the business case for the enterprise system was often completed at the same time as contractual negotiations with third parties were being finalised for outsourcing arrangements. These would allow the business case to include a category of estimated benefits described as 'quantifiable benefits' (Ward et al., 2008).

Perhaps the more customer facing processes, from CRM to supply chain processes, have been viewed as less susceptible to this form of standardisation. As Davenport (1998) has commented, 'differences in regional markets for most global companies remain so profound that strict process standardisation would be counter-productive'. A further comment of the same author, 'an ERP system forces businesses to make difficult decisions about commonality and variability of processes'. But these comments contrast with the Unilever project cited above which illustrate that enterprise systems have clearly enabled a new strategic vision to be adopted in terms of managing customers on a global basis, rather than a country by country basis or regional basis. Table 5-2 below summarises the relationship R-2 in tabular form.

Category of business driver	Estimates of benefits in business case	Timescale for realisation of benefits	Criteria for business success of ERP system
New lower cost operating models			
(1) Single site cost reduction within business function	Examples would include: (1) Staff or other operating cost reductions through process improvements (2) inventory reduction through supply chain efficiencies from the new ERP system	Short-term, often within a year after go-live date.	*Achievement of planned cost savings *Successful operation of new ERP system
(2) IT cost savings	Replacement of legacy systems by ERP system provides cost savings, whether managed in-house or serviced externally	Short-term, often within a year after go-live date.	*Successful operation of new ERP systems. *Measurement of actual IT cost savings
(3) Centralisation of business functions through standardisation of business processes and data structures	Cost savings from rationalisation of multiple business functions across multiple geographic business units	Short-term, often within a year after go-live date.	*Successful operation of new centralised finance/HR/CRM centres *Quantification of actual operational cost savings
(4) Out-sourcing of above centralised business functions	Cost savings from both the rationalisation of business functions and operation by lower cost service provider	Short-term, often within a year after go-live date.	*Acceptable service from outsourcing company *Lower costs included in outsourcing contract

Table 5-2: Lower cost business models as driver of ERP project

5.1.4 'Do- nothing is not an option' (R-3)

The third category relationship identified is that many business organisations adopted an ERP system in the last two decades because the 'do-nothing option' was not acceptable.

The implication of this terminology of the key informants is that the ERP system was, for example, critical to implementation of a new business strategy and that the 'do nothing option' was not a valid option because the legacy systems could not support the new strategy in terms of, for example, the common financial reporting systems and more advanced management information systems required. This explains the absence of a business case for an ERP system where a new business strategy was the driver for the project. But, also there were cases where the legacy systems were close to failure and could no longer support even the current business model; doing nothing was not viewed as an option and this argued against preparation of a business case. Practitioners interviewed often referred to this as the 'burning platform' situation.

One senior practitioner from KPMG (KI #7) commented that business cases restricted to new technology were often based upon industry benchmarks for IT costs i.e. 1.5% of turnover.

Another practitioner in IBM (KI#5) said 'business cases for ERP projects are low quality; benefits are not assessed properly. Cause and effect is difficult to establish. Also once a business case is sanctioned, there seems to be no going back. Projects are rarely cancelled even if the business case is badly scoped or misconceived'

In many of these cases, it would have been possible to calculate the costs of upgrading the legacy systems and compare this to the costs of expensive new ERP technology but this was often not completed, perhaps because of the momentum behind enterprise systems at the time. Also there was a perception that competitors who had already adopted an ERP system would gain market advantage, particularly where industry releases of the ERP system were involved (the oil industry and CPG industries were the best examples). 'As the CEO of one large chemical firm said, 'competitive advantage might just come from doing the best and cheapest job at implementing SAP' (Davenport, 1998).

Markus and Tanis (2000) have written 'many adopters who had been using ERP long enough to have business results did not know whether they had realised improvements. In most cases, these companies viewed ERP strictly as a technology decision and had not prepared business cases justifying ERP in terms of business benefits'.

In all these categories of ERP system project where 'do-nothing was not an option', I am using the language of the key informants; the inference was that there was a strong justification for these investments based upon cost avoidance and a business case was often considered unnecessary because of the urgency of the position and the belief that the cost benefit equation was very persuasive, even if the benefits were 'measurable' (Ward et al: 2008).

5.1.5 The Y2K factor (R-4)

Finally within the 'do-nothing option' category of business case was the Y2K project. The Y2K factor was a key driver for many ERP implementations in the period 1995-2000. Generally the need for Y2K compliance was recognised some 3-5 years before Y2000 and these projects were justified on wider grounds than Y2K compliance, although this factor alone would justify the ERP project costs because of the serious implications of non-compliance.

There were examples of detailed benefits estimates where legacy systems were replaced with an ERP system to provide Y2K compliance. Here the cost of upgrading legacy systems to give Y2K compliance was estimated to be higher than the cost of operating the ERP system. This process was generally followed without reference to the wider benefits of adopting the ERP system.

Ross et al. (2003) 'The Continuing ERP revolution: Sustainable Lessons, New Modes of Delivery' cite one case study where 'the cost of Y2K compliance was estimated at \$30m, which was equal to the cost of implementing SAP. The firm decided to implement SAP as the solution to both its Y2K problem and the need for a common systems platform to support the business'.

It should be added that although Y2K compliance will not occur again, there are likely to be other compliance requirements in the future, for example with EU or wider trade regulations that may force the redesign of new corporate information systems.

The relationships R-3 and R-4 are summarised in Table 5-3 below.

Category of business driver	Estimates of benefits in business case	Timescale for realisation of benefits	Criteria for business success of ERP system
'Do-nothing' not an option			
(1) Business survival –legacy systems cannot support business	Business cases often not completed being viewed as subsidiary to business survival. Where business case is completed, reduced cost of operating new IT systems would be planned benefit.	Immediate – after the go-live date for ERP system.	*Business survival *Project management success criteria
Need for regulatory compliance ie Y2K compliance	Business case not completed because there is no other option (different software options may be evaluated)	Immediate – after the go-live date for ERP system.	*Business survival *Project management success criteria
Enables new business strategy	ERP system is only IT solution to enable new business strategy so separate business case is not completed	Timescale for implementation of new strategy	*Successful implementation of new strategy *No business disruption from new ERP system

Table 5-3: 'Do-nothing option' as driver of ERP project

5.1.6 Business case contents (R-5 and R-6)

Discussion of the three main categories of business drivers for adoption of enterprise systems has illustrated that business cases, where completed, generally contain metrics based upon estimated, *a priori*, business benefits from the new technology.

The point was often made by the expert practitioners that the business case is generally part of a wider document, often termed the 'project charter' that sets out the overall strategy for the project, the resourcing, timelines and deliverables of each phase in addition to the costs and estimated benefits of the project (Markus and Tanis, 2000).

Also it seemed that the business case was often completed to satisfy financial hurdles that applied to all major capital expenditure projects in the organisation. It was a key

part of a formal presentation to the board or group of senior executives to gain project approval. Often interviewees stated that project costs were estimated with some rigour but financial benefits were merely calculated to exceed project costs. Ward et al. (2008) reached similar conclusions.

Similar comments within this theme were that benefits were calculated to cover project costs and any surplus was considered 'a bonus'. The impression was given that the business case was completed to satisfy governance needs rather than to present a rigorous estimate of ERP system benefits.

In cases where ERP systems were implemented to reduce back office costs, the point was made that staff reductions were cited rather than efficiency savings through process improvement because these cost reductions were 'harder' figures and easier to justify. Certainly many ERP systems were implemented initially in the finance function allowing finance staff reductions and related cost savings. These savings were not difficult to estimate for business case approval purposes.

5.1.7 Main findings relating to pre-implementation relationships

The enterprise systems discussed in interviews with key informants were classified according to the business driver of the project, whether new business strategies, operating models or the 'do-nothing' option.

Further this framework has influenced the nature of the business case for each category of enterprise system and the extent to which benefits metrics were used to support the business case.

The main findings relating to pre-implementation relationships are summarised below (references to categories coded in Table 4-2 are included where appropriate).

(1) Firstly, the category of business cases where global business strategies were enabled (B17) by new ERP technology suggests that the business success of the ERP system was inseparable from the success of the implementation of the new strategy. Further, the organisational profile of a global strategy that is driven by a competitive need to have global brands, products and customers in many cases positioned the ERP investment as a less critical activity - as long as there was no disruption to the business from the new systems (L90). Many practitioners talked in these terms; avoiding disruption and problems was critical to stakeholders. The inference was that

the more positive benefits of ERP technology could wait for the longer term as long as the short term was 'business as usual'. Markus and Tanis (2000) have emphasised that the 'shakedown phase' , stage 3 of an ERP project often involves short-term deterioration in KPI's (key performance indicators) and the length of time before these return to normal is viewed as a measure of success. This emphasis upon success of the new business model and enablement by ERP technology has perhaps reduced the effort made to estimate those benefits more directly attributable to the ERP system itself, for example reduced IT operational costs or benefits from improved process improvements (E46), as opposed to more strategic benefits. However, there were robust business cases cited for this category of ERP system (enabling new business strategy) but often with more emphasis upon the business strategy itself.

(2) Secondly, the business cases for ERP systems driven by standardisation of business processes and new lower cost operating models (B-20) have included detailed estimates of planned benefits, often related to development of shared service centres (B22,23). These business cases were often based upon outsourcing contracts with lower cost providers which included cost metrics that were a measure of the savings generated. These benefits were generally realised within a short period after implementation (B21).

(3) Finally, in cases where ERP systems adopted by organisations because the 'do-nothing option' was not viable (B24, B25), these situations had the least robust business cases in terms of estimates of planned benefits from the ERP system. As mentioned earlier, the 'do-nothing' situation is associated with urgency and high risk to business operations if the legacy systems are not replaced.

To conclude, the categorisation of ERP business case by business driver has been helpful in making observations about the extent to which businesses plan and estimate benefits from ERP systems; these relationships are summarised in Table 5-4 below.

Business driver	Estimates of benefits in business case	Timescale for realisation of benefits	Criteria for business success of ERP system
New global or regional business strategy	Variable – generally success of business strategy overrides separate estimates of ERP system benefits. Some business cases include strategic business benefits and separate cost savings from new ERP systems	Business strategy implementation dictates timescales for benefits. This can vary according to regional or global scale of the strategic change.	• Success of new business strategy. • Project management (delivery) success. • No business disruption from new system
New lower cost operating models	Where new operating models are enabled, such as shared service centres for outsourced processes or IT systems, often benefits are clearly estimated in the business case	Short-term, often within a year after go-live date.	• Successful operation of new operating models – shared service centres, or outsourced IT systems.
‘Do-nothing’ not an option	Business cases often not completed being viewed as subsidiary to business survival, including regulatory compliance, such as Y2K compliance	Immediate – after the go-live date for ERP system.	• Business survival • Regulatory compliance • Project management success criteria

Table 5-4: Framework of ERP business drivers and business success measures

5.2 Discussion of post-implementation category relationships (R-7 to R-15)

To recap, where business benefits are directly attributable to the ERP system, for example reduced costs of operating legacy systems, these benefits are tangible and measurement can be made. Likewise, where new operating models are enabled by the system, including shared service centres, regional distribution centres and so on, these benefits – generally cost savings - can be relatively easily measured.

But the fact that benefits are rigorously stated in a business case, project charter or other planning document and can be readily measured after implementation of the enterprise system does not mean that the various sets of stakeholders will actually do

this. Ward et al. (2008) have argued the ‘degree of explicitness’ can be used to classify benefits and proposed a classification of financial, quantifiable, measurable and observable benefits. However, in a survey of 100 European companies, completed as part of the same research, it was found that ‘only 20% of business organisations surveyed were satisfied that they carried out an evaluation and review of business benefits sufficiently well’.

5.2.1 Reasons for not using business case metrics (R-7 to R-9)

There were a number of categories selected from interview data which explain to what extent benefits metrics are used to evaluate business success by stakeholders in ERP projects.

Organisational factors were often cited as influencing the use of business case metrics. For example, category D41, the lack of continuity amongst project stakeholders responsible for estimating and delivering project benefits was mentioned (R-7). To quote Markus and Tanis (2000) again, ‘While there may be some continuity across phases (for example, oversight by an executive steering committee during the project phase), handoffs to a different group of people (with different specialties, experiences, and skills) increase the likelihood that variances passed on from earlier phases will not be caught and resolved until they create significant problems. For example, project teams rarely catch and correct significant errors (e.g., failure to match the project to business strategy) in the business case that forms their ‘charter’.

One relationship (R-8) between categories selected from interview data was that business cases rarely provided accountability for delivery of benefits (D43) estimated by management of the process areas involved.

One ERP practitioner (KI#8) commented upon both the accountability for business case benefits and the motivation for revisiting the business case, supporting category relationships R-7 and R-8 as follows:

After the ERP system was live, how were any planned benefits managed in terms of realisation and was there any accountability for benefits estimated in the original business case? (Researcher’s question)

KI#8 commented ‘I am not sure, but I don’t believe this was ever done. There were many new faces by the end of the project and little appetite for revisiting the

benefits case. The generally accepted view was that the project simply had to be done in order for the company to realise its strategic vision of acting as a pan-European business, so why go back to a 5 year old document to measure against the individual goals?

Relationship R-9, the absence of metrics in the business case militating use of this data for evaluation of business success, has been discussed earlier in the context of relationships R-1 and R-3. In other words, there are categories of ERP project (business drivers being strategic change or simply business survival) where generally the business case for the ERP system itself is viewed as subordinate to the overall business driver and associated benefits and there are no business case metrics related to the operation of the ERP system itself.

5.2.2 Retrospective reviews (R-10-R-12)

Views varied on the value of retrospective or post-implementation reviews of ERP projects. Comments were made that these reviews were more common in the 1990's when ERP systems were less well understood. *There are now 'fewer lessons to be learned' commented one experienced practitioner (KI#8 –category K-88)*

This contrasts with arguments of Nelson (2005) who has emphasised the importance of evaluating project success from multiple dimensions, as well as from different stakeholder perspectives.

Nelson (2007) reviewed 99 'retrospectives' conducted in 74 organisations in the period 2000-2007 and concluded that 'mistakes tend to be people or process related rather than technology related'. The author cited the Nike SAP project as an 'infamous failure' but this was viewed by key informants as a success some years later.

Many ERP consultants interviewed were engaged to complete 'in-flight reviews' (K87) rather than post-implementation reviews (K85). These were viewed by many senior practitioners as being of a retrospective nature but of more value because the system design and technical parameters could still be changed. These in-flight reviews focused on quality reviews of project management and whether value was being obtained from the project. In contrast post-implementation reviews were often completed where projects had encountered serious problems to ensure that future similar projects did not have a similar outcome (for example, in a global roll-out programme).

An extract from an interview with one practitioner (KI#7) discussed a pilot project in Australia which resulted in serious business failures and a review was completed to ensure lessons were learned for future implementation projects. The global project was subsequently abandoned and replaced by a series of country projects based upon the same software.

To describe the value of revisiting or reviewing an ERP project after implementation, an experienced IBM practitioner (KI#16) commented that *'you can revisit a warehouse investment and close it down if necessary - you can't close down an ERP system without very major reimplementation costs'*.

Retrospective reviews rarely attempted to measure delivered business benefits or made reference to estimates of benefits in business cases. Some reviews were often completed in project 'post-mortem' situations.

Peppard et al. (2007) commented 'no wonder few companies engage in post-implementation reviews. They already know that many of the benefits in the business case are unlikely to be achieved. Success is measured by whether the system is delivered on time, within budget and meets the technical specifications. Success is not measured on how well the business exploits the system and delivers planned business benefits'. There is a naive assumption underpinning IT investments that 'once we get it in, the benefits will flow'. This 'silver bullet' view has however long been shown to be flawed (Markus and Benjamin, 1997). This theory from the literature supports the relationship R-12 identified between categories F58 and K85.

5.2.3 Reasons for not measuring actual business benefits (R-13 –R-15)

Another recurring relationship in discussion of measuring ERP system benefits and a comparison to business case benefits metrics was that there was no value in doing this because the business model and market environment inevitably changed over 3-4 years; starting business assumptions were necessarily invalidated because of this (relationship R-13). My email correspondence with a senior Unilever SAP project manager (KI #2a) illustrates this point well.

'I discussed this with a senior director and his response was that he was having difficulty in convincing the business to do any sort of post implementation reviews, even for current projects, and that for long term

projects like ERP implementations the business had invariably changed so much that reviews against the initial objectives were almost meaningless’.

In support of relationships R-14 and R-15, an IBM practitioner (KI#16) pointed out that measurement of planned benefits was difficult because there was not the accounting technology to isolate and measure benefits but the biggest factor was simply the lack of appetite to measure benefits - ‘project fatigue’.

An extract from an interview with one practitioner (KI #13) again supports the category relationships R-14 and R-15.

‘If you had a small fast-track SAP implementation, say over 6 months, you might be able to measure business case delivery but measuring business case costs and revenues over longer timeframes is very difficult for three reasons:

- we don’t have the accounting technology to measure future benefits*
- the linkage between the projects and benefits cannot always be made*
- but biggest issue is the appetite to measure the benefits’*

5.2.4 Subjective measures of ERP business success (selected category L)

Almost all the informed participants commented on the range of opinions expressed by categories of stakeholders about the business success of the project. Some consultants expressed the view that business success was not their responsibility and was a longer term view of the project than the project management objectives for which they were contracted and rewarded.

Markus and Tanis (2000) have defined success in the ‘onward and upward’ phase (a year after system go-live) as achievement of expected business results, such as reduced IT operating costs and reduced inventories but the authors also comment that success can be measured in terms of whether the original ERP decision makes sense in terms of subsequent events such as mergers and acquisitions.

Perceptions of ERP project success were often discussed in terms of ‘there was no disruption to the business, so management and stakeholders were happy’. It seems that business organisations, based upon past experiences, view new technology with trepidation and suspicion and when the supposedly complex ERP systems are delivered without any serious mishap, this is viewed as a measure of success.

Further organisational factors relating to measuring ERP system benefits were the corporate destinies of the project sponsors. Often the promotions of project sponsors was seen a measure of project success (L98).

5.2.5 Main findings relating to post-implementation category relationships

Returning to my three categories of business case, based upon the business driver for the adoption of the enterprise system, the business cases that often did not contain planned benefits metrics are those driven by new business strategies or where 'doing nothing' would result in business failure. The discussion above, based upon interview data and the many different ERP projects cited in interviews, supports the argument that the evaluation of business success of these projects is based upon enabling new business models or, for the 'doing nothing' situations, an implementation that does not disrupt the business. In these business cases, planned benefits have not been estimated. However, even where very detailed benefits have been estimated for the ERP system, there are a multitude of reasons why these are not measured in the post-implementation phase; these reasons do not however relate to the inherent difficulties of operationalisation of benefits and measurement processes.

These reasons are based upon organisational and behavioural factors, such as incentive, motivation, lack of continuity of stakeholders, reluctance to review the past and changes in the business environment (D41, F58 and F55). It is perhaps this latter factor that is used most commonly as a reason for not completing empirical studies of ERP system benefits.

These organisational and behavioural factors have been discussed in the above section on post-implementation relationships. But another simpler explanation for lack of measurement of benefits is that if the 'constellation' of stakeholders accept largely subjective measures (L89 to L100) for the business success of ERP projects – as the above paragraphs argue – there are perhaps fewer incentives for stakeholders to complete empirical studies of system benefits in a more objective manner.

Retrospective reviews were completed more often to diagnose problems encountered in an implementation project, often a pilot project, because of the implications for future events. The informed participants did not generally think of these reviews as

an attempt to measure business benefits or to compare benefits with estimated benefits.

In summary, the main findings based upon category relationships in the post-implementation phase are as follows:

(1) The reasons for not using business case metrics (other than for project approval purposes (C38) as a measure of the business success of ERP projects is based primarily upon organisational and behavioural factors, rather than any fundamental problems in the operationalisation and subsequent measurement of these (benefits) metrics. Further, certain categories of ERP business cases, for example strategic business change projects, where the ERP implementation is viewed as subsidiary to the wider strategic change project, often do not include costs or benefits metrics (C32).

(2) The reasons for not measuring actual, realised business benefits of enterprise systems projects may also be for organisational and behavioural reasons but the changed business environment on completion of a large global ERP implementation over a number of years (F55) has been more often cited as an underlying reason for not measuring these benefits (and using the comparison with planned benefits as a measure of business success). Also relationship R-15 indicated that lack of comparable measurement systems may prevent meaningful comparisons between business case benefits and empirical studies of actual benefits metrics (F6o).

(3) Retrospective reviews of ERP implementations (K85) are viewed as the most common method of assessing ERP system benefits but are mostly carried out where particular problems occurred during an implementation and lessons need to be learned for further roll-out of the same system design (A6). Where the project is perceived as being successful, based upon more subjective measures (L89 to L100), stakeholders generally do not make the effort to evaluate business success by measuring business benefits as part of a retrospective review or indeed, any other objective means.

5.3 Main findings and the research question

Research question: *How do businesses evaluate the business success, as opposed to the implementation project success, of enterprise systems projects?*

This motivating research question was based upon observations as a practitioner that there is generally an absence of measurement of the business success of very substantial investments in enterprise systems (often over \$50 million on a global basis). The research findings summarised in Table 5-1 to 5-4 explain how my research has allowed investments in enterprise systems to be categorised according to the business driver and how these three main categories (enabling business strategy or lower cost business models and simple business survival) determine the way in which business success is measured and the related timescales.

More explicit targeted research questions, set out at the conclusion of the literature review in Chapter 2, can now be discussed in the context of this framework;

(1) Why do businesses generally not use initial estimates of business benefits, generally included in a business case, to evaluate the business success of ERP implementation projects?

Initial estimates are not used for two main reasons:

Firstly, the business case may simply not include any detailed estimates of business benefits. Where the business drivers are enabling strategic change or simply business survival (the 'do-nothing' option) the business success of the ERP project is inseparable from, and subordinate to, these wider strategic or survival objectives. Evaluation of business success of the enabling technology project is based upon meeting these wider objectives, rather than use of planned benefits metrics. The exception is the category of ERP projects where lower cost business models drive the business case. In these cases, measures of business success can be based upon the planned metrics generally included in the business case because actual, realised benefits are more readily measured using empirical data and comparisons can be made.

Secondly, where business benefits are included in business cases across the three main categories of ERP project, these are used primarily for approval purposes and it is not always meaningful to compare these estimates to actual, realised, benefits because of the changed business environment in place upon completion of the project. There are also many organisational and behavioural factors that prevent the measurement and use of business case benefits metrics for evaluation of business

success. These factors include lack of continuity of stakeholders or a simple lack of interest in revisiting what are viewed as past and irreversible events.

(2) How then is business success evaluated on an empirical basis?

Where stakeholders in an ERP project do evaluate business success on an objective basis, it is generally determined at a higher conceptual level than delivery of particular categories of business benefits, by the achievement or otherwise of the three main business drivers as set out in Table 5-4. Only where the category of business case is based upon lower cost business models, as discussed above, can planned benefits be readily compared by to actual, realised benefits by empirical study. Success is then evaluated at a more detailed conceptual level than business drivers or broader strategic objectives.

Finally, there are a wide range of subjective measures of business success accepted by stakeholders that have been studied by researchers using survey methods, as discussed in my literature review. These subjective measures perhaps reduce the incentive to complete more objective measures of success, including those based upon measurement of actual business benefits.

(3) Are measures of business success related to the different characteristics of ERP projects? (for example, the size of the adopting organisation and the implementation strategy adopted)

The key findings of my research are summarised in Tables 5-1 to Table 5-4 and clearly relate measures of business success to three main categories of ERP project, each category being defined at a relatively high level, but with markedly different (and often overlapping) characteristics. As stated earlier in my thesis, there are probably as many measures of business success as there are individual enterprise system projects, reflecting the specific business and technical dimensions of the implementation. But the difficulties of using *a priori* benefits in any business case to measure business success, and subsequent comparison with actual benefits post-implementation, has been discussed at length in this paper; *these difficulties make these higher level concepts of success, defined in terms of the key business drivers, a more practical framework for the analysis of business success of enterprise systems projects.*

CHAPTER 6 - CONTRIBUTION OF THE RESEARCH

6.1 Contribution to the practitioner and academic fields

My research has provided a number of key findings relating to the evaluation of the business success of enterprise system projects. I now discuss each finding in terms of the contribution, firstly to practitioner research and secondly to academic research, in the field of enterprise systems.

6.2 Contribution to the practitioner field

The main research findings discussed in Chapter 5 are now each discussed in terms of their contribution to the practitioner field

(1) ERP business cases can be categorised according to three key business drivers: strategic business change, new lower cost operational models and the 'do-nothing option'. The business cases vary in their estimates of system benefits based upon the nature of these business drivers.

Further, this categorisation of business cases is necessarily also a categorisation of enterprise systems and defines the timescales for realisation of business benefits and criteria for measures of the success of each category of enterprise system.

I believe these findings form a valuable framework (see Table 5-4) for categorisation of enterprise systems based upon the goals and objectives of stakeholders in the business organisation adopting the system. The argument that where strategic business change is the primary driver, the business case for the enterprise system itself may often regarded as subsidiary to the wider strategic plan helps explain the absence of benefits metrics in planning documentation for many projects in this category.

Shang and Seddon (2003) have proposed some dimensions of ERP system benefits (operational, managerial, strategic, IT infrastructure and organisational). They suggest that 'these categories of benefit could be used as a technique for measuring the dependent variable in studies that try to assess the impact of factors that influence ERP system benefits'.

The dependent variable is implicitly business success and certainly the success 'dimensions' of Shang and Seddon (2003) are helpful categories of the benefits of enterprise systems but this does not recognise the difficulties discussed earlier about the objective measurement of these benefits.

Also this research indicates that these dimensions of benefit are often not included in the business case for the ERP system and, even where this is the case, there is generally dissociation between these metrics and subsequent measures of business success, the dependent variable referred to by the authors. Without planned benefits metrics in the business case or other planning documents, it is difficult to use these measures in any assessment of business success by objective means. Measures of business success have been shown earlier to be generally based upon subjective measures rather than objective measures that can be readily operationalised. Examples of objective measures would be headcount savings through improved or standardised processes and data, inventory reductions through provision of ATP facilities, reduced cost of operating legacy IT systems and so on.

However, the first dimension of benefit proposed by Shang and Seddon (2003) – 'operational' – accords with the second main finding arising from this study.

6.3 New lower cost business models

(1) Benefits of enterprise systems are more likely to be both estimated and subsequently measured when the business driver is based upon new operating models and resultant cost savings. These metrics can more readily be used to evaluate business success of the enterprise system.

There is little consistency of terminology in enterprise system literature (Ifinedo, 2010) or wider IS domain literature (Gable et al., 2008) but the above mentioned dimension of operational systems is helpful terminology for the category of ERP system discussed above.

For adopters of enterprise systems this suggests that there is more value in planning and measuring ERP system benefits where the business driver is related to operational cost savings. This may be extended to include the dimension of IT infrastructure savings, often the result of the replacement of legacy systems. In the context of planning and resourcing a complex global ERP project, it is helpful for

practitioners to understand areas where estimation of benefits metrics, often requiring extensive effort by project team members at a critical juncture in the system lifecycle, may be valuable in the subsequent assessment of the business success of the project. Again, I emphasise business success because the project planning stage will generally be more focussed upon development of measures of project management success.

I have discussed extensively the dissociation of benefits metrics in enterprise system business cases and subsequent, post-implementation evaluation of business success. In this context, I believe it is of value to practitioners to understand where this dissociation is unnecessary and where comparison of planned and realised benefits metrics can increase business success. One example would be the inclusion in the business case of benefits metrics related to outsourcing contracts for back-office processes such as HR, finance and accounting. The monitoring of the effectiveness of such projects would be more effective with the close association of planned and actual financial data relating to system benefits.

6.4 The ‘do-nothing option’

(3) Where the business driver is a new business strategy or the ‘doing nothing is not acceptable’ situation then the business case is less likely to include benefits metrics and other measures of business success are accepted.

This finding would indicate to practitioners that where the ERP system is implemented to enable new business strategies and major transformation projects, the business case for the enterprise system is subordinate to, and difficult to disentangle from, the wider business case for the new strategy. The costs of the new technology could be included in the wider strategic business case but benefits within the ‘dimensions’ discussed above may be subsidiary to the overall business case. In other words, the business case for the ERP project may not be made because it is subordinate to the benefits of the wider business strategy.

Davenport (1998) cites Elf Altochem who viewed ‘an enterprise system as not simply a technology initiative, rather they viewed implementing SAP as an opportunity to take a fresh look at the company’s strategy and organisation’.

Where the 'do-nothing option' is not acceptable the finding implies that practitioners should not allocate resource to preparation of business cases but rather focus upon other ERP related decisions, for example selection of appropriate ERP software, systems integrators, internal project resourcing, consultants etc.

6.5 Use of planned benefits metrics

(4) There are many reasons, both organisational and behavioural, why business case metrics are not subsequently used to evaluate the business success of enterprise systems. Generally it would appear that the evaluation of the business success of enterprise systems is based less upon specific categories of planned business benefits but more upon the achievement of wider business goals that drive the business case.

Again, this finding, supported by this research and extant literature, emphasises the need for clarity of business goals driving the business case. If these can be readily translated into benefits metrics, so much the better, but at this point the argument diverges. One argument is that these benefits metrics and the associated accountability of business managers are necessary for post-implementation benefits realisation projects. Peppard et al. (2007) have argued that the use of a benefits dependency network (BDN) increases the likelihood of the realisation of benefits from IT investments, citing enterprise systems projects. But the authors do not clarify in this paper whether these benefits metrics were derived from initial planning studies, reflected in a business case, or whether they have been estimated as benefits targets during or after the implementation of the enterprise system. A second argument, which aligns more closely with the above finding, is that there is rarely a close association between any benefits metrics included in ERP business cases and empirical evaluation of business success post-implementation.

Either way, this discussion of the use of planned benefits metrics in subsequent enterprise system project stages will be of interest to practitioners who, based upon my own observations during 1990-2003, are continuously striving to demonstrate measures of the success of ERP projects. Forrester Research Inc. (2011) reported that in 2009 just 53% of the 154 clients interviewed stated that their SAP integration firms had methodologies for measuring business benefits related to the solution. In 2012, just half of the references responded that their providers offered these methodologies.

A wider comment in the same report was that ‘clients (of SAP) were always looking for more input from providers with respect to tracking solution metrics’.

These comments from an industry leader (along with Gartner) in surveying enterprise systems outcomes indicate that the gap between academic and practitioners research in the ERP field is not as wide in certain areas as I suggested in my literature review. This can be explained by the preoccupation of practitioners, and in particular consultants, with project management success rather than business success. This is hardly surprising as consulting fees are often closely linked to project delivery metrics than subsequent evaluation of business success.

6.6 Validation of planning assumptions

(5) Comparisons of planned and actual system benefits are rarely completed because of the difficulties of measuring realised benefits unless these benefits are realised from new lower cost business operating models (for example enablement of shared service centres and outsourcing of these businesses). However, this comparison to allow validation of planning assumptions is rarely of value because of the necessarily substantial changes in business environment enabled by enterprise systems.

Going back to Shang and Seddon (2003) who argued there were five dimensions of benefits from ERP systems, (operational, managerial, strategic, IT infrastructure and organisational) the benefits data in this study was primarily qualitative rather than quantitative data obtained by operationalisation of these categories of benefits. For example, interviewees talked in general terms about ‘benefits in terms of cost reduction, cycle time reduction, productivity and quality improvement and improved customer service’. There was no discussion regarding metrics of quantitative benefits that were realised or how these might have compared with initial estimates of benefits. In terms of the value of this finding to practitioners, the argument that benefits metrics are used in evaluating the success of lower cost business models, enabled by enterprise systems, would be of significant interest.

6.7 Contribution to academic research

As discussed in Chapters 2 and 3 covering the literature review and research method, my research has differed from much of the enterprise systems research in extant literature because of my research question and also the research method used.

To clarify, my research question about evaluation of the business success of ERP systems involves a study of the association between benefits metrics included in any business case and subsequent empirical measures of business success, a study that necessitates a longer term view of the lifecycle of an enterprise system. There are limited case studies of enterprise systems with this longitudinal scale (see section 2.7.1) and very few studies that have used field research or survey methods to question ERP project stakeholders about planned and realised benefits over such an extended timescale.

Reiterating earlier arguments, this can be largely explained by the preoccupation of enterprise system researchers with the phenomenon of project management success and the impact of CSFs (grouping of independent variables) upon this dependent variable. In this popular field of ERP research in the 1990's the longitudinal aspect may be limited to 1-2 years and is often restricted to questioning of stakeholders at a single point in the system lifecycle. As Ifinedo (2008) states 'the assessment of post-implementation success of ERP packages is one area that is not sufficiently researched'.

Ward et al. (2005) studied how organisational issues affect enterprise systems success and recommend longitudinal case studies to increase understanding of how stakeholders' actions during the project 'affect the realisation of intended benefits of the ES investment'. Ifinedo (2010) studied ERP post-implementation success constructs, building on the Delone and McLean (1992) IS success evaluation model. The author recommended that future studies could consider using longitudinal data to facilitate insight regarding ERP success evaluation over the entire project lifecycle in adopting organisations.

Markus and Tanis (2000), discussing directions for future ERP research have said 'what one wants to know is the proportion of success at each stage that is successful in the next. An important issue concerns the specific metrics of success; which metrics have the greatest predictive and explanatory power?' This research has

addressed the question of the predictive power of business case benefits metrics and concluded that these metrics do not have a significant role in the subsequent evaluation of enterprise system business success, other than perhaps where new operational business models, leading to specific cost reduction targets, are the dominant business driver.

Shang and Seddon (2003), as mentioned earlier in a managerial context, have suggested some dimensions of ERP system benefits (operational, managerial, strategic, IT infrastructure and organisational). They suggest that 'these categories of benefit could be used as a technique for measuring the dependent variable in studies that try to assess the impact of factors that influence ERP system benefits'. This research confirms and extends these arguments and also proposes timescales for the measurement of each category of benefit (see Tables 5-1 to 5-4). The authors' five dimensions of ERP system benefits restated have been contextualised in the business case and post-implementation phases of an ERP implementation project and my research has clarified the difficulties for ERP researchers in identifying and completing empirical studies of these categories of business benefit. Further, continuing to use the authors' study as a framework for identifying the contribution of my own research to extant literature, I have utilised a research method that overcomes many of the study limitations recognised by Shang and Seddon (2003) related to the authors' sources of data (ERP vendors and websites, for example).

This study has tackled the longitudinal issue emphasised above by interviewing key informants who have extensive experience of the entire life cycle of enterprise systems. This expertise has resulted from being engaged as consultants to global business organisations who have embarked upon long term global roll-out programs or have been engaged throughout the entire lifecycle of a single site ERP project. The collective experience of these research participants is estimated at over 100 projects over the last two decades including both first and second generation ERP technology and provides a degree of generalisation of research findings across the enterprise systems field. This method can be reasonably viewed as providing the same outcome as a multiple case study approach of ERP projects completed over the longer-term.

My necessarily limited (by PhD study timescales and resources) research into planned and post-implementation measures of success of enterprise system projects has, I believe, increased the understanding of how businesses can most usefully assess the

value of different categories of large global enterprise systems. I believe this research could readily be extended through the validation of these findings by a wider, independent group of experienced consultant practitioners to provide an empirically tested framework for assessment of business success criteria.

6.8 Creation of new knowledge

In terms of the creation of new knowledge, City University Doctoral criteria include this as a key measure of the quality of a doctoral thesis. My response to this is summarised below:

Extant enterprise systems literature, as discussed in Chapter 2 has two central threads:

- (1) Study of the CSFs (groupings of independent variables) that impact project management success and business success (assuming a level of causality between the two dependent variables).
- (2) The application of the IS success measurement model thread of research initiated by Delone and McLean (1992) to enterprise systems.

I have clarified the first thread by explaining the different concepts of project management and business success and how these dependent variables are associated. I have also clarified some of the limitations of the second thread of research.

There has been relatively little study of how the evaluation of business success of ERP implementation projects relate to business case metrics or to objective measures of realised business benefits because of the difficulties of this type of longitudinal case study and also difficulties of obtaining this data from business organisations (Ifinedo, 2008). A research method, including interviews of key informants with both multiple ERP project and longitudinal experience, has allowed the study of the association of business drivers and business case metrics with the evaluation of success that are used by adopters of enterprise systems. This has provided a framework for categorisation of enterprise systems into the three inclusive groups.

This framework is of substantial value for the following reasons:

- (1) It explains and clarifies the degree of association of business case metrics with post-implementation measures of success in different categories of enterprise systems projects (Tables 5-1 to 5-4).
- (2) It provides clear criteria for evaluation of the business success of categories of ERP projects that have been absent from previous research; these include projects that enable major strategic change, projects directed at operational cost savings and those that are critical to the survival of the business. This framework is the result of inductive analysis of interview data with 20 key informants who discussed multiple enterprise system projects implemented during the last two decades.
- (3) The proposed framework for evaluation of the business success of enterprise systems projects is expressed at a relatively high conceptual level (business strategies, new business models involving shared service centres , business survival and so forth). However, the research explains clearly why the evaluation of business success at a lower conceptual level, by assessment of various categories of delivered business benefits, is difficult to achieve and often not meaningful in the context of comparison with any initial planned benefits.

6.9 Limitations of the study

The method used for the interviews of key informants was appropriate for the nature of the ERP phenomenon being studied but I have commented below on certain limitations of the study.

6.9.1 Reliability and limitations of the interview data

Interview data was provided in response to my ten question interview protocol. In six of these interviews there was a level of validation of the interview data by virtue of there being multiple informants from the three business organisations interviewed (project manager and consultant); also extensive project documentation was provided and used to validate certain category relationships.

However, the key informants included mostly ERP management consultants. As a result, these interviews included many generalisations which were necessarily influenced by the particular client experience of the ERP consultants who participated. It might be argued that these consultants had an interest in expressing

positive views about the business success of ERP projects in which they had been engaged. However, there were regularities across the interviews in terms of external consultants expressing a wide range of views of the value of the enterprise system to the adopting business and also of their own consulting firm's contribution. Also the ERP consulting firms represented a wide cross section of the industry, perhaps over 80% in terms of consultants deployed in the field of ERP consulting. Shang and Seddon (2003) have commented upon the ERP project stakeholders most appropriate to express views about the value of enterprise systems. They comment that strategic managers are too high level and operational managers are too low level and that process owners (a term normally applied to ERP project positions rather than line management positions) are best positioned to do this. I believe that ERP consultants interviewed all worked closely with process owners to complete implementations are also an appropriate level within the project hierarchy to express views about the value of enterprise systems.

6.9.2 Replicability of the interviews

One limitation of this research relates to the replicability of the interviews. All the key informants requested advanced notice of the interview protocol and made it clear to the researcher that they wanted to gain some benefit from the interview. This raises questions as to how a researcher without prior experience of ERP projects would be able to gain access to these experts.

The researcher's prior experience also created a risk that bias or subjectivity might influence the interpretation of interview data. This possible bias has been reduced as far as possible by the rigorous inductive process of generation of categories and selected categories from the interview data.

A further limitation of the research is that the majority of the 20 key informants were ERP consulting directors rather than business project managers but this imbalance was compensated by the earlier project management experience of the consultants.

If I were to repeat the research, I would overcome the above limitations, as follows:

(1) I would interview an equal number of business project managers, who would probably be seconded from line management and be managing their first ERP project, and experienced consultants who had experience of multiple projects.

(2) A wider range of case project documentation would be requested, rather than just accepting documents that were pertinent to the particular stage of the project lifecycle that may have dominated the interview (for example, critical, internally written, post-implementation review papers could be made available).

(3) I would evaluate the benefits of the use analytic software for the identification of categories and selected categories rather than the time consuming manual methods that I adopted.

6.10 Avenues for future research

Firstly, as argued earlier in my opening chapter, this dissertation studies the impact of a new information systems technology, enterprise resource planning systems, upon global businesses over the last two decades. But this research could equally well be applied to other more recent technologies, such as the impact of web based technology upon the collaboration of information systems across businesses, in the context of e-business developments or the use of cloud technology to extend the utilisation of, and access to, enterprise systems.

However, more specifically in relation to understanding the business success of enterprise systems, whether termed first, second, or other generations, I would expect further research to develop the ERP success measurement model thread of research. But as I have pointed out in my studies, this research would benefit from a study of higher level concepts of business success rather than dimensions such as system use and user satisfaction. Also the operationalisation of business success into objective measures such as reduced inventory levels, headcount savings and reduced IT costs and the study of the relationship between these measures and the independent variables used in this area of research would be of benefit. But as Ifinedo (2008) has pointed out, these objective measures of business success are difficult to obtain from business organisations. The interviewing of ERP practitioners by researchers would, however, alleviate this difficulty.

6.11 Overall conclusions

My research findings are, I believe, of value to the practitioner and research communities. In particular, I refer to the dimensions of business drivers for enterprise systems and the use of this framework for understanding how best to evaluate the

business success of enterprise systems. I now look forward to continuing my research through the validation of my findings with a wider group of experienced consulting practitioners, extending a research approach which, because of the restricted involvement of expert participants in academic research, has not been readily available to enterprise systems researchers, but which has, in my own research, yielded valuable insights into the continuing phenomenon of enterprise systems technology over the last two decades.

Appendix 1 - Researcher's experience

This Appendix discusses the advantages and disadvantages of my professional experience and how I have tried to avoid prejudices or preconceptions that might have arisen from this experience.

Summary of my academic and professional experience

(1) Academic: MA (Oxon), Biochemistry, MSc (London Business School), Cass Business School.

(2) Professional: FCA (Accenture), Consultancy in Price Waterhouse, PwC and IBM (1975-2003). Other consultancy work and non-executive roles, 2003 to present date.

Advantages of practitioner experience

(1) Access to key informants to interview in research study based upon contacts made during professional work.

(2) Relevant experience to discuss issues with key informants that encouraged cooperation and further involvement of participants, for example, their willingness to review of draft sections of thesis chapters.

(2) Understanding of wider IT and specific ERP terminology in practitioner and academic literature.

(3) Familiarity with practitioner IT literature, for example Gartner, Forrester and Panorama for use in research studies.

Addressing preconceptions from practitioner experience

Firstly, it is now over ten years since I worked as an ERP practitioner, and during study of recent ERP literature as part of a necessary update to my literature review, I realised that I was far removed from the current ERP culture and technology. Also my knowledge and memory of ERP projects and technology from the period 1990-2003 is necessarily less clear.

However, I have not completely been able to abandon preconceptions from my consultancy experience; one interviewee told me I was asking a 'leading question'. Fortunately this was at an early stage in my research and I was careful not to do this again by more disciplined adherence to my interview protocol.

A further point, as far as the issue of measuring ERP business success as opposed to project implementation success, my own ERP practitioner experience was very much

based upon project success, for which consultants were generally rewarded. So my preconceptions regarding business success were very much based upon *a priori* measures, in other words, estimates of business success in business cases for ERP projects, prepared as part of consultancy proposals for implementation work. As discussed in this thesis, empirical measures of business success completed, *a posteriori*, so to speak, were completed, if at all, by project stakeholders rather than ERP consulting firms. Hence, my motivating research question of how business success was measured, if indeed this evaluation was made.

As far as preconceptions associated with professional experience while undertaking the research study, my research involvement has been full time apart from a transition period in 2014-2015 when my supervisory arrangements changed.

Appendix 2 - Regularity of Selected Categories

Selected category	KI#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
A1		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
A5		x	x	x	x		x		x		x		x	x		x	x		x		x
B		x	x	x	x		x	x		x		x	x		x		x	x		x	
B17		x	x	x	x	x		x		x		x	x	x		x		x		x	x
B20		x	x	x	x	x		x	x		x		x	x	x			x		x	
B24		x	x			x			x		x			x			x		x	x	x
B27					x		x			x		x	x			x		x	x		
C		x	x	x	x	x	x		x	x		x	x	x		x	x		x	x	x
C31		x	x	x	x	x	x		x			x		x		x	x		x	x	x
C37		x		x		x			x	x		x		x	x		x		x	x	
C38		x		x		x			x	x		x			x				x	x	
D		x			x		x	x			x		x			x			x		x
D41			x		x			x			x			x			x		x	x	
D43			x			x			x			x			x			x			x
D45				x			x			x			x			x			x	x	
E		x	x	x	x		x		x		x		x		x		x	x		x	x
F			x			x	x		x		x			x		x		x		x	
F55				x		x		x			x				x	x				x	x
F58			x		x			x			x	x			x			x	x		
F59		x			x		x			x					x		x		x		x
G		x		x		x	x		x	x			x	x		x	x		x	x	x
H		x		x		x		x			x			x	x		x		x	x	
K		x	x	x	x	x			x			x		x			x	x			x
K85		x	x		x			x			x	x		x		x		x	x		
L		x		x			x		x			x			x	x		x		x	x

Appendix 3 - Examples of selected categories from interviews

	Selected categories	Interview extracts
A	25 ERP projects cited as examples during interviews and in project documentation	<i>See Appendix 6 for specific ERP projects cited in interviews.</i>
A1	Dimensions of project	<i>BFP was really step one of the Roadmap. Roadmap based on 2007 'Discovery exercise' within M&S - project to build future application architecture for the business. BFP also clearly was key to enabling further Roadmap projects.</i>
A5	Implementation strategy adopted	<i>Because the SAP global rollout was delayed for 18 months, the Oracle systems were no longer fit for purpose but upgrading the Oracle systems went against the SAP global model strategy. We have now decided to adopt an Oracle based solution for most of the supply chain systems in Vodafone.</i>
B	Business case drivers	<i>Yes, we are seeing more projects where business transformation is the key objective.</i>
B17	Enabling new business strategy	<i>The generally accepted view was that the project simply had to be done in order for the company to realise its strategic vision of acting as a pan-European business.</i>
B20	New lower cost business models	<i>Administrative cost reduction in Europe through the introduction of shared services and central IT organization was a key objective.</i>
B24	'Do-nothing option'	<i>FTP had no do-nothing options, legacy financial systems were not fit for purpose and so formal business case not needed.</i>
B27	Year 2000 compliance	<i>Some ES adopters have taken a two stage approach. First get the SAP technology in and then realise business benefits. Y2K was an example of this approach.</i>
C	Business cases	<i>I can discuss two main types of SAP project - no business case because legacy systems had to be replaced, no other option - and those where rigorous business case is prepared.</i>
C31	Contains above drivers	<i>The business case was driven completely by Lever Europe's strategic business plan.</i>
C37	Includes benefits estimates	<i>A fairly detailed business case was done to justify the program. Much of the measurable benefit came from three areas: inventory reduction, headcount reduction from shared purchasing cost reduction through consolidate purchasing power.</i>
C38	Used for approval only	<i>The business case was therefore very marginal but adequate for approval by the business.</i>
D	Reasons for not using business case metrics	<i>Another issue is longitudinal in that over time the processes and benefits in the business case may become secondary to other factors after the go-live date.</i>

	Selected categories	Interview extracts
D41	Stakeholder continuity	<i>Boards who have the bigger picture get the right people and continuity across the implementation and change management phases of a project.</i>
D43	Lack of accountability	<i>And there was not really any attempt to measure these subsequently and make people accountable even though there was continuity of project management.</i>
D45	No metrics in business case	<i>There was no real business case. This is the irony. GSK likewise invested large amounts in replacing commercial systems without a formal business case. There was no 'do-nothing option'.</i>
E	Planned system benefits	<i>The achievement of lower materials cost through centralised purchasing; comparability between manufacturing plants and standardised reporting.</i>
F	Reasons for not measuring actual benefits	<i>The detailed tracking of benefits was time consuming.</i>
F55	Changed business environment	<i>For long term projects like ERP implementations the business had invariably changed so much that reviews against the initial objectives were almost meaningless.</i>
F58	Lack of incentive	<i>I discussed this with the CIO and his response was that he was having difficulty in convincing the business to do any sort of post implementation reviews, even for current projects.</i>
F59	No measurement method	<i>If you had a small fast-track SAP implementation, say over 6 months, you might be able to measure business case delivery but measuring business case costs and revenues over longer timeframes is very difficult.</i>
G	Delivery of benefits	<i>Delivery to time and budget without clear benefits was seen as failure.</i>
H	Project management success	<i>Would say three things. PM success is easily measured and demonstrable. Secondly you can measure PM success ie 3 RDC's reduced to a single RDC. But this very physical business success, true measurement of financial benefits is rarely tracked.</i>
K	Objective measures of business success	<i>The implementation of a single data centre and single IT organisation across Europe; the implementation of shared services clusters for administrative functions; the achievement of lower materials cost through centralised purchasing.</i>
K85	Retrospective reviews of ERP projects	<i>Generally retrospective reviews are political i.e. protecting people or blaming people - they should be used more constructively - an opportunity for collective learning.</i>
L	Subjective measures of business success	<i>Two main comments on this; first, certainly quality people in the implementation phase who then work (or plan) the benefits realisation phase is key to business success.</i>

Appendix 4 - Extracts from interviews with key informants

Extracts from interviews with key informants (Table 3-1) that support particular category relationships are referenced in the table below and then itemised below in sequence of the interview extract #.

Interview extract #	Key informant reference # (Table 3-1)	Category relationship(s) supported by extract
1	4	R-5 , R-6
2	1	R-1, R-3
3	8	R-4, R-2, R-5
4	7	R-3, R-9, R-13
5	17	R-3
6	16	R-12
7	2	R-11
8	6	R-13, R-14 and R-15
9	8	R-7, R-2,
10	1	R-6, R-14
11	13	R-9
12	15	R-4
13	5	R-13
14	16	R-8, R-10
15	19	R-14
16	17	R-12

Interview extract 1 (Key informant is the (KI) reference #4 in Table 3-1)

RJ: Following your interview with WS, it would be valuable to have your views as consultant to the M&S project about my research agenda. Can we begin with the approach to approving and measuring the business success of the BFP project?

PM: So business case was completed in detail and benefits identified to cover these costs ie IT and people cost savings (R-5). The benefits of the enabled projects downstream, so to speak, were not detailed in the business case. There was a plethora of old legacy systems and many of these were replaced by BFP. The business case was therefore marginal but adequate for approval by the business (R-6).

Interview extract 2 (KI #1)

'FTP had no do-nothing options, legacy financial systems were not fit for purpose and so formal business case not needed (R-3). Some benefits were estimated ie better cash flow from improved financial processes (purchase to pay) Also recognition that better BI would give sales increases but these were too intangible to estimate as benefit in business case terms.

- WS: BFP was really step one of the Roadmap. Roadmap based on the 2007 'Discovery exercise' within M&S - project to build future application architecture for the business. BFP also clearly was the key to enabling further Roadmap projects (R-1).
- So no formal business case for BFP went to the board but programme costs were submitted. It was a question of BFP enabling key future business activities. But there was background work in assessing benefits i.e. improvements to managing stock invoices and this type of benefit. But these were being tracked and managed separately rather than being part of a business case.

Interview extract 3 (KI #8)

Business case goals were:

- Year 2000 avoidance (R-4)
- Inventory reduction through better visibility
- Material cost reduction through consolidation of buying
- Administrative cost reduction in Europe through the introduction of shared services and central IT organization (R-2).
- Better information to run the business e.g. efficiencies through comparison between countries which had never previously been possible.

How was the project formally approved ? If a business case was prepared, to what extent were estimates of project costs and benefits included?

- Business case and ROI were calculated based on estimates done from the European HQ.
- A fairly detailed business case was done to justify the program. Much of the measurable benefit came from three areas: inventory reduction, headcount reduction from shared purchasing cost reduction through consolidate purchasing power (R-5).

Interview extract 4 (KI #7)

ME: This has evolved over time. In the 1990s CIOs would drive introduction of ERP technology and the CFO often take ownership because of the high cost of the project. The rigour of the business cases varied; often the 'behemoth' of the ERP project would subsume many other related change projects.

In CS the ERP project was approved based on a huge reduction in operating the legacy systems. There was no real business case (R-9). This is the irony. GSK likewise invested large amounts in replacing commercial systems without a formal business case. There was no 'do-nothing option' (R-3).

However, where companies implement a more incremental project like BI or CRM, there is pressure on the business and consultant to deliver value and specific benefits. So a more detailed business case. Another issue is longitudinal in that over time the processes and benefits in the business case may become secondary to other factors after the go-live date (R-13).

Interview extract 5 (KI # 17)

SR: I can discuss two main types of SAP project - no business case because legacy systems had to be replaced, no other option (R-3) - and those where rigorous business case is prepared. Let me give example of the BP retail project.

BP retail stations (4-5000 globally) buy 'dry goods' in bulk but had no global view of supplier data/ability to obtain better discounts - business case was 'no brainer', \$300m cost with a 2 year payback.

Vision was to have global and consistent data from SAP systems to negotiate with suppliers/opportunity for promotions etc. Also BP were entering into JV with M&S and SAP would give them the ability to integrate with M&S supply chain systems.

Interview extract 6 (KI # 16)

Retrospective reviews of IS/ERP projects and their value ?

DH: Well, if they are robust and done professionally by third parties they can be valuable but certainly Gartner et al do not fall into this space. Generally retrospective reviews are political i.e. protecting people or blaming people - they should be used more constructively - an opportunity for collective learning.

These reviews are often completed too late in the project lifecycle and the learning is left to other businesses rather than the project reviewed (R-12).

There is a second level of review - those carried out during programs i.e. continuous reviews as part of program governance - but not done by the program office. These regular reviews can correct critical factors like project management and process design.

RJ: Many consulting firms offer these 'in-flight reviews' but these are one-off rather than the continuous reviews you refer to.

DH: One example, GSK asked for a review of a pilot SAP project and the costs were outrageous. If rolled out it would have been a 'gold plated' solution - excessive cost - and we were able to prevent this happening.

Interview extract 7 (KI#2)

The main problem with post-implementation reviews, as opposed to in-flight reviews is that that for 2-3 year global ERP projects the business environment has changed so much that that the assumptions underlying the original assumptions in the business case are out-of-date (R-11).

Interview extract 8 (KI # 6)

PM: These ERP projects have long lifecycles (Shell and Nestle global projects were over 10 years?) and the world changes over this timeline. So in Boots what started out as a rigorous review process became less so as time progressed (R-13).

PM: If you had a small fast-track SAP implementation, say over 6 months, you might be able to measure business case delivery but measuring business case costs and revenues over longer timeframes is very difficult for three reasons

- we don't have the accounting technology to measure future benefits (R-15)
- the linkage between the projects and benefits cannot always be made
- but biggest issue is the appetite to measure the benefits (R-14)

Interview extract 9 (KI # 8)

Were the planned benefits in the business case examined post-implementation? I am not sure, but I don't believe this was ever done. There were many new faces by the end of the project and little appetite for revisiting the benefits case (R-7).

Some of the major goals were indeed achieved, albeit not to the extent defined by the program at the outset. Among them were the implementation of shared service centres for admin functions, lower materials through centralised purchasing, cost comparability between manufacturing plants and standardised reporting (R-2).

Interview extract 10 (KI # 1)

Interview with (M&S) completed by intermediary (IBM director)

PM compared the project spend to that incurred in opening new stores.

WS commented on measures of success. Delivery to time and budget without clear benefits was seen as failure. **The detailed tracking of benefits was time consuming and with business buy-in and continuity of sponsorship this was viewed as sufficient for benefits case (R-14).** In this sense, project management success was likely to deliver business success because of the strong governance around senior business commitment in the planning and design stages of BFP (and FTP)

PM and WS then discussed the overall cost of funding the Roadmap.

WS felt there was not a relaxed approach as PM suggested; BF was a big part of IT spend and was monitored by 'EXCO'.

PM and WS discussed the move from legacy bespoke systems to ERP and the strategic benefits of this. Roadmap had big upfront costs but over perhaps 2-3 years the IT cost profile would show lower operating costs. **On the question of BFP, generally the position with BFP was that the business case was not 'compelling but it was the right thing to do (R-6).**

Interview extract 11 (KI# 13)

Talking measures of success, often avoidance of disruption to the business is used as a measure of success. But disruption can be positive; it can be a catalyst for change. Companies tend to mitigate risk rather than seeing opportunities for change.

RJ: In many Y2K projects the approach sold by the vendors was to implement the new technology and then realise benefits as a second stage. Views on this approach?

JT: This doesn't work – you need a reimplementation to do this because of the lack of flexibility within SAP software. But certainly SAP and consultants have been guilty of advocating this approach.

RJ: Going back to your category1 business case, there are often ERP projects which support major structural business change and where disruption to the business would be very high cost? The ERP technology can be seen as enabling the business change?

JT: Yes, we are seeing more projects where business transformation is the key objective. One example, a large agrochemicals client is moving to set up 3 shared service hubs - to transform their back office structure. They will need to re-implement SAP to do this. **A similar large transformation project in a global metal company will require a single SAP materials master data/file. In these cases the SAP project is regarded as a cost component of the overall transformation project and not a standalone project to be justified separately. I think this is the correct approach (R-9).**

Interview extract 12 (KI#15)

'Some ES adopters have taken a two stage approach. First get the SAP technology in and then realise business benefits. Y2K was an example of this approach' (R-4).

Agree - you cannot dislocate the transformation project from the technology project. SAP data structures are pillars of the project and these are built in the implementation phase and very difficult to 'unpick' later in the project. You can't 'future proof' a design. Even though there may be sensitive information about acquisitions that would influence design, these cannot be shared easily with project management. There is no silver bullet in this area.

Coming back to the benefits estimated in business cases, how often do you find management made accountable for figures in budgets or KPIs?

Well, in CS the business case was for a global template and related process benefits. But there was a 'bottom-up' challenge from the local businesses to these figures. Real accountability does not often take place but it can help persuade management to bring the best people into a project.

Interview extract 13 (KI# 5)

PM: Well, clearly M&S and other large organisations need due diligence reviews as part of governance over projects where the spend rate is as high as \$1m per month. One simple reason is they need these if something goes wrong. EXCO regard these big ES projects as a 'moneypit' and there are different layers of review. It is rather invidious though as you can always find something wrong as an outsider looking at other parties' projects.

SAP, for example, will be concerned with technical issues rather than achievement of business targets.

RJ: Looking at M&S as an ES case study, how representative do you think Warren's views are? If we interviewed a business leader from the BTP project would they be different?

PM: WS attends EXCO meetings and is on the steering committee for BTP, so they all tend to follow the same agenda. But business leaders can be more emotional about the IT costs and unquantifiable benefits of some of these projects. An example; the head of the foods business in M&S was in a meeting to discuss increase in scope of the BTP project to provide valuable BI which, in benefit terms, was difficult to measure. Response was 'we could open new store in France for similar costs!'.

PM: Issue here is new store opening is part of existing KPI's and has measurable ROI etc. whereas extension to large existing ES project is very difficult to measure in benefit terms (R-13).

Interview extract 14 (KI#16)

NAC: Their approach to a business case was similar to Shell in some ways - they began with a business model review in their procurement area and then selected Oracle e-procurement systems. They had business cases based on individual procurement (of non-resale goods) areas or clusters.

RJ: Were Sainsbury's managers accountable for estimated cost savings from the e-procurement systems?

NAC: There had been a rigorous planning exercise to estimate cost savings over 1-2 years before the implementation so they were viewed as realistic and there was not really any attempt to measure these subsequently (R-10) and make people accountable even though there was continuity of project management (R-8). The lead project manager was to go on and manage a much larger project so this was a measure of the view of success of the project.

Interview extract 15 (KI#19)

DH: Aviva was a part ERP and other IS components project and there were issues of governance here in the sense that there was inadequate accountability for delivery of benefits. If you factor in benefits to managers' budgets for example, there is more chance of getting benefits estimated in the business case. But again there is the cause and effect problem. You need strong business ownership or benefits just 'run into the sand'. Once the 'circus leaves town' there is less incentive to realise and measure benefits if governance is low (R-14).

Interview extract 16 (KI#17)

So project was piloted in a small # of countries but went horribly wrong; project was not scalable/\$150 was spent/the end-to-end technical processes not properly tested. Global sourcing was not implemented to support new retail business model.

So the business case was revisited and priorities of different projects in countries to implement new systems were reassessed (R-12). So, second time round, another \$150m was spent, total of over \$400m - classic case of 'slam-dunk' business case but both organisational and technical issues not addressed at outset. Also key sponsors and stakeholders changed during project (both phases)

Appendix 5 – Extracts from selected project documents

The documents that have been used to validate the findings from interviews are shown below; the extracts that are considered to provide supporting evidence for interview findings (category relationships R-1 to R-15) have been colour coded to highlight the evidential phrase or paragraph. The table below includes:

(1) the document reference #

(2) the context of the document within the implementation model of the Markus and Tanis implementation model (Diagram 4-2). Documents # 4-6 relate to the project implementation phase but do not support particular relationships; they are included for illustration of the complete range of documents provided by informants across the implementation lifecycle.

(4) the category relationship supported by the particular document is listed in the final column.

The anonymity of certain client documents has been observed in accordance with the principles set out in Section 3.6.3.

Document reference	Nature of document	Project phase related to document (as defined in Diagram 4-2)	Category relationship illustrated
Document # 1	M&S business case discussing strategic benefits of ERP project	Project chartering phase (1)	R-1, R-3 and R-9
2	Vodafone business case slide discussing lower cost business model through business transformation	Project chartering phase (1)	R-2
3	Press release covering strategic benefits from use of SAP software by Unilever	Project chartering phase (1)	R-1
4	Implementation progress report	Project implementation phase (2)	n/a
5	As above	Project implementation phase (2)	n/a
6	As above	Project implementation phase (2)	n/a
7	Project document discussing project benefits and realisation of benefits	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-5

Document reference	Nature of document	Project phase related to document (as defined in Diagram 4-2)	Category relationship illustrated
8	Joint document from major UK retailer and Oracle re benefits of new procurement system	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-2 and R-5
9	Value diagram showing areas of benefits from ERP system	Project phases (3) 'shakedown' and (4) 'onwards and upwards'	R-2 and R-5
10	Post-implementation review	Onwards and upwards phase (4)	R-11 and R-14
11	Post-implementation review documents	Onwards and upwards phase (4)	R-6
12	Post-implementation review documents	Onwards and upwards phase (4)	R-8
13	Email correspondence with Unilever	Onwards and upwards phase (4)	R-1, R-11 and R-12
14	Post-implementation review documents	Onwards and upwards phase (4)	R-10 and R-15
15	Post-implementation review documents	Onwards and upwards phase (4)	R-8
16	Post-implementation review documents	Onwards and upwards phase (4)	R-7, R-10 and R-15

Document extract #1 in support of relationships R-1, R-3 and R-9

Business Benefits

The programme will establish a foundation for the future growth of the business, It is not a cost saving or efficiency improving programme. The ExCo has decided to implement a strategic ERP solution as it is not cost efficient to enhance the existing infrastructure (support for R-1). Future benefit will be derived from increasing the flexibility of the system whilst reducing the operational risk to the business. The implementation of SAP Retail will require the organisation to adopt new ways of working which are more consistent with industry best practice. Although there have not been any specific benefits attributed to this particular phase of the SAP implementation (R-9), if it is not implemented, all future business growth initiatives will need to be delivered through a significant investment in resources (support for R-3).

As a result the profit associated with new initiatives will not be maximised, ultimately restricting the growth ambitions of the business.

Document extract #2 from Vodafone in support of relationship R-2

**EVO Vision**

EVO is Vodafone's global business transformation programme, which is changing the way we work across Finance, Supply Chain and Human Resources. It is underpinned by one single IT system housed in Europe, using SAP as the base platform.

Functions of today:	Functions of tomorrow:
Benchmarking indicates a high cost operating model	An efficient & effective world class organisation that delivers lower transaction costs
Low value transaction focus within functions	Optimisation of back office via VOCH
Very responsive, reactive organisation delivering on short-term challenges	Optimisation of global purchasing via VPC
Internal customer engagement could be improved	Speed, Simplicity and Trust achieved via a single version of the truth
Technology solutions not exploited globally to achieve efficiency potential	Involving the whole company in the transformation and change activities
We have excellent policy and practice but lack joined-up thinking	Optimisation of global single ERP solution
	Implementation of an integrated common global operating model across SCM, Finance and HR.



Document extract #3 from Unilever in support of relationship R-1

Unilever's Global Business Transformation

Vienna, Austria - May 15, 2007 -SAP AG (NYSE: SAP) today announced that Unilever (NYSE: UL), one of the world's largest consumer goods companies, has strengthened its long-time relationship with SAP by naming the leading business software company as the global premium IT solution provider **to enable and support Unilever's global business transformation strategy. Unilever signed a Global Enterprise Agreement with SAP in December 2006 to aid its global business transformation project (support for R-1)** thus enabling broad access to licensed SAP® solutions. Global Enterprise Agreements strengthen SAP's position as the long-term strategic partner to its customers, enabling business agility and growth as they evolve their global IT landscapes to enterprise service-oriented architecture (enterprise SOA). Unilever is the first consumer packaged goods company to sign such an agreement with SAP. The announcement was made at SAPHIRE® '07, SAP's international customer conference, being held in Vienna, Austria, May 14

Document extract #4 Phase 2 (implementation) document example

1) Current position

Programme dashboard



Area	Description	RAG	Trend
Overall Status	Technical go-live achieved on plan – low volume of incidents being seen since go-live. UAT completed to plan without compromise to quality. Key priorities are now progressing deployment & support, data cleansing, defect resolution (data & test) and executing remaining testing (mainly interface). Support model for CATS key issue		
Schedule	Technical go-live achieved on plan. UAT completed to plan without compromise to quality. Support model for CATS key issue. Risk to HR roadmap remains. Deployment planning remains behind target but still manageable - on track against back to green plan. Some testing still outstanding – mainly interfaces (see later slide). All other activities on track.		
Scope	Scope clear. Post R6 demands being identified. Firm commitment required on delivery timetable for items not delivered as part of R6.		
Financials	Challenge from UK FinOps to whether capitalization of some costs to date appropriate. May result in CAPEX under spend. Meeting next week to agree next steps.		
Resource	Resources adequate though there continues to be pressure on some teams. Pinch points being managed.		
Quality	UAT phase completed with no compromise to quality. Stage gates being rigorously enforced. 17 open defects but 8 are fixed ready for retest (planned for today)		
Commercial	HCL-Axon purchase order raised and cost tracking in place. Cost and quality tracking operational for other 3rd parties (HP, Morse, KPMG).		

vodafone

Document extract #5 Phase 2 (implementation) document example

Areas of Concern in Scope and Planning (Amber Status)

Progress vs. 6 week Scope and Planning Plan

- Programme has moved into Design and Build phase in parallel with scope and planning phase until the end of January – outstanding actions are being tracked

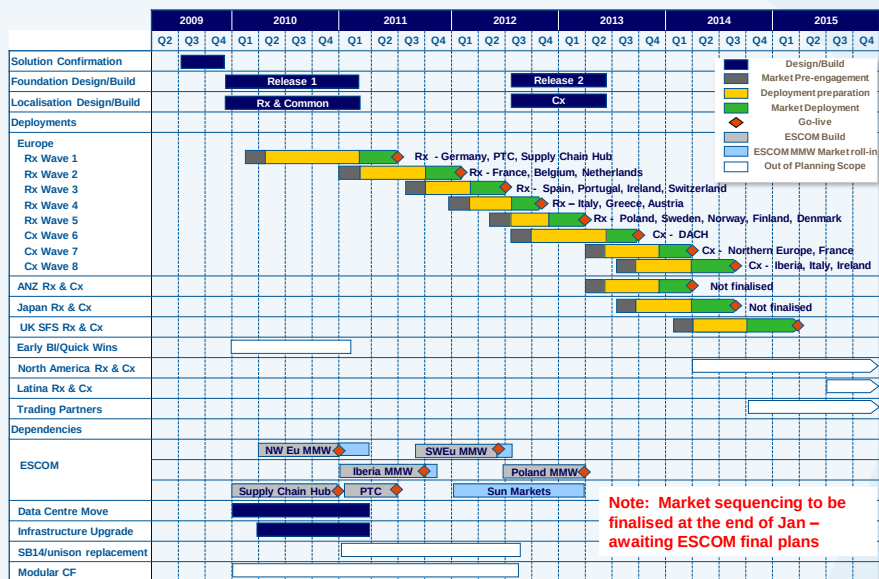
Issues to address urgently in the Foundation and Wave 1 Plan:

- Finalising markets per wave in the 18 month plan (dependent on ESCOM plan being finalised in order to confirm markets per wave)
- Obtain signed off Business requirements for
 - ESCOM Biologicals Tender process
 - HCP reporting
 - Flexible General Ledger impact on COPA reporting requirements
- Sign off of new STP's (e.g. T&E) and template confirmation actions at STRB

6

Document extract #6 Phase 2 (implementation) document example

ERP Programme Plan



15

Document extract #7 from Government agency in support of relationships R-5

The current business case identifies procurement savings resulting from improved buyer opportunities to be spread over the initial 3 years of the project. CAPU believe this level of benefit is not sustainable beyond year 3 (2005/6), (support for R-5).

However, if the project is successful it is unlikely that all the benefits would discontinue after 3 years. Other government departments, including the DTI share this assumption on the 'roll out' of benefits.

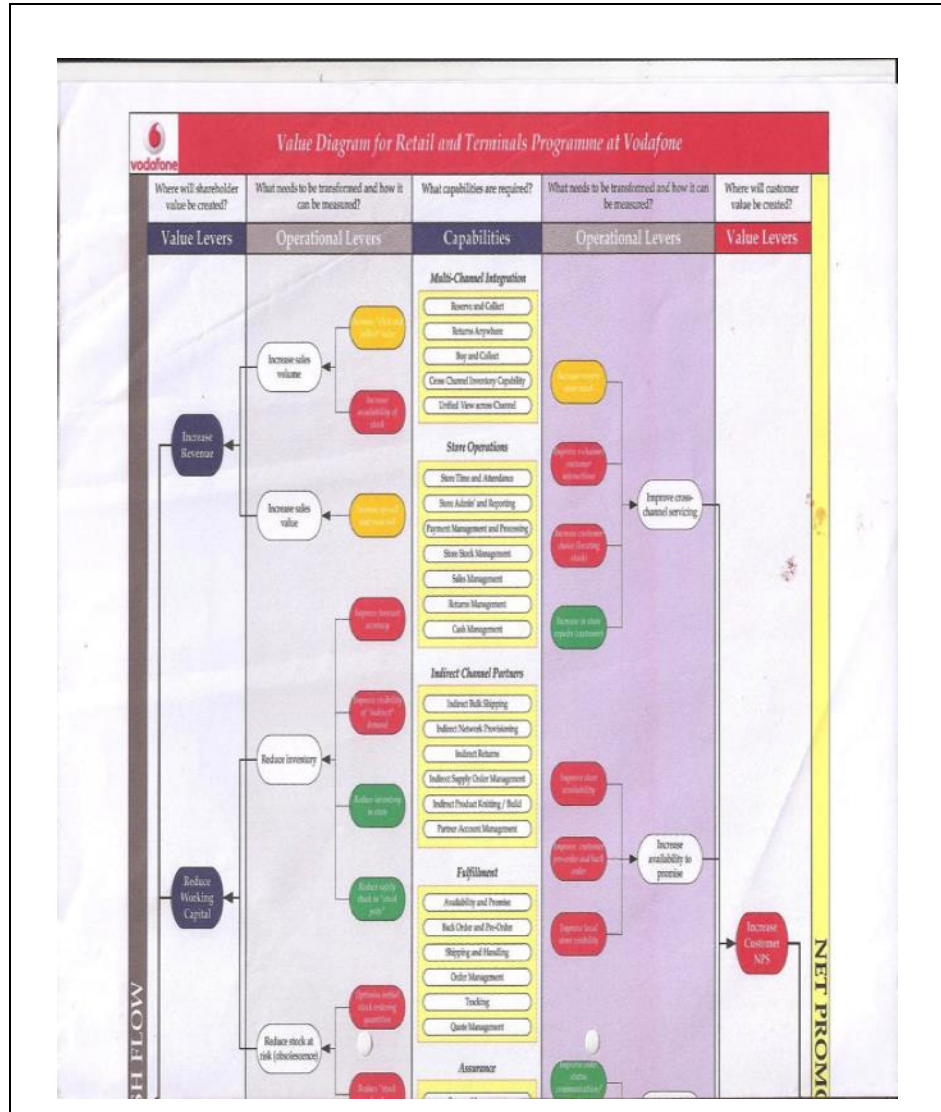
The figures in Table 1 below show a possible alternative stream of benefits based on the following assumptions: procurement benefits rise in the first two years; in the third year procurement benefits level off and remain constant thereafter. So although there are no percentage increases after year 3, cumulative benefits rise year-on-year. to allow for over-optimism there is a 60% probability of realisation of these benefits a 3.5% discount rate is used

Document extract #8 from a major UK retailer in support of relationship R-2 and R-5

ABC Supermarkets Ltd is one the the UK's leading grocery retailers focused on delivering high quality at low cost to its customers. Procurement and financial operational costs directly impact ABC's ability to deliver their customer value promise.(R-5) The GNFR procurement function has been striving to drive out operational cost through strategic sourcing and IT alignment initiatives.(R-2). Using Oracle Internet Procurement integrated into their existing Oracle financials system and through innovative re-engineered of business processes, ABC created an easy to use, web based, self-service procurement solution. Serving more than 450 stores and a user base of over 3000, this solution has streamlined the GNFR supply chain/procurement processes and provides valuable management information to the procurement sourcing teams.

Document extract #9 from Vodafone in support of relationships R-2 and R-5

Note: It has not been possible to highlight relevant areas of the document which are about relationship R-2 (business case is based upon new lower cost operational model) and R-5 (business case includes benefits estimates) but the value diagram can be viewed as a holistic diagram that supports both these relationships, rather than any particular extract.



Document extract #10 in support of relationship R-11 and R-14

As per previous reporting as the programme completes the Design Phase and scope is finalised, we strongly recommend the UK Op Co updates planned costs and benefits for the UK. Some of the original assumptions (e.g. around month end close, CATS etc.) will have changed based on the numerous workshops and deliverables to date, current progress and issues etc. **As such it is appropriate to have a checkpoint for how the current situation ties back to the original benefits case so you can see what has changed and what the key priorities for you are looking forwards(R-11).** The benefits realisation strategy in place at a Programme level should be localised for the UK Op Co recognising the wider transformation work required (see above comments) and local processes established to drive realisation of the local benefits.

Although a vendor management approach (regular performance assessments, control over on-boarding / off-boarding, quality reviews etc.) has been proposed this is not yet actively used. In points made earlier, there remains evidence of challenge in some aspects of SI performance including slippage in some of the

Dates for deliverables. Proposed vendor management approach should be operationalised and actions taken to address any performance issues identified.

The issue and risk registers are in place and a review of these is included in the weekly management reporting cycle. However, the content of these registers is very light. They do not, for instance, cover a number of the things covered in this report which leads one to conclude either that the programme does not recognise these issues/risks or, if they do, they are not capturing and managing them appropriately (support for R-14).

Document extract #11 in support of relationship R-6

Earlier in this report (in Cost Management) we noted significant concerns around cost management, related oversight and reporting. Effective monitoring and control of costs is significantly impaired in light of such concerns and furthermore we note that reporting of actual and budget costs has been neither regular or timely nor as clear as we would expect. We noted that certain concerns around cost management had also been raised in previous Internal Audit reports. **The review and approval status of the business case likewise remains unclear and we note this has also been raised before. During our review we received different opinions (R-6)**

Document extract #12 in support of relationship R-8

Another issue we have identified is a lack of accountability for delivering the planned business benefits. We know there is an assumption that the local business units will have some accountability -and this is definitely correct - but it is not yet clear who and how much. For example, the VP Business Transformation will not be able to deliver all the benefits on their own - there will need to be a range of individuals targeted and measured for successful realisation, e.g. departmental heads, process owners etc. Also, it should not just be the business units who are accountable for benefits - there should also be some people in Programme ABC who are measured in this way so that all relevant parties are aligned and the programme's potential is maximised. (R-8)

Document extract #13 in support of relationships R-1, R-11 and R-12

I discussed this with the CIO and his response was that he was having difficulty in convincing the business to do any sort of post implementation reviews, even for current projects (R-12), and that for long term projects like ERP implementations the business had invariably changed so much that reviews against the initial objectives and planned benefits were almost meaningless (R-11).

I wondered whether there might be a case for looking longitudinally at project proposals?

I don't know whether they are on file somewhere but I would expect any changes to the assumptions in new project proposals might reflect changes in approach. I can imagine that my original proposal for the Lever Europe implementation would be different from the later European and American proposals and the current one for Asia.

The generally accepted view was that the project simply had to be done in order for the company to realise its strategic vision of acting as a pan-European business (R-1), so why go back to a 5 year old document to measure against the individual goals?

Document extract#14 in support of relationship R-10 and R-15

It is not explicitly clear how the planned benefits for the programme will be delivered other than a very high level assertion that the business units will be accountable for “leveraging” the SAP solution (R-10) nor how the business will be enabled to drive out the benefits when live with SAP. Some benefit initiatives are cited in the Business Benefits Realisation Handbook, e.g. reduction of inventory to 6 weeks, but there is no direct link between these comments and the work that the teams in Astana are actually doing, ie what is it that the team needs to do with SAP to enable these improvements or how this is reflected in the scope, plan issues and risks .Without this level of “benefit connectivity” there is an increased risk that ABC will go the way of many other ERP programmes and deliver an IT solution targeted around a go-live date rather than a business-driven change programme with a measurable step-change in performance improvements (R-15). We note that in the previous Internal Audit report the point was made about ‘best practice’ including “benefit related activity to be done in a co-ordinated approach, in line with the advancement of the programme work.”

Document extract #15 in support of relationship R-8

We note that the original business case for the programme was said to be \$500m based on a scope for 13 business processes; the revised business case based on a reduced scope of just 6 processes remains at \$500m. It is not clear if the Programme Sponsor and Steering Committee has formally reviewed and approved this (R-8). Furthermore the headline benefits business case value of \$500m is not the result of a clear aggregation of all identified and properly calculated potential benefits, underpinned by clear outline execution plans. The benefits value quoted of \$500m aggregates values for certain identified opportunities, and adds together the potential for cost savings and the potential for reduction in working capital (expressed not as the profit impact but as the working capital impact). We also note that there is inadequate distinction between recurring and one-off benefits, and that costs of realization of benefits are not clearly explained.

Document extract #16 in support of relationship R-7, R-10 and R-15

The post-implementation review included a review of the delivery of planned system benefits (support for R-10) but was a difficult exercise as most of the project management team, including process owners, who had ownership of the benefits estimates, had largely been transferred to line management positions after system implementation (R-7). Further there have been difficulties using new accounting systems to measure staff savings budgeted using the legacy systems (R-15)

Appendix 6 - ERP projects cited during interviews

ERP project reference	Company cited	ERP project profile
1	M&S	Financial and logistics projects started in 2007 -- ongoing ERP program
2	Unilever	Global roll-out of ERP to achieve 'One Unilever' over two decades
3	Vodafone	SAP and Oracle used for UK/Eire initial projects
4	Xerox	European implementation
5	Boots	UK based implementation of SAP retail version
6	GlaxoSmithKline	Global roll-out of corporate design
7	Nestle	Global roll-out after earlier pilot project problems
8	Mobil	Global roll-out of SAP R/3 after use of R/2
9	Warner Lambert	Global rollout after pilot in US region
10	Cadbury Schweppes	20 separate global ERP projects implemented without common design
11	Orangina	ERP implemented to allow acquisition by above company
12	Johnson & Johnson	US implementation of SAP for 'wall-to-wall' applications
13	Aviva	UK insurance business use of ERP for consolidation of back-office functions
14	Home Office	Project to implement Oracle for back-office functions
15	City University	Project to implement SAP for HR function
16	Smiths Industries	European ERP project driven by Y2000 needs
17	BAT	Global roll-out of ERP systems after pilot projects
18	British Gas	SAP projects implemented in 13 countries
19	BP	ERP implementation after difficult pilot showed scalability problems
20	Shell	Global rollout of oil industry release of SAP
21	Post Office	Implementation of SAP to control security products in branch offices

ERP project reference	Company cited	ERP project profile
22	Centrica	ERP implementation was project success but not viewed as business success
23	AstroZeneca	ERP implemented to allow shared services centre
24	Goodyear	Global roll-out of central ERP design partly driven by Y2000 compliance
25	MOL	Implementation of SAP in preference to JDE software in Hungarian oil company
26	Diageo	ERP implemented in Guinness Eire in late 1990's followed by global roll-out
27	Sainsbury's	Oracle ERP software used for e-procurement in early 2000's
28	Equifax	ERP project driven by Y2K compliance followed by further benefits realisation

Appendix 7 - Derivation of interview protocol

<i>A priori category</i>	<i>Interview protocol reference</i>
1 ERP systems implementation projects	Q1 Please detail characteristics of ERP project under discussion
2 Objectives of ERP projects (generally stated in business case)	Q2 What key business factors influenced the decision to implement the ERP system ? Q4 What other options were considered? What would have been the consequences of doing nothing and leaving the legacy systems in place ?
3 Contents of business cases	Q2 Were there specific and measurable benefits within any business case that was written ?
4 Planned system benefits	Q3 How was the project approved? If a business case was prepared, to what extent were estimates of project costs and benefits included?
5 Reasons for not using business case metrics	Q6 Was there any accountability for benefits estimated in the original business case?
6 Reasons for not measuring benefits	Q7 How were these realised benefits related to benefits estimated in any business case? Q9 What level of continuity was there amongst different categories of stakeholders across various stages of the project?
7 Delivery of benefits	Q's 6 and 7 above
8 Project success	Q5 In terms of project management criteria was the implementation considered successful? Q8 How was the project perceived by stakeholders in terms of project and business success ?
9 Objective measures of business success	Q's 5 and 8 above
10 Subjective measures of business success	Q8 above

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