



A Multiple Case Study of ERP Implementations in Australia

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Leon Kok Yang Teo

Bachelor of Computing, National University of Singapore

Master of Information System and Management, Monash University

Master of Information Technology, Monash University

Graduate Certificate in Tertiary Teaching and Learning, RMIT University

School of Business IT and Logistics

College of Business

RMIT University

September 2017

Dedication

In memory of my grandmothers,

To Allen and Brenda, my parents,

To Avril, my wife

And to Thea, my daughter

Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed. I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

Leon Kok Yang Teo

May 2017

Acknowledgements

"No man is an island"

I would like to thank to the many people who had made this PhD possible. Without their support, this PhD journey would have never reached its final destination. There have been so many people who have helped me along this journey that I fear that I might have forgotten to mention everyone deserving.

My gratitude goes to supervisors, Prof. Mohini Singh and A/Prof. Vanessa Cooper for their valuable guidance and mentoring over the years. Their invaluable comments, constructive criticism, support had made this journey an intellectually stimulating experience. My heartfelt gratitude also extends to Prof. Booi Kam and Dr. Konrad Peszynski, who had played important roles in the completion of this thesis.

Special appreciation goes to my former and current Heads of School, Prof. Brian Corbitt and Prof. Caroline Chan. Brian gave me the opportunity to kick-start my academia career, even before the completion of my PhD. He has taught me on how to be a good academic, scholar and mentor. Caroline has also supported me with opportunities to develop, and at the same time, challenged me to constantly strive for excellence.

I am also extremely appreciative of the colleagues in my School, in particular, Prof. Prem Chhetri, Prof. Mark Goh, A/Prof. Barry McIntyre, Dr. Siddhi Pittayachawan, Dr. Elsie Hooi, Dr. Sayyen Teoh, Dr Yee Ling Boo and Dr. Ahmad Abareshi for their valuable inputs, encouragement and support throughout this research. I have greatly benefited from the collegiality in my School, and grateful for all their teachings and assistance in my work.

My deepest thanks are felt to my family and parents. Dad and Mum, who provided me the opportunity to follow my academia passion, and further my education. Without their valuable financial support, this journey would have never commenced. My parents, whose emotional support and encouragement, had been a constant source of substance in my journey.

To the two special ladies in my life, my wife and daughter, I owe them my utmost gratitude for the patience and pain they bore during the time I had to work late in the office, or over the weekends. The love and steadfast support from my lovely wife, Avril is the driving force that inspires me to work tirelessly through this challenging time. Also, daughter Thea, whose birth during the PhD journey, had made me a better man.

Table of Contents

DEDICATION	I
DECLARATION.....	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS.....	IV
LIST OF TABLES	VI
LIST OF FIGURES.....	VIII
ABSTRACT.....	IX
PUBLICATIONS FROM THESIS.....	XI
CHAPTER 1 INTRODUCTION	1
1.1 RESEARCH BACKGROUND.....	1
1.2 RESEARCH QUESTION AND OBJECTIVES	2
1.3 SIGNIFICANCE OF THIS RESEARCH	3
1.4 THESIS STRUCTURE	7
CHAPTER 2 LITERATURE REVIEW.....	9
2.1 INTRODUCTION	9
2.2 DRIVERS OF ERP SYSTEM ADOPTION	9
2.3 DISRUPTIVENESS OF ERP IMPLEMENTATIONS ON MODERN BUSINESSES	13
2.4 EXTANT RESEARCH ON ERP IMPLEMENTATIONS	19
2.5 A MODEL TO STUDY HOW ORGANISATIONS DRIVE ERP BENEFITS	24
2.6 SUMMARY.....	32
CHAPTER 3 RESEARCH METHODOLOGY	33
3.1 INTRODUCTION	33
3.2 RESEARCH DESIGN	34
3.3 DATA SOURCES	36
3.4 DATA COLLECTION.....	38
3.5 ANALYSIS OF INTERVIEW DATA	43
3.6 DATA QUALITY.....	45
CHAPTER 4 CASES	49
4.1 INTRODUCTION	49
4.2 PIPECO	50
4.3 ENVICO	62
4.4 GOVDEP	77
4.5 ENTERTAINCO.....	88
4.6 PACKCO.....	98
4.7 CONFECOCO.....	109
4.8 DAIRYCO.....	119
4.9 ELECTRICCO	130
4.10 CLUBCO.....	141
CHAPTER 5 CROSS CASE FINDINGS & DISCUSSION.....	152
5.1 OVERVIEW AND KEY LESSONS FROM THE ERP IMPLEMENTATION CASES.....	152

5.2 ERP BENEFIT DRIVERS..... 155

5.3 A PROCESS MODEL OF ERP IMPLEMENTATION..... 170

5.4 DERIVING BENEFITS FROM THE ERP IMPLEMENTATIONS 177

CHAPTER 6 CONCLUSION..... 188

6.1 SUMMARY OF STUDY 188

6.2 SIGNIFICANCE OF FINDINGS 190

6.3 LIMITATIONS AND SUGGESTIONS FOR FURTHER STUDY 192

REFERENCES 195

APPENDIX A PLAIN LANGUAGE STATEMENT 212

APPENDIX B INTERVIEW INSTRUMENT 214

APPENDIX C EXEMPLAR OF INTERVIEW TRANSCRIPTION (PIPECO)..... 217

APPENDIX D COMMERCIAL DOCUMENT (ANONYMISED)..... 234

APPENDIX E EXEMPLAR FOR CODING OF THEMES (ENVICO) 235

List of Tables

Table 2.1: Summary of ERP Benefits	12
Table 2.2: Summary of ERP Evaluation Research.....	21
Table 3.1: Sources of Information Used to Develop Cases.....	41
Table 3.2: Background of the Organisations and ERP Modules.....	42
Table 4.1: Estimated Costs for PipeCo's ERP Implementation.....	53
Table 4.2: PipeCo's Benefits Derived from ERP Development.....	55
Table 4.3: PipeCo's ERP Benefits Derived from ERP Deployment	57
Table 4.4: PipeCo's ERP Benefits Derived from Post Implementation	59
Table 4.5: EnviCo's ERP Benefits Derived from Project Development.....	69
Table 4.6: EnviCo's ERP Benefits Derived from ERP Deployment.....	71
Table 4.7: EnviCo's ERP Benefits Derived from Post Implementation	75
Table 4.8: GovDep's ERP Benefits from Planned System Upgrades (Including Consolidation)	82
Table 4.9: GovDep's ERP Benefits from Upgrades Deployment	83
Table 4.10: GovDep's ERP Benefits from Post-Implementations	87
Table 4.11: Estimated Costs for EntertainCo's ERP Implementation	90
Table 4.12: EntertainCo's ERP Benefits from Project Development.....	92
Table 4.13: EntertainCo's ERP Benefits from Project Deployment.....	93
Table 4.14: EntertainCo's ERP Benefits from Post Implementation	95
Table 4.15: Estimated Costs for PackCo's ERP Implementation	100
Table 4.16: PackCo's ERP Benefits from Project Development	102
Table 4.17: PackCo's ERP Benefits from Project Deployment	103
Table 4.18: PackCo's ERP Benefits from Post Implementation	107
Table 4.19: ConfecCo's ERP Benefits During Project Development.....	113
Table 4.20: ConfecCo's ERP Benefits from Project Deployment	114
Table 4.21: ConfecCo's ERP Benefits Post Implementation	117

Table 4.22: Estimated Costs for DairyCo's ERP Implementation.....	121
Table 4.23: DairyCo's ERP Benefits During Project Development	122
Table 4.24: DairyCo's ERP Benefits from Project Deployment	123
Table 4.25: DairyCo's ERP Benefits Post Implementation.....	127
Table 4.26: ElectricCo's ERP Benefits During Project Development	133
Table 4.27: ElectricCo's ERP Benefits from Project Deployment.....	135
Table 4.28: ElectricCo's ERP Benefits from Post Implementation	139
Table 4.29: ClubCo's ERP Benefits from Project Deployment	145
Table 4.30: ClubCo's ERP Benefits from Post Implementation.....	150
Table 5.1: Summary of ERP Projects for all Cases	153
Table 5.2.A: Implementation Change Process for all Cases	156
Table 5.3: Constructs that Affect ERP Implementation Outcomes.....	170
Table 5.4: Summary of ERP Benefits Analysed from Cases.....	178

List of Figures

Figure 2.1: A Summary of Competing Value & Effective Model (Quinn & Rohrbaugh, 1983)	29
Figure 2.2: Proposed Research Framework.....	32
Figure 3.1: Research Process Stages	33
Figure 3.2: Hermeneutic cycle approach used in this research to analyse interview data	44
Figure 3.3: Cross-Case Analysis via Hermeneutic Principles	45
Figure 4.1: PipeCo's Organisational Chart (includes other business groups).....	51
Figure 4.2: EnviCo's Organisational Chart.....	63
Figure 4.3: ERP System Implementation Stages at EnviCo.....	69
Figure 4.4: GovDep's Organisational Chart	78
Figure 4.5: EntertainCo's Organisational Chart	89
Figure 4.6: PackCo's Organisational Chart	98
Figure 4.7: ConfecCo's Organisational Chart	110
Figure 4.8: DairyCo's Organisational Chart	119
Figure 4.9: ElectricCo's Organisational Chart.....	130
Figure 4.10: ClubCo's Organisational Chart	142
Figure 5.1: Interactions with Stakeholders Involved in Implementation Projects	163
Figure 5.2: Process Model for Deriving Benefits from ERP Implementations.....	172
Figure 5.3: Visualisation of the ERP Benefits in CVF	184

Abstract

The plethora of business benefits that Enterprise Resource Planning (ERP) systems can potentially deliver has led to an unprecedented level of ERP systems adoption by business organisations in the last decade, resulting in a global market value of US\$32 billion in 2016. While ERP systems are reputed for their many beneficial outcomes, both tangible and intangible, ERP implementation is also well-known to be full of challenges, generating organisational-wide disruptions. Not all adopters have been able to reap the anticipated ERP benefits, despite the huge investments they expended on ERP implementations.

Though an extensive range of studies exists on how organisational factors, such as change management, organisational inertia, organisational learning and innovation, affect ERP implementation outcomes, few have examined how these factors interact with one another to drive ERP benefits. Fewer still have related the benefits achieved to the interactions between organisational factors. One of the reasons has been attributed to the reliance on cross-sectional analysis, such as focusing exclusively on evaluating post-implementation outcomes using finance and/or operational data, without accounting for the “lag and learning” process of ERP adoption. More importantly, the social dimension of ERP implementation has been given scant attention.

This research explores the contributory role of organisational factors, covering both the technical and social aspects, to generate benefits from ERP implementation. Using a qualitative multiple case study approach, it explored the ERP implementation journey of nine Australian companies (via the lens of the ERP project managers) that spanned systems acquisition to system extension post-implementation. Specifically, the study examined how the nine case organisations undertook change management, engaged in organisational learning and strategic innovations to derive a host of ERP-related benefits, both expected and unexpected. Expecting a disparate range of implementation tactics being employed by these companies, this study drew on the tenets of the Contingency Theory complemented by the Competing Value Framework (CVF) to address two research questions:

- How do ERP adopting organisations respond to the contingent factors to secure ERP system benefits? What proactive actions do they take?
- What has been the range of benefits achieved by ERP adopting organisations? How and why do these benefits change over time?

This research is grounded on the epistemological belief that understanding social process warrants penetrating into the world of those generating it, which forms the undergirding principle of interpretivism. The study comprised two main stages. *Stage One* involved i) identifying and selecting business organisations that had implemented an ERP system, which went live recently, as case study candidates; ii) interviewing ERP managers with first-hand knowledge of the entire ERP implementation process; and iii) thematically coding the interview transcripts using hermeneutic principles. *Stage Two* was the data

analysis, which consisted of a within-case analysis and a cross-case comparison. The within-case analysis unearthed 10 contingent constructs that underpinned the ERP implementation process of the nine case companies. The cross-case comparison led to the formulation of an ERP implementation process model that links the ERP implementation constructs to the benefits generated at different stages of the implementation. Putting the range of ERP benefits onto the CVF framework, this study offers seven working propositions for theory building.

This study contributes to theory development in ERP implementation in three ways. First, by examining the ERP implementation process of organisations through the combined lens of contingency theory and CVF, this study has revealed how organisational factors can impact the types of ERP benefits derived at different implementation stages as well as post-implementation. Second, it developed a process model that shows how the benefit drivers embedded within the organisational factors interact to create opportunities for organisational learning and innovation, and promote a fit between the ERP technology, business and end-users. The process model could also serve as an ERP project implementation guide to aid project teams to manage changes, offering a tool for practitioners to direct appropriate resources to maximise the benefits expected during ERP implementation, optimise the ERP system capabilities and avoid costly unproductive expenditure. Lastly, grounded on the implementation experience of nine organisations, the working propositions derived offer basic building blocks for developing a theory of benefit-oriented ERP implementation management.

Publications from Thesis

Teo, L. Singh, M. and Cooper, V. 2014, 'A contingent model for evaluating enterprise systems' benefits using competing value approach', in *Proceedings of the 25th Australasian Conference on Information Systems (ACIS 2014)*, Glenn Stewart (ed.), Australasian Association on Information Systems, Queensland, Australia, pp. 1-10 (ACIS 2014: Integral IS: The Embedding of Information Systems in Business, Government and Society)

Teo, L. Singh, M. and Cooper, V. 2014, 'An investigation of contingent factors for ES benefits realisation', in *Proceedings of the 25th Australasian Conference on Information Systems, ACIS 2014*, F. B. Tan and D. Bunker (ed.), Auckland University of Technology, Auckland, New Zealand, pp. 1-11 (25th Australasian Conference on Information Systems)

Teo, L. Singh, M. and Cooper, V. 2012, 'Adopting CVA to evaluate ES benefits' impact on organisational effectiveness in Australia', in *PACIS 2012 Proceedings*, Duc A. Duong, Michael D. Myers, Thuy B.T Dong (ed.), PACIS, Ho Chi Minh, Vietnam, pp. 1-17 (16th Pacific Asia Conference on Information Systems)

Teo, L. Singh, M. and Cooper, V. 2010, 'The impacts of organizational learning and innovation on enterprise systems benefits of Australian organizations', in *AMCIS 2010 Proceedings*, Cynthia M. Beath (ed.), Association of Information Systems, Lima, Peru, pp. 1-9 (AMCIS 2010)

Teo, L. Singh, M. and Cooper, V. 2009, 'Evaluating ERP success factors: Vendor's perspective', in *Proceedings of the Fifteenth Americas Conference on Information Systems*, K. E. Kendall (ed.), Association for Information Systems (AIS), United States, pp. 1-10 (AMICS 2009)

Doctoral Consortium

PhD proposal presented at Doctoral Consortium, Australasian Conference on Information Systems (ACIS) 2008, A. Mills, S. Huff (ed.), University of Canterbury, Christchurch, New Zealand

Chapter 1 Introduction

1.1 Research Background

The invention of Enterprise Resource Planning (ERP) system is the “most important development in the corporate use of information in the 1990s” (Davenport, 1998, p. 1). Since then, ERP systems have established themselves as the standard platform for organisations to operate their businesses (Ram et al., 2014b), providing a consolidated suite of applications that support business automation and information flows (Dutta and Bose, 2015). Valued at US\$15.7 billion in 1997 (AMR Research, cited in Holland and Light, 2001), the ERP application market has experienced lucrative growth in the last twenty years and grown to US\$32 billion in 2016 (Gartner, 2016) with the Asia-Pacific market (including Australia) accounting for approximately 16.5% of the packaged software revenue (IDC Research, 2012).

The astronomical rise of ERP as a standard platform for business process automation and intra- as well as inter-organisation information flows is largely attributable to the scores of business benefits an ERP system could generate, including the inherent benefits resulting from the use of the system, such as automation (Davenport, 2000b, Davenport and Brooks, 2004), business process optimisation (Shang and Seddon, 2000, Shanks et al., 2003), and the unanticipated ones (Chen, 2001) arising from innovative extensions, such as empowerment (Sia et al., 2002), information collaboration and business intelligence (Holsapple and Sena, 2005, Koh et al., 2008). There appears to be a taken-for-granted belief within the business community that successful implementation of an ERP system would automatically lead to beneficial outcomes. To a certain extent, this uncontested assumption has proven to be true, as demonstrated by the multitude of studies that examine ERP implementation outcomes (e.g. Staehr et al., 2012, Bernroider et al., 2014, Nwankpa and Roumani, 2014).

Like all IT investments, ERP systems, however, may not always deliver the benefits as expected (Liu and Seddon, 2009). Indeed, ERP implementations carry considerable risks, because they often bring about complex organisational-wide disruptions (Wei et al., 2005b), are costly (Safavi et al., 2013) and time-consuming (Wei et al., 2005a, Manthou et al., 2015). A failed ERP implementation could render all operational units in an organisation dysfunctional (Yu, 2005). One of the most noted ERP failed projects is the American Air Force’s decision to abandon its Oracle-based ERP system despite an investment of more than US\$1 billion (Stross, 2012).

Not surprisingly, issues of ERP implementations have garnered much attention in research and public media in recent times (Chakravorty et al., 2016). While an extensive range of studies have been carried out to examine the drivers (e.g. Chang and Chou, 2009, Chou et al., 2014a, Ram et al., 2014b) and barriers (e.g. Kim et al., 2005, Saatçioglu, 2009, Aloini et al., 2016) of ERP benefits, few have explored the way in which ERP adopting organisations went about to secure the benefits associated with the

implementation of the system. As some researchers (Staehr, 2010, Staehr et al., 2012) observe, there is lack of understanding on how ERP implementation process influence the way ERP benefits were generated.

This research seeks to fill this gap by examining how ERP adopting organisations manage their ERP implementation process to capture the benefits anticipated as well as the unintended benefits generated post-implementation.

1.2 Research Question and Objectives

ERP implementations are complex IT projects that disrupt business operations on a large scale (Leyh and Muschick, 2013, Ali and Miller, 2017). They bring about considerable organisational change, in not only in the technical area but also the social dimension (e.g. Chang and Chou, 2009, Uwizeyemungu and Raymond, 2010, Sasidharan et al., 2012, Aloini et al., 2016). Extant literature on ERP implementation process and benefit tends to use quantitative-based evaluations (e.g. Stefanou, 2001, Hitt et al., 2002, Parthasarathy, 2009, Manthou et al., 2015, Shen et al., 2015). There is a lack of an encompassing theoretical approach that considers the social aspects, such as from the ERP system lifecycle perspective that includes the organisational learning and innovation aspects occurring within the adoption and use of the ERP system (Marabelli and Newell, 2009, Chou et al., 2014a, Nwankpa and Roumani, 2014). Although achieving the benefits inherent in the use of ERP systems is expected, once the system goes live, it is still not known: i) if adopting organisations managed to achieve all the expected benefits (Yu, 2005); ii) how long after ERP implementation before the adopting organisations realise those expected benefits (Uwizeyemungu and Raymond, 2010, Schubert and Williams, 2011); and iii) what factors influence the realisation of the unanticipated, intangible benefits (Murphy and Simon, 2002). Although ERP systems have been used widely (Gartner, 2007, Gartner, 2016), there is a lack of understanding on what ERP systems deliver to adopting organisations (Murphy and Simon, 2002, Hawking et al., 2004, Slabbert et al., 2016). More significantly, the interrelationships between the change processes linked to ERP implementations and how different ERP implementation approaches might lead to different outcomes remain unclear. The understanding of the interrelationship is important for organisations to reap the returns from their costly ERP implementations.

This research examines the organisational factors associated with ERP implementations that may affect the types (e.g. finance-based, process-based) and range (operational, tactical or strategic) of benefits derived, both tangible and intangible. This is accomplished by adopting a multiple case study, an approach that has long been recognised as most suited to answering “how” and “why” questions (Eisenhardt, 1989, Miles and Huberman, 1994, Eisenhardt and Graebner, 2007, Yin, 2013), of nine ERP adopting companies in Australia. The nine selected case companies all had a history of ERP implementation varying between 5 and 14 years at the time of the interview (See Table 5.1).

As no ERP implementations are alike (Soh et al., 2000, Yu, 2005, Glowalla and Sunyaev, 2014), but dependent on the adopting organisation's business model, structure, resources and employee make-up (Katerattanakul et al., 2014), this research draws on the principles of the Contingency Theory (Fiedler, 1964, Edstrom, 1977, Schonberger, 1980, Reinking, 2012), supplemented by the Competing Value Framework (CVF) (Quinn and Rohrbaugh, 1981, Denison and Spreitzer, 1991, Carlsson and Widmeyer, 1994, Borell and Hedman, 2000), to address the following two research questions:

- How do ERP adopting organisations respond to the contingent factors to secure ERP system benefits? What proactive actions do they take?
- What has been the range of benefits achieved by ERP adopting organisations? How and why do these benefits change over time?

The contingency theory assists in understanding how organisations manage their ERP implementations and process changes impacted by contingent organisational factors, such as organisational IT maturity, organisational learning, and organisational innovation. The CVF provides a lens to evaluate the outcomes of ERP implementations in the four dimensions of organisational effectiveness that entail: i) Human Relationship (HR) or human resource development that considers participating members with a common stake in the social system; ii) Internal Process (IP) arising from outcomes of information management that brings about organisational stability and control; iii) Open System (OS) including flexibility, readiness, growth, new opportunities and external support and brings about innovation and creativity; and iv) Rational Goals (RG) encompassing increased productivity and efficiency (Quinn and Rohrbaugh, 1981, Quinn and Rohrbaugh, 1983).

In this connection, the objectives of the research are to:

1. investigate the interactions between contingent organisational factors underpinning ERP systems implementation in adopting organisations with a view to assessing how the social aspects of organisational learning and innovation contribute to generating expected and unintended benefits resulting from ERP system implementation;
2. develop a theoretical ERP process implementation model that encompasses the above-mentioned interactions; and
3. establish how ERP implementation benefits are related to the four dimensions of HR, IP, RG and OS prescribed by the CVF framework.

1.3 Significance of this Research

Uwizeyemungu and Raymond (2010) argued that the highly complex ERP implementation process requires an inclusive approach to take account of both techno- and socio-changes (Ballantine et al., 2000, Sarker and Lee, 2003) with consideration given to the following four issues:

1. **Intangibility of benefits** – Adoption of IT platforms, such as ERP systems, results in large under studied intangible benefits (Murphy and Simon, 2002). Soft or intangible benefits do not always lead to identifiable performance improvements and cannot be easily evaluated with traditional pragmatic means (Berghout and Remenyi, 2005). ERP implementations entail soft benefits, such as improved decision-making, enhanced employee productivity, empowerment of users (Shang and Seddon, 2002), facilitation of business learning and ability to support organisational changes (Schubert and Williams, 2011).
2. **Depth of evaluation** – Al-Mudimigh et al. (2001) suggested that ERP implementations can be categorised into three levels: strategic, tactical and operational. Studies (Chand et al., 2005, Cotteleer, 2006, Uwizeyemungu and Raymond, 2010) on ERP implementation outcomes at different organisational levels suggest the need to explore implementation processes and evaluate benefits achieved from different levels, where activities took place within the organisation rather than the entire system (Gefen and Ragowsky (2005).
3. **Time-based maturity and organisational learning** – Markus et al. (2000a) argued that value of ERP implementation can be effectively evaluated only when the ERP system is already successfully implemented and integrated in the business operations – also known as the “*on and upward phase*”. Some ERP benefits, such as automation may be inherent to the process implementation itself (Bendoly and Schoenherr, 2005). Besides the inherent benefits, an organisation may achieve considerable benefits from increased knowledge of ERP use resulting from organisational learning (Oseni et al., 2014) that occurred during the implementation process. Interdependencies between various organisational subunits have been found to contribute to benefits due to ERP’s ability to coordinate and facilitate information flows (Gattiker and Goodhue, 2004, Gattiker and Goodhue, 2005).
4. **Organisational innovation** – Organisational innovation is defined as the creation of a useful and novel product, service, procedure or process as a result of individual cooperating in complex social systems on heuristics (Legare, 2002). In the context of ERP system, innovations can be the enabling of new market strategies, building new process chains or creating new businesses (Hawking et al., 2004). The interaction and synergy of individuals, groups and organisations adopting the use of ERP may lead to a creative output or product (Bradford and Florin, 2003), e.g. reengineering of business processes (Chen, 2001). The nurturing of organisational innovation also assists in overcoming organisational resistance that prevents organisations from fully achieving the benefits associated with ERP implementations (Kemp and Low, 2008).

This study heeded Uwizeyemungu and Raymond’s (2010) advice. It used a qualitative multiple case study approach to explore organisational factors associated with ERP implementations, taking into account both techno- and socio-changes to understand how they result in different types of beneficial outcomes, both tangible and intangible. The exploration focused on the strategic and tactical organisational level, where decisions were made, as well as the day-to-day operational level, where implementation activities took place. Through a careful selection of nine ERP adopting companies that

had implemented an ERP system for no less than five years, this study was able to prod not only into the anticipated, inherent benefits, but also to unearth the way in which those case organisations achieved unintended benefits arising from increased knowledge of ERP use. The opportunity to study companies with post-ERP implementation experience during their “*on and upward phase*” also enables this research to dig into questions relating to the outcomes resulting from innovative use of ERP functionalities: how such innovations had assisted the case companies to circumvent organisational resistance to achieve the unintended benefits post-ERP implementation?

In recent years, the call has intensified for ERP implementing organisations to appreciate that the disruptions brought by ERP implementation are not limited to techno-changes, but also include socio-changes (Wang et al., 2006, Chou et al., 2014a, Tortorella et al., 2014). In this light, several studies (Robey et al., 2002, Volkoff et al., 2004, Ko et al., 2005) have highlighted the importance of understanding the role of knowledge transfer and of organisational learning and innovation on ERP implementation process. Because ERP implementations create dynamic working environments involving a number of stakeholders (such as end users, managers, consultants) with unique relationships (Akkermans and van Helden, 2002, Somers and Nelson, 2004, Ifinedo and Nahar, 2006), the way change management was introduced and its effect on the stakeholders (Patel and Irani, 1999), and the degree of learning or knowledge assimilation (Fichman and Kemerer, 1997, Martinsons and Chong, 1999, Saraf et al., 2013) also affect ERP implementation outcomes. Hirschheim and Smithson (1987) have argued that the inclusion of both social and technical aspects is essential, even if the social aspect tends to be more subjective and challenging to analyse. The importance of incorporating the subjective and qualitative social factors has been further demonstrated in more recent works on ERP implementation (Al-Rashid et al., 2012, Staehr et al., 2012). Using a qualitative inductive approach to review the dynamics of the change processes associated with ERP implementation, this study uncovered the basic drivers of process change in ERP implementation, leading to the identification of three ERP implementation constructs (organisational learning, organisational innovation and ERP system governance) and seven main working propositions for theory building.

Though ERP system development have reached the maturity stage (Hawking et al., 2004, Uppström et al., 2015), many early adopting organisations have yet to optimise the full potential of their implemented ERP systems (Liang et al., 2007). While some researchers (e.g. Brynjolfsson and Yang (1997), Brynjolfsson and Hitt (1998), Brynjolfsson and Hitt (2003)) have attributed this to the IT productivity paradox, which suggests that decline in organisational productivity (Stratopoulos and Dehning, 2000) during IT implementation is attributed to the phenomenon of “lag and learning” (Brynjolfsson, 1993), others (e.g. Liu and Seddon, 2009, Ghosh, 2012, Chiang, 2013, Shaheen, 2016) have highlighted the way adopting organisations manage the change process of ERP implementations as a contributing factor. Despite the abundance of studies examining change management in ERP implementation (Kim et al., 2005, Kemp and Low, 2008, Ghosh, 2012, Park and Koh, 2015, Shaheen, 2016, Umar et al., 2016), the manner in which the change processes (e.g. education, training, change strategy) interact with one

another remains little understood. By tracking the relationships between the ERP implementation constructs over the implementation process, this study developed an ERP implementation process model, shedding light on how ERP adopting companies managed the change process associated with ERP implementation.

Further, many studies (e.g. Robey et al., 2002, Park et al., 2007, Saraf et al., 2013) have established that changes brought by ERP implementations provide adopting organisations opportunities to assimilate and develop new ERP expertise to support business operations and growth. Yet, extant research indicates little consensus on how ERP implementation benefits may be evaluated effectively (Stefanou, 2001, Murphy and Simon, 2002, Shang and Seddon, 2002, Nwankpa and Roumani, 2014), and how the organisational change processes driven by ERP implementation contribute to beneficial outcomes (Yang and Su, 2009, Remus, 2012, Chiang, 2013, Umar et al., 2016). Using a research framework based on the contingency theory (Fiedler, 1964, Kast and Rosenzweig, 1973, Edstrom, 1977, Kast and Rosenzweig, 1979) and CVF (Quinn and Rohrbaugh, 1981, Quinn and Rohrbaugh, 1983, Denison and Spreitzer, 1991), this study has investigated the relationships between the contingent organisational factors unique to nine different ERP implementation project environments to shed light on how ERP adopting organisations derive benefits from a contingency perspective, taking into consideration factors such as social complexities that arise from change (Chiang, 2013), learning (Nwankpa and Roumani, 2014) and temporal variations, i.e. maturity (Hawking et al., 2004, Huang and Handfield, 2015).

ERP platforms have emerged as a standard part of the business landscape, integrating a whole suite of business functions and modules for business operations (Shanks et al., 2003, Davenport and Brooks, 2004, Seddon et al., 2010). Many organisations have continued to invest large sums of money into their ERP platforms, despite not having achieved the business benefits expected (Nicolau and Bhattacharya, 2006, Leyh and Muschick, 2013). Partly, this may be because ERP software vendors, such as SAP and Microsoft, have been pushing their client organisations to upgrade their ERP systems to incorporate more functionalities, such as analytics (Babu and Sastry, 2014, Lee et al., 2014) or service-based management modules (Lenart, 2011), despite senior executives in ERP system adopting organisations becoming more prudent with their IT expenditure on ERP upgrades and moving to cloud-based platforms (Al-Ghofaili and Al-Mashari, 2014). As business executives are finding it increasingly difficult to justify the capital spent on ERP systems, emphasis has been shifting to the need to understand how ERP implementation benefits could be efficiently gained (Bernroider, 2013). Often costs of IT implementations are perceived to be easier to estimate than benefits, because implementation costs are more tangible (Alshawi et al., 2003). ERP benefits, such as improved decision making, increased customer satisfaction and enhanced productivity from ERP use, on the other hand, are not usually fully captured in the evaluation process, despite their contributions to business growth (Murphy and Simon, 2002).

Given the extensive levels of investments into ERP-related applications, the management of the implementation and its associated organisational changes becomes necessary to drive the returns on

investments. Through the development of a process model and associated working propositions, this study has explained how organisational change, learning and innovation influence the type of ERP benefits. Findings of this research hold the potential to offer insights on how organisations could achieve benefits associated with ERP implementation and innovative use in practice.

1.4 Thesis Structure

The remainder of the thesis is structured as follows:

Chapter 2 – This chapter provides a review of the extant literature on ERP implementations, covering drivers of ERP system adoption, barriers to ERP implementations and ERP benefits, leading to the development of a theoretical lens that combines contingency theory (Fiedler, 1964, Kast and Rosenzweig, 1973, Kast and Rosenzweig, 1979, Otley, 1980) with CVF (Quinn and Rohrbaugh, 1981, Quinn and Rohrbaugh, 1983, Denison and Spreitzer, 1991) to examine the two research questions. This chapter also discusses the importance of evaluating ERP outcomes, especially the unintended benefits derived from extended ERP usage. It also explains the various approaches carried out in the field of ERP implementation and benefit evaluation and examines the issues affecting ERP implementation and benefit evaluations.

Chapter 3 – The research design and the multiple case study methodology underpinning this study is presented in this chapter. The chapter includes the justification of the research paradigm, research methodology and research design. It also explains how an interpretative approach utilising semi-structured interview techniques supplemented by secondary databases and publicly available information, has been adopted to address the research question.

Chapter 4 – This chapter provides the findings of nine cases selected to inform the research. Semi-structured interviews with nominated company informants (ERP project managers), supplemented by site observations and secondary data, including corporate websites, finance reports, annual general meeting reports and news releases, were utilised to establish the ERP implementation process experienced by the case companies. The case description contains a brief background of the organisation, ERP project implementation history, benefits achieved from ERP system use as well as the organisational dynamics contributing to the ERP benefit realisation.

Chapter 5 – This chapter provides the cross-case analysis of the ERP implementation process of the nine case organisations. It highlights the commonalities among the processes adopted by the case companies together with the benefits, both expected and unanticipated, spawning from their ERP implementation. It describes the factors contributing to the realisation of the ERP benefits, leading to the development of an ERP implementation process model. This chapter also offers a number of working propositions for theory building.

Chapter 6 – This chapter summarises the study findings and relates them to extant literature. Implications of the findings for theory and practice are discussed. The chapter concludes by highlighting the limitations of the study and suggests avenues for future research.

Chapter 2 Literature Review

2.1 Introduction

ERP systems are large, complex, sophisticated IT packages (Davenport, 2000b, Malhotra and Temponi, 2010) that have become the standard technological platform for business operations (Li and Haynes, 2016). Widely adopted by organisations globally (Staehr et al., 2012), ERP systems support and enhance business strategies (Tsai et al., 2012). ERP implementations, however, are risky (Aloini et al., 2007, Tian and Xu, 2015) and costly, with projects known to cost up to USD30 million (Abdinnour-Helm et al., 2003, Galy and Saucedo, 2014) that often ended up over-time and over-budget (Plaza and Rohlf, 2008). Despite the obvious risk associated with ERP implementations, many organisations are still wanting to invest in costly ERP systems in their search for organisational efficiencies. This is driven by the promise of a centralised IT platform that uses modern “computational, data storage, and data transmission power of modern information technology to support processes, information flows, reporting and business analytics within and between organisations” (Seddon et al., 2010, p. 305). The many ERP system-driven business benefits often is a key justification for ERP implementation (Shang and Seddon, 2002).

Given the vast amount of resources required for ERP implementations, it is necessary for organisations to determine if they have achieved a return on their investment (Wier et al., 2007, HassabElnaby et al., 2012, Huang and Handfield, 2015). However, ERP system benefits are complex and challenging due to the organisational-wide impacts that they bring about (Murphy and Simon, 2002). The implementation of ERP systems is a socially complex process (Hamilton and Chervany, 1981), as it involves a large number of internal and external stakeholders and is subject to contingent factors, such as change management, top management involvement, resourcing, upgrades and maturity of users (Staehr et al., 2012).

Chapter 2 serves two purposes: i) to review the current state of research related to ERP benefits evaluation; and ii) to develop a model to evaluate ERP benefits. This chapter is organised into two main parts. It firstly provides an extensive discussion about the ERP benefits literature. Secondly, it develops a conceptual model, incorporating the issues that have been identified from the literature review, to evaluate ERP outcomes.

2.2 Drivers of ERP System Adoption

Despite the notoriety of failed ERP implementations, investments in ERP and related systems are on the increase (Pang, 2015). An extensive systematic review of extant literature, using scholar and library databases, e.g. Google Scholar, Elsevier, ProQuest etc, on the primary reasons for ERP system

adoption was conducted. The systemic literature involved the evaluation of articles containing key words that included “ERP”, “Enterprise System”, “adoption”, “implementation”, “development”, “reasons”, “rationales”, “drivers” and “motivators”. Seven common themes were identified and they are presented as follow:

1) Problems with Legacy Systems

Issues with “legacy systems” (Al-Rashid et al., 2012) are one of the most typical reasons explaining “why” businesses remain keen on implementing costly and complex ERP systems. The issues generally include multiple databases (Davenport, 1998, Davenport, 2000a, Zach and Erik Munkvold, 2012), resulting in scattered information (Lawrence et al., 2010), huge IT upkeep (Gallagher et al., 2012), repetitive processes (Ovacik, 2011), obsolete software (Cullinan et al., 2010) and increased indirect costs, e.g. the need to maintain expertise for legacy systems (Chen, 2001, Conteh and Akhtar, 2015). The use of a single ERP application system reduces the unnecessary costs associated with the continued use of the legacy systems (Davenport et al., 2004), supports online real-time data processing (Seddon et al., 2010), and minimises duplication of work with automated processes (Davenport, 1998).

2) Increasing Complexities in Business Environments

Business environments have become more complex as a result of globalisation (Turban, 2008, Shiang-Yen et al., 2013), evolving business models (Karsak and Özogul, 2009, Bhati and Trivedi, 2016) and continuous technological developments (Wood and Caldas, 2001, Lyytinen and Newman, 2015). The liberalism of world markets, demands for innovation and competition are forcing organisations to be agile, market-oriented and knowledge-driven (Al-Mudimigh et al., 2001, Tuominen et al., 2008, Hedman and Sarker, 2015). Businesses not only need to leverage the prowess of IT and align IT with business strategy (Tallon and Pinsonneault, 2011, Hedman and Sarker, 2015), but also have to increase the effectiveness of IT use to cope with competition, new markets, rising customer expectations (Nah et al., 2001, Umble et al., 2003, Kim et al., 2013), and achieve cost-efficiency in the management of their supply chains (Davenport, 2000a, Kraemmerand et al., 2003). ERP systems provide adopting businesses with industrial “best practices” (Nwankpa, 2015) and business analytics (Yeoh and Popovič, 2016) functionalities to help manage the complexities, through streamlining, automation and digitalisation of inefficient processes (Davenport, 2000a, Davenport et al., 2004).

3) Need for Information Sharing and Collaboration

As market competition moves from between companies to between supply chains, organisations are turning to inter-organisational collaboration to gain competitive advantages (Al-Mashari, 2003, Umble et al., 2003, Du et al., 2011, Christopher, 2016). Central to these collaborative arrangements is the sharing of “critical in-house information” with suppliers, distributors and customers (Umble et al., 2003p. 241). ERP packages encompass applications that provide supply chain management (SCM), customer

relationship management (CRM) and e-business functionalities, that allow adopting organisations to share information with their supply chain partners (Koh et al., 2008). ERP platforms, through standardised databases and transactions (Bendoly and Kaefer, 2004) and sharing of standardised information via Electronic Data Interchange (EDI) platforms (Koh et al., 2008), also allow business organisations and their partners to more efficiently coordinate their supply chain (Koh et al., 2008, Stadtler, 2015) and develop more trusting collaborative relationships (Búrca et al., 2005, Nwankpa, 2015).

4) Data Support for Executive Decision Making

In a volatile business environment (Mettler et al., 2011), having real-time data from business transactions could help managers make critical decisions (Shang and Seddon, 2002, Davenport et al., 2004, Stadtler, 2015). ERP applications have the reporting tools that could help business managers utilise real-time data to coordinate operations and business processes (Seddon et al., 2010) and integrate supply chains involving complex parent-subsidary relationships (Haug et al., 2010).

5) Facilitating Capabilities for Business Process Reengineering (BPR)

BPR can be defined as an organisational effort to the redesign of core business processes (Grover et al., 1995) to “generate dramatic improvements in critical performance measures – such as costs, quality, service and speed” (Hammer and Champy, 1993, p. 2). ERP implementations and BPR efforts are closely connected (Scheer and Habermann, 2000, Ram et al., 2014b). Some organisations adopt ERP to reengineer their existing business processes to remove redundancies (Murphy and Simon, 2002, Kohli and Hoadley, 2006). ERP systems have integration capabilities that could facilitate the transformation of business processes to a more integrative, cross-functional and customer-oriented design (Al-Mashari, 2003) and encourage the adoption of industries’ “best business processes standard” (Bingi et al., 1999) or “best practices” (Nwankpa, 2015). Organisational processes conforming to the ERP system model (Bingi et al., 1999) could improve operational efficiencies (Wagner and Newell, 2004).

6) Support for e-Commerce

ERP systems integrate business functions that manage back-office operations, such as manufacturing, finance, marketing, warehousing and distribution (Madapusi and D'Souza, 2012), which are essential requirements for conducting e-Commerce (Tarn et al., 2002, Cheng, 2009). The use of ERP systems helps overcome information bottle-necks, commonly associated with the use of disparate ERP, SCM and CRM applications (Cheng, 2009), through the use of a centralised database and standardised applications. These applications are critical to e-business operations (Ash and Burn, 2003a).

7) Promise of Wide-Ranging Business Benefits

Another compelling reason why companies want to adopt ERP systems is the wide-ranging business benefits associated with ERP usage (Karsak and Özogul, 2009). ERP systems are well noted in helping organisations to be more effective (Subramoniam et al., 2009) and competitive (Gunasekaran and Ngai, 2011). Shang and Seddon (2000) suggested that the business benefits brought about by ERP systems implementation could be classified into five areas: i) *operational*; ii) *managerial*; iii) *strategic*; iv) *IT infrastructure*; and v) *organisational*. Table 2.1 shows that the plethora of benefits ERP systems bring to the adopting organisations are not limited to technical ones, but also include tangibles and the less distinct, difficult-to-assess intangible managerial and operational benefits (Murphy and Simon, 2001, Murphy and Simon, 2002), such as improved decision making (HassabElnaby et al., 2012), increased information availability (Marthandan and Tang, 2010) and improved employee behaviour (Shang and Seddon (2002).

Table 2.1: Summary of ERP Benefits

Areas	Benefits	References
Operational	Reduces costs	Chand et al. (2005), (Kim, 2009), Al-Ghofaili and Al-Mashari (2014)
	Reduces cycle time	Cotteleer (2006), Cotteleer and Bendoly (2006); Galy and Saucedo (2014), Huang and Handfield (2015)
	Increases productivity	Hawking et al. (2004), Spathis and Ananiadis (2005), Kanellou and Spathis (2013), Shen et al. (2015)
	Improves quality	Spathis and Constantinides (2003), Spathis and Constantinides (2004), Zhong et al. (2013)
	Enhances customer service	Ash and Burn (2003a), Beard and Sumner (2004), Piccoli et al. (2009)
Managerial	Improves resource management	Shang and Seddon (2002), Hasibuan and Dantes (2012)
	Improves decision making and planning	Spathis and Constantinides (2003), Holsapple and Sena (2005), HassabElnaby et al. (2012)
	Increases business performance	Bendoly and Schoenherr (2005), Cotteleer and Bendoly (2006), Chapman and Kihn (2009)
Strategic	Supports business	Beard and Sumner (2004), Hawking et al. (2004), Chapman and Kihn (2009)
	Builds business alliances	Ash and Burn (2003a), Themistocleous (2004); Wang et al. (2016)
	Creates innovating	Shang and Seddon (2002), Gambardella and McGahan (2010), Anaya et al. (2015), Badewi et al. (2015)
	Enables cost leadership	Shang and Seddon (2002), HassabElnaby et al. (2012);
	Differentiates products	Shang and Seddon (2000), Saatçioğlu (2009);
	Develops external linkages between partners	Shang and Seddon (2002), Yang and Su (2009), Grover and Kohli (2012);
	Allows expansion	Park et al. (2012)
	Enables e-Commerce	Ash and Burn (2003a), Brown and Vessey (2003), Tarantilis et al. (2008)
IT	Increase flexibility for business change	Spathis and Ananiadis (2005), Karsak and Özogul (2009), Tenhialä and Helkiö (2015)
	Reduces IT costs	Hawking et al. (2004), Bendoly and Schoenherr (2005), Tarantilis et al. (2008)
	Increases IT capabilities	Themistocleous (2004), Grover and Kohli (2012).

Organisational	Supports organisational change	Chand et al. (2005), Esteves (2009), Cullinan et al. (2010);
	Facilitates business learning	Shang and Seddon (2000), Ke and Wei (2008), Saraf et al. (2013)
	Empowers employees	Shang and Seddon (2000), Teoh and Shan (2008), Rothenberger and Srite (2009);
	Establishes common visions	Shang and Seddon (2002), Bendoly and Schoenherr (2005);
	Improves employee behaviour	Shang and Seddon (2002);
	Increases employee morale and satisfaction	Ash and Burn (2003a), Chang et al. (2008), Kanellou and Spathis (2013)

2.3 Disruptiveness of ERP Implementations on Modern Businesses

Implementation and deployment of ERP systems generally brings organisational-wide changes to the adopting organisation (Gattiker and Goodhue, 2004, Gargeya and Brady, 2005). These changes can disrupt organisations (Markus et al., 2000b) both positively and negatively. For instance, adopting organisations can achieve operational efficiencies from the use of a common technological platform that allows their internal units to share data and integrate processed information (Davenport and Brooks, 2004, Su and Yang, 2009). ERP systems, through automation and integration of business processes, could collect and disseminate online data via centralised databases in real-time (Davenport et al., 2004).

On the other hand, ERP system implementations can take up to three years or more to make the system fully functional (Weston, 2001, Aloini et al., 2007), due to the enterprise-wide and integration impacts that ERP implementations bring about (Yu, 2005). Implementation failures or even delays often have disastrous consequences that range from project abandonment, major revenue losses, and in severe cases - bankruptcy (Hsu et al., 2006). A poorly implemented ERP system can also potentially halt business operations that include incorrect order processing, inventory inaccuracies (Motwani et al., 2002), and financial and pay check delays (Marszalek, 2011). Besides the possibility of business disruptions, almost 90% of ERP projects were delivered late and up to 34% were reported over budget (Aloini et al., 2012). Not surprisingly, news of failed ERP implementation is not uncommon. The abortion of an ERP system implementation in 2012 by the USA military that commenced in 2005, cost the US taxpayers USD1.03 billion (Kanaracus, 2012). In Australia, the Queensland Health Department's failed ERP project (costing AUD6 million) needed an additional expense of AUD1.2 billion to make the system operational (Charette, 2013).

2.3.1 Issues Surrounding ERP Implementation and Outcomes

Extant literature investigating issues surrounding ERP implementations suggests that they broadly fall into seven areas.

1) Quantification of Intangible ERP Benefits

ERP systems provide a number of tangible and intangible benefits (Murphy and Simon, 2001, 2002, Shang and Seddon, 2002, Shen et al., 2015) that may be internal-oriented or external-oriented (Ash and Burn, 2003a, Bernroider et al., 2014). O'Leary (2004) observed that tangible benefits tend to be largely industry-independent, whereas intangible benefits tend to be industry-dependent. Tangible benefits tend to be objective and focus primarily on financial or operational performance which can be quantified.

On the other hand, intangible benefits (Kharuddin et al., 2015) may come from increased visibility of corporate data, new or improved business processes, increased responsiveness to customers, greater business flexibility to meet market changes, empowerment of users, facilitation of business learning and supporting organisational changes (Tortorella et al., 2014). According to Kale et al. (2010), ERP implementations tend to bring more intangible benefits compared to tangible ones. This is particularly true in service-based industries, where outputs tend to be intangible and are difficult to measure, e.g. quality of medical services in the hospital industry (Botta-Genoulaz and Millet, 2006). These soft or intangible benefits, however, do not always lead to identifiable performance improvements and cannot be easily evaluated with traditional financial means (Shen et al., 2015). While researchers (e.g. Anandarajan and Wen, 1999, Kharuddin et al., 2015) have repeatedly called for the quantification and incorporation of intangible benefits into the ERP evaluation process, capturing the qualitative and quantitative benefits to justify the changes and ERP implementations remains a major challenge (Al-Mashari, 2003).

2) Realisation of Un/Expected ERP Benefits

Research studies (Ross and Vitale, 2000, Akhgar et al., 2002, Murphy and Simon, 2002, Al-Mashari and Al-Mudimigh, 2003, Annamalai and Ramayah, 2011) have also shown that organisations do not always achieve all their expected benefits. This is because ERP benefits are affected by the scope of the ERP implementation (Yang and Su, 2009) and vary across industries (Gefen and Ragowsky, 2005), particularly the intangible benefits which often depend on the industry of the adopting organisation (O'Leary, 2004, Shen et al., 2015).

Levenburg and Magal (2004) argue that achieved benefits from IT implementations may not be the same as those that motivate the organisations to adopt it. Given that ERP benefits evolve over time (Stefanou, 2001, Hawking et al., 2004, Staehr, 2010), the resulting benefits may not only be intangible in nature (Stefanou, 2001) but also unexpected (Botta-Genoulaz and Millet, 2005). Schubert & William's (2009a) study indicated that the most expected and realised benefit from ERP-adopting organisations primarily involve the availability of information. The same study also suggests that time-saving for employees, process efficiency and cost reductions are common unexpected benefits.

McLaren et al. (2002) claims that realised benefits should be evaluated and consideration should be given to total costs of ownership (TCO), the opportunity costs due to inflexibility, improved responsiveness and savings. Other authors (Brynjolfsson et al., 2002, Brynjolfsson and Hitt, 2003) have also argued that ERP implementations should consider temporal variations, as most adopting organisations require time to learn and use its systems, in particular, ERP systems (Häkkinen and Hilmola, 2008, Staehr et al., 2012).

3) Scope of Implementation and Evaluation

ERP system usage impacts an adopting organisation at the strategic (Huang and Handfield, 2015), tactical and operational levels (Al-Mudimigh et al., 2001, Madapusi and D'Souza, 2012). Likewise, this implies that ERP benefits can be realised at strategic, tactical and operational levels too. (Irani and Love, 2001, Irani and Love, 2002, Gefen and Ragowsky, 2005, Yang and Su, 2009). Operational ERP benefits tend to arise from the automation of functional processes and IT infrastructure improvements. Tactical benefits generally result from planning and management of resources. Strategic benefits stem from the ability to support business growth and facilitate organisational learning, and empowerment and the increase in morale and satisfaction (Yang and Su, 2009).

Gefen and Ragowsky (2005) claim that ERP benefits can be measured separately at activity area levels within the organisation rather than the entire system. The same study also demonstrates that there are discrepancies in terms of benefits identified when evaluation was done at different levels, especially at the subunit level, i.e. manufacturing plant of an organisation. Morton and Hu (2008) also suggest that the organisational structure of the adopting organisations may influence the outcomes of ERP benefits. Evaluation studies of ERP implementations in manufacturing plants (Cotteleer, 2006, Cotteleer and Bendoly, 2006) tend to focus on operational data and hence results are restricted to operational benefits. Annamalai and Ramayah (2011) also show that ERP benefits derived from retailers tend to be more procurement and financial oriented.

The benefits of ERP implementation, therefore, vary according to the dynamics of the operating environment (Seddon et al., 2010). Often the operating environment is contingent-based and depends on the nature of the industry. ERP implementations at sub-organisational levels, such as manufacturing plants and retail stores, would thus yield more operational oriented benefits, whereas at divisional units, the benefits generated tend to be more tactical and strategic oriented (Gattiker and Goodhue, 2004).

4) IT Maturity

Most companies require time (from a few months to years) after ERP implementations to accurately determine if any business benefits have been achieved (Nolan and Norton, 2000, Al-Mashari and Al-Mudimigh, 2003, Häkkinen and Hilmola, 2008). Wieder et al. (2006) suggest that there is correlation between the ERP usage experience and organisational performance – the longer the experience, the

better the performance. Adopting organisations that possess longer views of ERP system would more likely achieve significant tactical and strategic benefits (Willis and Willis-Brown, 2002, Huang and Handfield, 2015).

Kremers and van Dissel (2000) claim that “the value of an ERP lies not so much in the product itself but in its effective and efficient usage” (p. 54). The value of ERP system can be effectively evaluated during the “on and upward phase” when the organisation captures actual business results, but these results only happen when the systems have already been successfully implemented and integrated into business operations (Markus et al., 2000b). Holland and Light (2001) also suggested that business benefits of ERP system use occur in the third stage of the evolution – a period of high ERP system usage that leads to strategic benefits.

The need to adopt a “wait and see” approach to ERP system evaluation can be explained by the effect known as “lag and learning”. Research (Brynjolfsson and Hitt, 1998, Brynjolfsson and Hitt, 2000, Brynjolfsson et al., 2002, Brynjolfsson and Hitt, 2003) indicates that there will be a loss of productivity from IT/IS investments due to the learning that is required by the organisation to use the ERP system effectively. During the learning process (Chou et al., 2014b), various support and maintenance related activities help promote the realisation of benefits (Häkkinen and Hilmola, 2008). These activities include: i) fixing bugs; ii) tuning performance; iii) adding hardware capacity; iv) upgrading or migrating technology; v) retraining staff; vi) improving business processes; and vii) increasing more IT staff for user training (Bajwa et al., 2004). Researchers (Brynjolfsson, 1993, Brynjolfsson and Hitt, 1998) argue that IT investments may fail to demonstrate early business benefits because many cross-sectional studies did not take into consideration of the lagged effects of the IT investments, that require the organisations to relearn and readjust.

5) Organisational Learning

Organisational learning is “a dialectic between old memory and new knowledge. When an ERP package is rolled out, organizational members must acquire complex new knowledge and simultaneously unlearn what they already know. They must learn to overcome knowledge barriers related to ERP and the organizational changes that implementation carries with it. However, knowledge barriers are not easy to overcome, even where formal training is available.” (Robey et al., 2002, p. 22)

Extant literature suggests that organisations undergo a learning process when an IT/IS investment is made and implemented (Aanestad and Jensen, 2016). Likewise, an ERP implementation is considered an opportunity to facilitate organisational learning (Soh et al., 2000, Chou et al., 2014a). The adoption of an ERP system fundamentally changes the way organisations use information as a knowledge asset (Newell et al., 2003, Chou et al., 2014b).

Existing research (Marabelli and Newell, 2009) suggests that the development of learning capabilities or organisational learning is fundamental to realise the potential of the ERP system. ERP system implementations force adopting organisations to undergo a series of learning cycles and is viewed not “as a one time process but rather as a series of implementation and practical use cycles” (Marabelli and Newell, 2009, p. 1). Key personnel involved in the implementation process will gain experiences that enable them to be more effective in subsequent system implementation projects and users adapting to the system and learning more about its functionalities will allow more benefits to surface (Soh et al., 2000).

Technological implementations can bring about unpredictable effects on both individuals and organisations (Bannister, 2005). An ERP implementation provides an organisation with opportunities to access knowledge from outside sources and assist in the development of new cognitive structures and business processes, to improve its knowledge absorption and business innovation capabilities (Srivardhana and Pawlowski, 2007).

Besides the influence of organisational learning on ERP benefits, interdependencies (Gattiker and Goodhue, 2005) and synergies (Hsu, 2013) between organisational subunits could improve the ERP system’s ability to coordinate and facilitate information flows. Organisations capable of attaining such information transparency across the business units are more likely to enhance their organisational analytical capabilities (Ruivo et al., 2014) and achieve a greater level of benefits through learning and collaborative relationships formed from the use of their IT capability (McLaren et al., 2002).

6) Organisational Inertia and Change Management

In the IT/IS content, organisational inertia has been defined as the “extent to which members of the organisation have been motivated to learn, use and accept the new system” (Seddon et al., 2010, p. 313). Change management is an important enabler to overcome organisational inertia to promote learning within organisations (Staehr et al., 2012). Techno-change management is needed to overcome employee resistance (Abdinnour and Saeed, 2015) to ERP use and to foster new job designs that may enforce discipline and promote organisational learning (Staehr et al., 2012).

Regardless how good the ERP system is, unless staff in the adopting organisation are motivated to use the system and have sufficient knowledge to utilise the system effectively, the organisation may not reap benefits from the ERP system (Robey et al., 2002, Volkoff et al., 2004, Ko et al., 2005). Strong and Volkoff (2010) have similarly expressed that people in organisations are required to be motivated and to possess sufficient knowledge in order to gain the desired benefits from the implemented systems.

Effective change management (Ross and Vitale, 2000) practices involve user awareness, marketing, education (Aladwani, 2001) and user group meetings that are sponsored by vendors and similar interest groups to promote a feedback and learning mechanism (Bajwa et al., 2004). A culture of continuous

learning needs to be cultivated if internal ownership of new processes is to be embraced and the processes are to be practiced (Bajwa et al., 2004).

ERP system implementations require organisational change management (Kemp and Low, 2008), BPR and knowledge transfer for successful implementations (Gattiker and Goodhue, 2000, Ash and Burn, 2003b, Chou et al., 2014b). Research indicates that change management promotes knowledge transfer (Wang et al., 2007) and organisational learning (Seddon et al., 2010) for ERP benefits realisation. Training of users via effective change management is required for successful ERP implementation (Nah et al., 2003, Abdinnour and Saeed, 2015, Park and Koh, 2015).

7) Organisational Innovation & Creativity

The implementation of an ERP system is an architecture innovation, which reconfigures existing business processes and linkages within the adopting organisation, but keeps existing organisational knowledge intact (Chung and Snyder, 2000, Wang et al., 2006, p. 235, Ram et al., 2014a). This is because ERP system implementations are complex and often challenges the social structures as much as the technical ones. The reengineered business processes typically increase information transparency (Chou et al., 2014b) that leads to improve individual or business units' productivity (Qutaishat et al., 2012), but also requires high levels of organisational change to be implemented.

Studies have shown that, through change management, ERP implementations can encourage organisational innovation (Kemp and Low, 2008) and organisational learning (Bradford and Florin, 2003, Nwankpa and Roumani, 2014). Willis and Willis-Brown (2002) suggest that ERP system innovation and optimization should ultimately lead to growth, improved organisational agility and profitability (Willis and Willis-Brown, 2002, Kemp and Low, 2008). Many adopting organisations would undertake ERP system improvement projects after implementation (Seddon et al., 2010) to further enhance their operational and business capability (Staehr et al., 2012).

Legare (2002) argues that organisational creativity increases through the implementation of a useful and novel product, service, procedure or process as a result of individuals cooperating and interacting within complex social systems. Research (Bradford and Florin, 2003, McAdam and Galloway, 2005, Saraf et al., 2013) has suggested that ERP system implementation may lead to organisational innovation. In the context of ERP system, innovations can be an enabler of new market strategies, building new process chains, or creating new business entities (Shang and Seddon, 2000) or upgrading functionalities of existing ERP system (Seddon et al., 2010). ERP system also provides a common technology platform for other forms of EAI (Enterprise Application Integration) (Corbitt et al., 2012) to operate, prompting other benefits such as process optimisation (Davenport et al., 2004), improved supply chain management (Hawking et al., 2004) to emerge.

In short, ERP system implementations often bring about intrinsic tangible benefits associated with automation via a central database. Furthermore, ERP system improvements made by adopting organisations post-implementation could enhance the capabilities of the ERP system (Scheckenbach et al., 2014), leading to more benefits being achieved from the extended usage of the ERP system.

2.4 Extant Research on ERP Implementations

Despite the obvious risks and potential disruptions that may arise with a failed ERP implementation, an increasing number of business organisations worldwide have adopted ERP systems to transform their business processes (Françoise et al., 2009). Through the implementation of a centralised database, an ERP system facilitates the “process of innovation that enhances data processing, distribution, and service standards via the employment of new methods, hardware, software and human resources” (Malhotra and Temponi, 2010, p. 29). Market research (AMR, 2009, Forrester, 2011, Panorama, 2011) has shown that business organisations are willing to overlook the risks associated with ERP implementations and continue to invest in ERP systems. This can be attributed to a number of reasons, in particular the many business benefits resulting from ERP system usage (Shang and Seddon, 2000, Shang and Seddon, 2002).

Measuring IT system benefits is a well-established way to understand the returns on IT investments (Kohli and Devaraj, 2003), in particular ERP systems (Uwizeyemungu and Raymond, 2010, Kanellou and Spathis, 2013). Senior management tend to expect that their ERP investment will return some form of benefits for their business organisations (Shang and Seddon, 2002). Hence businesses often rely on the evaluation of ERP implementation outcomes, especially from the benefits perspective, to justify the investment (Velcu, 2007) and to determine the return on investment (Murphy and Simon, 2002).

According to Bannister (2005), extant IT evaluation research can be categorised into three groups:

1. studies that focus on the long-term historical economic impact of IT investments;
2. studies that determine whether specific IT investments made over shorter periods have yield value; and
3. studies that are concerned with methods of assessing whether or not a potential IT investment is meaningful.

The literature review reveals additional categories, including, and not limited to, IT value (Ahituv, 1980, Chan, 2000, Kohli and Devaraj, 2003, Grover and Kohli, 2012), strategic alignment (Henderson and Venkatraman, 1993, Beard and Sumner, 2004, Galliers and Leidner, 2014), behaviour impacts (Davis, 1993, Boonstra and Govers, 2009, Vries and Boonstra, 2012, Nwankpa and Roumani, 2014), user acceptance (Venkatesh et al., 2003, Park et al., 2009, Sun, 2012), and productivity (Brynjolfsson, 1993, Brynjolfsson and Hitt, 1998, Brynjolfsson and Hitt, 2003).

Evaluation of IT systems are both technical and social (Ballantine et al., 2000). The social elements and processes in IT/IS provide a more thorough understanding of business needs and outcomes (Eden and Ackermann, 1996, Teoh and Shan, 2008). However, because of the subjectivity of social elements, researchers have called for the inclusion of both social and technical aspects for IT/IS evaluation to be meaning (Hirschheim and Smithson, 1987).

In addition, the nature and quality of data collected also have an impact on the outcomes of the evaluation studies (Brynjolfsson and Hitt, 1996, Uwizeyemungu and Raymond, 2010). Temporal variations (Ram and Swatman, 2008), duration of research studies (Uwizeyemungu and Raymond, 2009) and process of IT investment determine how the data collected will also affect the findings of the evaluation studies (Ward et al., 1996).

“The appropriate use of IT assets leads to IT impacts, and IT impacts when positioned competitively, lead to impacts on organisational performance” (Kohli and Devaraj, 2003, p 128). Kohli and Devaraj (2003) observe that IT evaluation studies tend to be difficult to conduct in certain industries due to insufficient data. On the other hand, existing studies that utilise available and complete data tend to demonstrate a positive relationship between IT investment and organisational performance.

Alshawi et al. (2003) argued that it is also important to recognise the distinction between outcomes and benefits. An outcome is the result of introducing a new IT system, and a benefit is what is subsequently derived if the new capability is exploited. The distinction is crucial as organisations are currently managing outcomes rather than benefits (Alshawi et al., 2003). Alshawi et al. (2003, p 419) offered the following clarification: “a system may have as an outcome that a task can be now performed more quickly. However, doing a task in less time need not be a benefit itself; the benefit comes from what is done with the saved time” (p. 419).

A number of studies have been conducted specifically for ERP systems within the IT/IS evaluation literature. A key focus for ERP-related evaluation research is implementation success (Shang and Seddon, 2002, Gallagher et al., 2012, Tsai et al., 2012). Extant literature suggests that ERP implementation success (i.e. system going live) and benefit outcomes are interrelated (Law and Ngai, 2007, Sharma and Yetton, 2007, Badewi and Shehab, 2016). Lesjak and Vehovar (2005) argue that IT/IS evaluation is often complicated by the micro-level and macro-level benefits derived from the system. This is particularly applicable for ERP systems as they micro shape the technological landscape of the organisations, but at the same time bring about organisation-wide (macro) impacts (Pollock and Cornford, 2004). A synthesis of the literature related to ERP returns, value, or benefits is summarised in Table 2.2.

Table 2.2: Summary of ERP Evaluation Research

Approach	Theory or Method	Areas of ERP Benefits Addressed	References
Quantitative	Analytical Hierarchy Process	Qualitative, quantitative	Chen and Wang (2010)
	Balanced scorecard	Finance, customer, innovation, process	Shen et al. (2015)
		Operational	Tsai et al. (2011)
	Finance tools (ROI, ROA, ROS, CBA)	Finance	Hendricks et al. (2007)
		Organisational	Hunton et al. (2003)
		Organisational, tangible, intangible	Murphy and Simon (2001), Murphy and Simon (2002)
	Established theory/framework	Operational	Madapusi and D'Souza (2012)
		Operational	Karimi et al. (2007)
		Organisational, operational	Wieder et al. (2006)
		Operational, managerial, strategic, IT, organisational	Annamalai and Ramayah (2011)
	Hypothesis testing	IT	Karimi et al. (2009)
		Operational	Cotteleer (2006), Cotteleer and Bendoly (2006)
		Managerial	Holsapple and Sena (2005)
		Organisational, tangible, intangible	Poston and Grabski (2000), Poston and Grabski (2001)
	Descriptive statistics	Operational, managerial, IT	Spathis and Ananiadis (2005)
		Operational	Gefen and Ragowsky (2005)
		Operational, organisational	Hawking et al. (2004)
Qualitative	Balanced scorecard	Strategic	Chand et al. (2005)
		Automation, informational, transformational	Uwizeyemungu and Raymond (2009), Uwizeyemungu and Raymond (2010)
	Conceptual framework	Operational, managerial, strategic, IT, organisational	Staehr et al. (2012)
		Business design, management, business functions, supply chain, IT	Schubert and Williams (2009b), Schubert and Williams (2009a), Schubert and Williams (2011)
		Tangible, intangible	Botta-Genoulaz and Millet (2006)
		Internal, external	Ash and Burn (2003a)
		Operational, managerial, strategic, IT, organisational	Shang and Seddon (2002); Shang and Seddon (2000)
	Established theory	Operational	Nwankpa and Roumani (2014), Nwankpa (2015)
Strategic		Beard and Sumner (2004)	
Mixed	Descriptive statistics and interview	Tangible, intangible	Kale et al. (2010)
	Established theory/framework	Organisational	Bendoly and Schoenherr (2005)
		System, information, satisfaction, user, organisational	Sedera and Gable (2004); Gable et al. (2003)
		Tangible, intangible	Hsu and Chen (2004)
		Operational	Kennerley and Neely (2001)

From Table 2.2, it is clear that studies employing quantitative tools to assess ERP benefits outnumber those using qualitative means. The use of financial tools, such as return on assets (ROA), return on sales (ROS) and cost benefit analysis (CBA), dominates quantitative evaluation of ERP implementation benefits. On the other hand, a number of qualitative conceptual frameworks have also been proposed for the evaluation of ERP benefits. The balanced scorecard (BSC) remains the only method that has been deployed in both quantitative and qualitative approaches.

Quantitative evaluation studies that adopts financial tools rely heavily on IT costing, secondary finance databases and uses publicly available financial records of the organisations that have implemented ERP (Vehovar and Lesjak, 2007). Although financial tools utilised in the studies are well established accounting practices, they are only suitable where benefits are seen to be objective (Anandarajan and Wen, 1999). Researchers have often argued that traditional financial tools and techniques lack the precision for ERP benefit measurements and results that management executives expect and require (Murphy and Simon, 2002, Alshawi et al., 2003, Uwizeyemungu and Raymond, 2010).

The use of financial data may also be biased, as “those responsible for implementing IT in organisations are totally committed towards the ‘success’ of the IT investment and often ignore the ‘full’ implications of their investment and thus advocate optimistic estimates of benefits and cost savings” (Alshawi et al., 2003 ,p. 417). The costs associated with IT implementations appear more tangible due to the assumptions and dependencies on which they are based and are often misunderstood (Alshawi et al., 2003). Besides financial data, operational performance data, such as lead time and cycle-time, have also been used to analyse the impacts of ERP system implementations (Cotteleer, 2006, Cotteleer and Bendoly, 2006). However, these studies (Cotteleer, 2006, Cotteleer and Bendoly, 2006) are primarily restricted to manufacturing firms that are able to provide such information.

Balanced scorecard (BSC), a prominent approach in IT evaluation, has also been adapted for ERP system implementation (Rosemann and Wiese, 1999) and outcome evaluations (Edwards, 2001, Sedera et al., 2001, Lin et al., 2006, Uwizeyemungu and Raymond, 2010). In the context of ERP benefits, BSC was used to evaluate strategic (Chand et al., 2005) and operation outcomes (Tsai et al., 2011). Despite being a popular tool for assessing ERP implementations, BSC-based approaches are limited to the four perspectives of innovation, internal processes, finance and customer and may exclude benefits that do not conform to the four perspectives (Uwizeyemungu and Raymond, 2009).

Extant literature also revealed that there has been attempts to underpin ERP benefit evaluation studies with a theoretical foundation. DeLone and McLean’s (1992, 2003) IS success model was incorporated by Kennerley and Neely (2001) and Gable et al. (2003) into their research to investigate the outcomes of ERP implementation. Other theories used in ERP benefits evaluation identified in Table 2.2 include i) structuration theory (Staehr et al., 2012); innovation diffusion theory (Karimi et al., 2007); contingency theory (Hsu and Chen, 2004); and competitive advantage theory (Beard and Sumner, 2004). The

theories (highlighted in Table 2.2) suggest that the ERP benefits evaluation is highly complex and findings may vary in accordance with the approaches undertaken, and the assumptions and limitations within the studies. More recently, Staehr et al. (2012) and Seddon et al. (2010) claimed that variables within ERP implementations will affect the outcomes of the ERP system impacts and hence a more holistic approach, that account for variables such change management, is required for ERP benefits evaluation.

Staehr et al. (2012) argue that ERP implementations create social systems that are imposed on adopting organisations. For IT/IS evaluation to be meaningful, the inclusion of social and technical aspects are essential, however social aspects tend to be subjective in nature and difficult to analyse (Hirschheim and Smithson, 1987). Post-implementation usage of ERP results in organisation changes over time (Staehr et al., 2012). Organisational change, brought about by ERP utilisation and business process reengineering, may impact on other internal or external social business systems (Whittington, 1992) that result in ERP benefit outcomes (Staehr et al., 2012).

There is “limited theoretical understanding as well as limited empirical grounding regarding how IT can be leveraged to design and govern the extended enterprise and how IT-enabled process capabilities across the extended enterprise enable firms to leverage resources, exploit competencies, manage partner relationships, and explore opportunities” (Krishnan et al., 2007, p. 233). Staehr et al. (2012) pointed out that existing variance models (Davenport et al., 2004, Gattiker and Goodhue, 2005) for ERP benefits lack insights into the interactions of the social systems that were created by the ERP implementations.

Studies underpinned by theories tend to pay limited attention to contextual and temporal variances (Staehr et al., 2012); socio-technical and business changes; and levels of benefit realised (Schubert and Williams, 2009b). Intangible benefits, such as improved decision making, increased customer satisfaction and enhanced employee productivity, contribute significantly to the business but have not been incorporated in the evaluation process (Anandarajan and Wen, 1999, Murphy and Simon, 2002, Shen et al., 2015).

The ERP benefits literature highlighted in Table 2.2, also demonstrated that research methods, data collected and samples used in the studies have an impact on the findings. Furthermore, organisations with differing environments and conditions (Staehr et al., 2012) will also have differing ERP benefits. ERP benefits evaluation studies are also affected by the type of industries that were investigated (Gefen and Ragowsky, 2005) and the level of impact, i.e. at organisational or module level (Vehovar and Lesjak, 2007). ERP systems can be implemented at an organisational level, business unit level or even for newly acquired business divisions (Chang et al., 2014).

In order to fully understand how organisations manage their ERP implementation to drive benefits, this study will address the following questions:

- How do ERP adopting organisations respond to the contingent factors to secure ERP system benefits? What proactive actions do they take?
- What has been the range of benefits achieved by ERP adopting organisations? How do these benefits change over time?

2.5 A Model to Study How Organisations Drive ERP Benefits

Though an extensive range of research has been conducted to evaluate ERP benefits, few of these studies have been underpinned by a theoretical foundation e.g. resource-based view (Beard and Sumner, 2004), information diffusion theory (Karimi et al., 2007), organisational information processing theory (Madapusi and D'Souza, 2012). A growing number of researchers (Anandarajan and Wen, 1999, Ballantine et al., 2000, Alshawi et al., 2003, Vehovar and Lesjak, 2007, Uwizeyemungu and Raymond, 2010) have argued that a unified approach to assess ERP system benefits is lacking and the research area tend to be dominantly quantitatively oriented, e.g. using Cost Benefit Analysis to classify benefits (Murphy and Simon, 2002), assessing Return on Investment of ERP implementations (Hendricks et al., 2007), or developing structural models to evaluate ERP benefits (Karimi et al., 2009) as shown in Table 2.2.

Central to evaluating ERP benefits is understanding the factors that impact on the outcomes (i.e. benefits), especially those that affect the different type of benefits resulting from implementing the ERP system. ERP benefits evaluation can be complicated by issues highlighted in Section 2.3.1. ERP system implementation, usage and outcomes may vary due to the dynamics of ERP implementation projects. However, research (Brown and Vessey, 1999, Velcu, 2007, Wang et al., 2008, Ifinedo, 2011) suggests that there is no systematic investigation of contingency variables in ERP system implementations and, yet the identification of these variables is crucial to the success of ERP system implementations. The contingency variables identified in existing studies tend to differ, subjected to the research approach and methodology, duration and extent of study, and also the respondents involved. Staehr et al. (2012) provided one of the most comprehensive lists of variables that include environmental context, organisational context, as well as variables that enable and drive ERP benefits. This means that respondents in differing context, involvement and ERP roles might come up with separate factors with non-identical meanings.

Empirical studies on information system benefits have been mixed or conflicting at times (Jurison, 1996). It can be “attributed to a lack of methodological rigour or the ad-hoc nature of the evaluation process” (Heo and Han, 2003, p. 243). Jurison (1996) offered three possible explanations for such discrepancies: i) ill-defined variables that impact on IS success and lacks consensus on what constitutes an

independent variable; ii) exclusion of effects of temporal variations; iii) complex interactions between the technology and users are difficult to study for the development of consistent theory.

Extant research that enumerates ERP benefits tends to utilise conventional finance methods (Hunton et al., 2003, Wu et al., 2006) or techniques (e.g. Return on Investments) or indirect measures (e.g. user satisfaction). The majority of these studies rely heavily on secondary data drawn from public databases (e.g., stock values via stock exchanges, corporate reports) (Hendricks et al., 2007, Wier et al., 2007). Most of the data used are also cross-sectional in nature and lack historical trends to financially quantify the effectiveness and innovation of ERP implementation outcomes (Chang et al., 2011).

On the other hand, studies adopting the qualitative approach to assess the soft and intangible ERP benefits (Shang and Seddon, 2002, Saatçioğlu, 2009) tend to be overly user-oriented, focusing largely on user or managerial satisfaction with operational benefits. Organisational and strategic benefits, e.g. linkages with other partners (Beard and Sumner, 2004), are often ignored (Akhgar et al., 2002, Stratman, 2007). However, research has shown that ERP implementations can lead to long term strategic benefits (Ranjan et al., 2016), especially on increasing supply chain efficiencies (Huang and Handfield, 2015) and also financial performance improvements (Galy and Saucedo, 2014). This suggests existing researchers tend to focus on benefits that area easily quantifiable or observable such as finance performance, operational improvements or supply chain efficiencies, thus neglecting the long term strategic benefits.

Every individual's perspective on supporting organisational goals is subjective, as users have different responsibilities, operating with different skill sets in varying environmental, organisational and technical conditions (Heo and Han, 2003). The outcomes obtained by the adopting organisations will differ based on the fit between users and systems (Kwak et al., 2012) and between internal and external resources (Ifinedo, 2011).

Extant literature has established that ERP system benefits evaluation are complex and complications arise from: i) the types of benefits to be measured; ii) the scope of the implementation; iii) the level of maturity of IT use; iv) the dynamics of change management; v) the organisational learning; and vi) the extent of organisational innovation (Saraf et al., 2013) and creativity (Legare, 2002, Ram et al., 2014a). Although emerging research (Seddon et al., 2010, Staehr, 2010, Staehr et al., 2012) have focuses on factors that influence the realisation of ERP system benefits, little work has been done to gain a deeper understanding of the role of variables, such as IT maturity, organisational learning, organisational innovation & creativity, in contributing to ERP system benefits. Such insights are essential for ERP adopting organisations to fully harness their ERP capabilities to achieve optimum returns on their investments (Brown and Vessey, 1999).

Different theories have been adopted to study ERP implementation. They include theory of competitive advantage (Ram et al., 2014b); resource-based theory (Stratman, 2007); organisational learning theory

(Nwankpa and Roumani, 2014); agency theory (Staehr, 2010); contingency theory (Morton and Hu, 2008); information processing theory (Gattiker, 2007); innovation diffusion theory (Karimi et al., 2007); and theory of constraints (Bendoly and Schoenherr, 2005). With the exception of studies by Staehr (2010) and Morton and Hu (2008), the other studies mentioned were limited to cross-sectional data and hence did not address the temporal variations nor the variables that impact on ERP benefits.

In summary, there appears to be little agreement on a unified theoretical perspective of evaluating ERP system that takes into consideration all the variability in the characteristics of ERP system benefits. The multi-faceted nature of ERP system benefits (which include operational, tactical and strategic) warrants a framework that could account for the historical background of the implementation to understand the differing factors that may have driven ERP benefits, and also provide a comprehensive lens to examine the type of benefits achieved. Of the various theories that have been adopted to study ERP implementations, Contingency theory, with a focus on organisational effectiveness, appear to be the most suited in offering a theoretical lens that could take into consideration of the variables that affect ERP implementation outcomes.

2.5.1 Contingency Theory

Contingency theory, a well-established management theory (Fiedler, 1964, Donaldson, 2001) has received considerable attention in IS research (Weill and Olson, 1989) since the 1980s. The *Contingency Theory* argues there is no one best way of achieving organisational effectiveness. Depending on the situation and variables considered, different outcomes might be achieved (Fiedler, 1964, Weill and Olson, 1989, Fiedler et al., 1996). Kast and Rosenzweig (1972) stated that:

“The contingency view seeks to understand the interrelationships within and among subsystems as well as between the organisation and its environment and to define patterns of relationships or configurations of variables. It emphasises the multivariate nature of organisations and attempts to understand how organisations operate under varying conditions and in specific circumstances” (p.460).

In the context of IS research, the theory has been used widely to investigate knowledge management (Becerra-Fernandez and Sabherwal, 2001), IT payoff (Devaraj and Kohli, 2000), IS implementation (Ginzberg, 1980, Khazanchi, 2005); data management (Wetherbe and Whitehead, 1977, Goodhue et al., 1988) and user participation (McKeen et al., 1994, McKeen and Guimaraes, 1997, Lin and Shao, 2000).

But more relevant to this research, *Contingency theory* has been adapted extensively for the evaluation of IT performance (Premkumar and King, 1992, Croteau and Raymond, 2004, Sugumaran and Arogyaswamy, 2004) and success (Edstrom, 1977, Raymond, 1990, Hong and Kim, 2002, Trkman, 2010) ever since 1980s (Huber, 1982, Luzi and Mackenzie, 1982). Central to all these contingency theory-based research, is the notion of *“fit”* between IT and organisational factors (Kanellis and Paul, 2005,

Khazanchi, 2005). IT implementations are unique in the sense that they are subjected to the organisational and environmental constraints.

There is a “need for ‘fit’ between the styles of management along with their structures and the circumstances facing the organisation to produce goods and/or services” (Reinking, 2012, p. 248). There should be an increase of organisational efficiency, effectiveness and satisfaction, if there was a suitable fit between the organisation, its environment, and internal organisational design (Kast and Rosenzweig, 1979).

Weill and Olson (1989) suggest that the general contingency variables of interest to IS research include: strategy; structure; size; environment; technology; task and individual characteristics. In addition, they propose that specific contingencies relevant to an IS function should comprise: i) management; ii) implementation; iii) structure; and iv) development of the system. According to Weill and Olson (1989), Contingency theory argues that:

1. Fit – the better the fit between the contingency variables, the better the performance of the organisation;
2. Performance – performance may not be always measured;
3. Rational actors – organisational actors always perform in accordance with the goal of organisational effectiveness;
4. Equilibrium – equilibrium is achieved when organisation achieves fit between its internal and external environments and improved performance is a result of that equilibrium;
5. Deterministic – causality inference is often made even though the methodologies used generally do not allow conclusions about causality.

The greatest contribution of contingency theory is to delineate the relationships among various variables by understanding how these variables co-exists and align with one another (Benlian, 2010), and also how the alignment of internal and external variables influences organisational performance over time (Ensign, 2001). Raymond (1990) has suggested that organisational factors such as i) size; ii) maturity; iii) resources; iv) time; and v) IS sophistication has an impact on system usage. Past studies (Ifinedo and Nahar, 2009, Seddon et al., 2010, Staehr et al., 2012) have suggested the need to take into consideration the evolving relationship between information systems and their environments. Organisational change is constant and therefore ERP system benefits may also be emerging and vary over time. Existing approaches make little distinction between time in terms of whether the ERP system benefits achieved is a “desired/perceived benefit, an emergent benefit or one that is realised (or unrealised)” (Schubert and Williams, 2009b, p. 3).

In the context of ERP systems, Hong and Kim (2002) has attempted to investigate the impact of contingent factors, such as ERP system adoption readiness, process adaption readiness and organisational resistance on ERP system implementation success. Their research suggests there needs

to be a fit between the contingencies and the ERP implementation to drive the success of ERP implementation. With the exception of Hong and Kim (2002) and Wang et al. (2008), little work has been done on understanding contingency factors on ERP outcomes. In recent years, only a limited number of works have raised the importance of such factors (Seddon et al., 2010, Staehr et al., 2012) within ERP implementations.

In summary, ERP system benefits realisation is contingent on the following factors: i) the level of ERP system implementation; ii) organisational IT maturity; iii) organisational inertia and change management; iv) organisational learning; and v) organisational innovation & creativity. Furthermore, ERP system projects vary in project scope, module selection, functional areas, stakeholders (Schubert and Williams, 2009b, Schubert and Williams, 2011). Smaller ERP system projects will have modest or narrowly focused benefits, whereas larger projects may have benefits that are more systemic and more complex to evaluate (Schubert and Williams, 2009b). Given that not all ERP system adopting organisations have the same business model, offer the same product and/or services and operate in the same structure, this research argues that *contingency theory* provides an appropriate lens to investigate the dynamic organisational factors that influence ERP system implementation and, hence, the resultant benefits.

2.5.2 Competing Value Framework

Contingency theory provides a conceptual base to explore interrelationships within and among organisational ecosystems, and helps define the pattern of relationships. It emphasises on understanding how organisations operate under different circumstances, but does not provide a theoretical foundation for understanding the outcomes due to patterns formed from the interrelationships. Researchers (Ginsberg and Venkatraman, 1985, Weill and Olson, 1989) have argued that *Contingency theory* (Van de Ven and Drazin, 1984), despite being useful for exploratory studies, lacks explanatory power. As such, the research proposes the use of the Competing Values Framework (CVF) to complement Contingency theory to address the research question. CVF, which combines diverse indicators of performance (Bhimani, 2003), is a suitable tool for assessing overall organisational effectiveness (Quinn and Rohrbaugh, 1981), i.e. how well an organisation achieves the efficiencies intended (Etzioni, 1969).

CVF is used to “explore the deep structures of organisational culture, the basic assumptions that are made about such things as the means to compliance, motives, leadership, decision making, effective values, and organisational forms” (Quinn and Kimberly, 1984, p 298). CVF establishes the relationships between the “strategic, political, interpersonal, and institutional aspects of organisational life by organising the different patterns of shared values, assumptions, and interpretations that define an organisation culture” (Denison and Spreitzer, 1991). The CVF offers a means to differentiate between underpinning values that create meanings in organisational environment and cultural artefacts that represents them (Bhimani, 2003). CVF has been extensively used by human resource management

researchers to assess managerial competencies (Preston, 2008) and links between human resource and firm performance (Panayotopoulou et al., 2003, Panayotopoulou and Papalexandris, 2004). It has also been used to understand organisational culture on quality of work (Goodman et al., 2001) as well as on organisational development (Denison and Spreitzer, 1991).

The four quadrants of CVF (Quinn and Rohrbaugh, 1981, Quinn and Rohrbaugh, 1983, Cameron et al., 2006) presented in Figure 2.1 provide competing views on the meaning of organisational effectiveness, namely: Human Relations; Open Systems; Internal Process; and Rational Goal. The Human Relations (HR) quadrant is characterised by a focus on internal flexibility to develop employee cohesion and morale and focused on human resource development, participation and empowerment. The Open Systems (OS) quadrant is concerned with external flexibility and relies on readiness and flexibility to gain growth, resource acquisition, and external support. The Internal Process (IP) quadrant focuses on internal stability and control. The Rational Goal (RG) quadrant explores external control and relies on planning and goal setting to gain an increase in productivity.

CVF incorporates three sets of competing values: i) *Flexibility & Spontaneity vs Stability & Predictability* (related to organisational structure); ii) *Internal vs External* (related to organisational focus) and iii) *Means vs Ends* (Buenger et al., 1996). The vertical axis in Figure 2.1 reflects the competing demands of change and stability. One end of the axis represents flexibility & spontaneity, whereas the other represents a conflicting focus on stability, control and order. The horizontal axis represents the competing demands between those created within the internal organisation and those imposed by the external environment. One end highlights the integration required to support organisational activities and the other end emphasises the attention on competition, adaptation and interaction with the environment (Denison and Spreitzer, 1991).

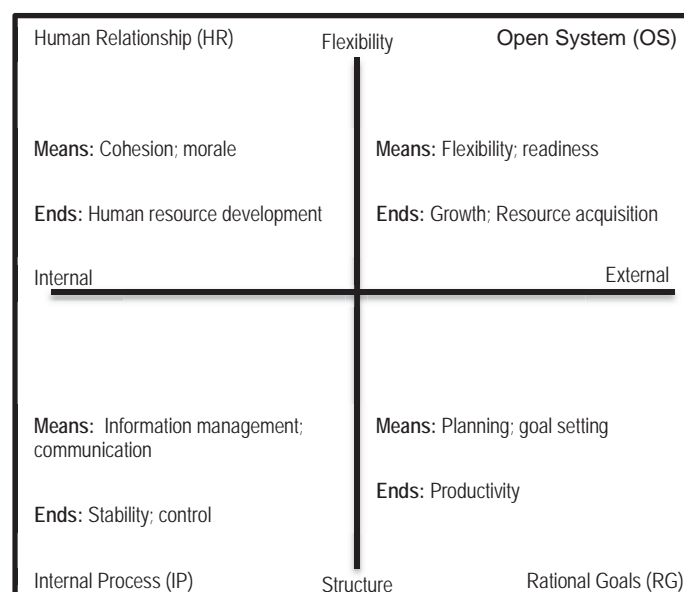


Figure 2.1: A Summary of Competing Value & Effective Model (Quinn & Rohrbaugh, 1983)

In the field of IS research, CVF has been used to study executive leadership and to evaluate organisational effectiveness (Hart and Quinn, 1993, Rojas, 2000), organisational life cycles (Quinn and Cameron, 1983), organisational culture (Denison and Spreitzer, 1991) and organisational value (Cameron et al., 2006). CVF has also been utilised in the IS discipline to investigate IT outcomes (Robey and Azevedo, 1994) and performance (Hult et al., 2004), IT impact on culture (Doherty and Doig, 2003), relationships between environment, technology values and structure (Buenger et al., 1996); executive support systems (Carlsson and Widmeyer, 1994); evaluation of marketing information systems (Sääksjärvi and Talvinen, 1996); and the evaluation of Business-to-employee (B2E) systems (Mootheril and Singh, 2009). CVF has been suggested to address organisational effectiveness achieved from Enterprise Systems (Borell and Hedman, 2000, Hedman, 2000). Hedman and Borell (2002) noted “that while different organisational models reflect different effectiveness criteria, they are not dichotomous” (p. 130). In adapting CVF for ERP evaluation, researchers (Borell and Hedman, 2000, Hedman, 2000) have propose the categorisation of ERP system outcomes into the four sub-types (quadrants):

1. ES – Human Resource (ES – HR) is the first subtype and assists an organisation in the area of human-capital development. HR related outcomes that are achieved from ERP system as a result of collaboration, learning and communication functionalities. These are associated with internal (Murphy and Simon, 2002) or/and organisational ERP system benefits (Shang and Seddon, 2000) that include: i) enable communication and collaboration amongst employees; ii) enabling management to empower; iii) monitoring and motivating employees (Sia et al., 2002).
2. ES – Open System (ES – OS) focus on structural flexibility with an external emphasis. These ERP system features support environmental scanning, and issues of tracking and probing for market opportunities and entrepreneurship that are primarily associated with ERP system benefits of external (Lee et al., 2003) or/and strategic in nature (Shang and Seddon, 2000, Chand et al., 2005) and may include collaborative or external linkages to partners (Ash and Burn, 2003a, Davenport and Brooks, 2004, Búrca et al., 2005).
3. ES – Internal Process (ES – IP) is the third subtype and focuses on internal controls that support associated organisational roles, processes and workflows. ES support effective management and control of business processes including finance, production, warehousing, accounts and marketing. Internal ERP system benefits that are of operational or/and tactical characteristics tend to be in this quadrant. This relates to the integration (Davenport, 1998) and centralisation (Markus et al., 2000b, Benders et al., 2006) brought about by ERP system implementation and use that may also lead to shared services (Davenport, 1998, Markus et al., 2000b, Scapens and Jazayeri, 2003).
4. ES - Rational Goals (ES – RG) has an external focus that assists mangers with goal setting, forecasting, simulations and sensitivity analysis. Such organisational effectiveness is often outcomes of improved IT infrastructural (Ross and Vitale, 2000, Gefen, 2004) and managerial (Shang and Seddon, 2002, Holsapple and Sena, 2005) benefits.

Although Hedman (2000) and (Borell and Hedman, 2000) had proposed the suitability of CVF as a model for evaluating ERP system impact on organisational effectiveness, a review of current literature reveals no further work originated from the same researchers to test the model with empirical data. Given its popularity in IS literature (Buenger et al., 1996, Hult et al., 2004, Mootheril and Singh, 2009) and strong suitability (Borell and Hedman, 2000, Hedman, 2000) for evaluating IT contribution to organisation effectiveness, this research finds that the CVF appropriate lens to evaluate the outcomes of ERP implementations especially from the benefits perspective.

2.5.3 Research Framework

Current literature on IT and IS evaluation research is divided in terms of focus and emphasis. Dominant economic or/and performance based approaches tend to ignore the social issues and intangible ERP system benefits (Ash and Burn, 2003a, Annamalai and Ramayah, 2011). The review of extant literature (refer to Section 2.4) suggests that theoretical and modelling based approaches, on the other hand, tend to neglect the organisational factors that have implications for the ERP system benefits realisation. Contemporary literature suggests that ERP system implementations and outcomes evolve over time (Ram and Swatman, 2008) and are influenced by inherent factors, such as change management, education, processes and innovation (Staehr et al., 2012). The dynamically complex process of ERP systems implementation has wide reaching effects on the adopting organisation and warrants a contingent approach to examine how firms implement their ERP systems to capture the expected benefits. The embedded value of ERP system is derived from benefits that have been holistically evaluated with consideration for the following issues:

- Some ERP system benefits are inherent in the system itself and come about when ERP system is implemented (Hayes et al., 2001), while other ERP system benefits only emerge when ERP implementation reaches maturity (influenced by organisational factors) (Deloitte, 1999, Hawking et al., 2004).
- System maturity through learning and awareness (Brynjolfsson and Hitt, 2000, Brynjolfsson and Hitt, 2003) creates opportunities for further evolution of usage and benefits.
- Theoretical frameworks employed for evaluations need to be holistic, taking into consideration of the variations in ERP implementations, in nature in order to effectively evaluate the system value (Levenburg and Magal, 2004, Uwizeyemungu and Raymond, 2010).

This study employs contingency theory and the CVF approach proposed by Hedman (2000) and (Borell and Hedman, 2000) to study how organisations manage their ERP system implementation to obtain benefits, focusing on the implications of contingent variables, such as time, organisational learning and organisational innovation and other potential factors, as depicted in Figure 2.2. The contingency theory assists with the exploration and understanding the contingency variables within ERP implementations

that influence the realisation of ERP benefits. The CVF has been adopted to further enhance the understanding on how ERP benefits achieved improve the organisational effectiveness of the adopters.

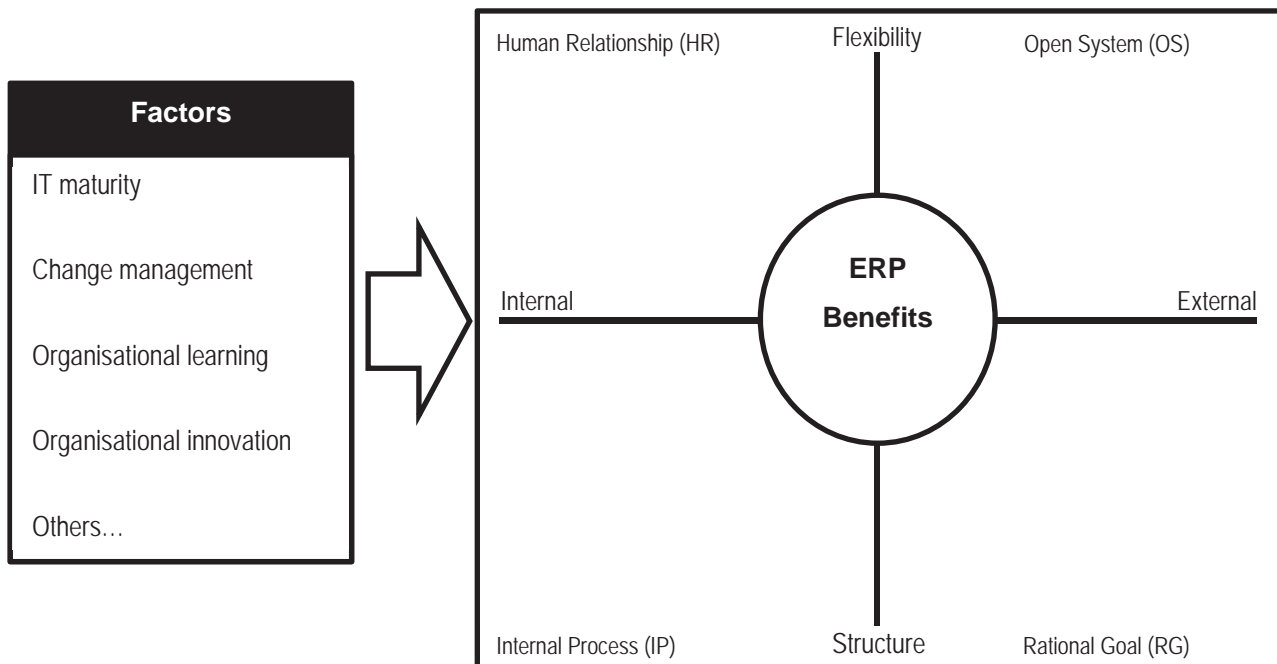


Figure 2.2: Proposed Research Framework

2.6 Summary

ERP systems offer adopting organisations the prospect of increased work productivity and operational efficiency. Yet its implementation is costly and resource intensive. The evaluation of ERP system benefits is important to justify the investment made. Equally, it is important for adopting organisations to understand what forms of implementation efforts are required to optimise their ERP system performance. Current literature on ERP system benefits overly focuses on performance-based metrics, i.e. financial, operational or balanced scorecard. The literature review suggests that organisational inertia & change management, IT maturity, organisational learning and organisational innovation are crucial factors impacting on ERP implementations, that may further enhance or inhibit the benefits derived from ERP system. Due to the situational nature of ERP implementations, this research employs contingency theory complemented by CVF as a theoretical lens to examine the implementation process of ERP projects and its associated outcomes.

There is a lack of understanding on the manner in which organisations deal with issues known to affect ERP implementations to obtain the anticipated ERP benefits. The proposed framework offers an analytical base to assess the manner in which the contingent factors contribute to ERP system benefits realisation, including the range of benefits that could be derived post ERP implementation.

Chapter 3 Research Methodology

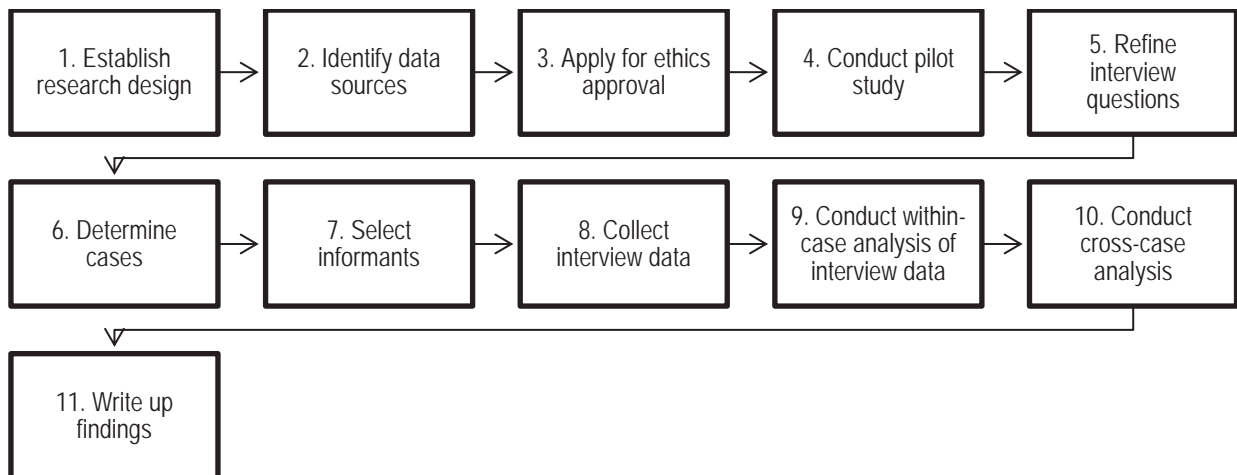
3.1 Introduction

This chapter presents the research design, including the paradigm, methods and techniques used in this thesis. It describes the philosophical lens, approach and methods adopted for this research to explore and explain how ERP adopting Australian organisations implemented their ERP systems to derive benefits.

3.1.1 Research Process

The process flow undertaken for this research is summarised in Figure 3.1.

Figure 3.1: Research Process Stages



An explanation of the research process stages is given as follow:

1. Establish research design –This stage explores the most appropriate research design to address the research questions. It involves the consideration of the research approach to be adopted, including how the data might be collected.
2. Identify data sources – The focus of this stage is determining the most suitable source(s) of data to support the research design. It also includes the design of the interview protocol that needs to conform to the University ethics policies and guidelines.
3. Apply for ethics approval – An application detailing the research methodology and data collection methods, including a draft interview protocol, was submitted to BCHEAN (Business College Human Ethics Advisory Network) to obtain university ethics approval to conduct the study. An approval for low-risk research was obtained.
4. Conduct pilot study – Upon receiving ethics approval, a pilot study was carried out using a group of subject matter experts as respondents to test and refine the interview protocol.

5. Determine cases – This step identifies business entities in Australia that meet the case selection criteria as candidates for the case study. An ERP vendor database was consulted to select and invite business organisations with more than 5 years of ERP implementation history to participate in this research.
6. Select informants – The selected case organisations that consented to participate in the study were asked to nominate informants who had first-hand knowledge of the ERP implementation history in their organisations.
7. Collect interview data – Respondents were visited by the research to conduct interview. The interview data was audio recorded with notes taken.
8. Conduct within case analysis – The audio-records of the interviews were transcribed and coded manually for the within case analyses. The cases were presented in Chapter 4.
9. Conduct cross-case analysis – The within case findings were compared and contrasted to find common themes or identify patterns of ERP implementations.
10. Interpret and discuss findings – The findings of the cross-case analysis were interpreted and their implications for theory and practice were discussed.

3.2 Research Design

This research used an interpretivist qualitative multi-case approach based on the notion that reality is socially constructed (Punch, 2013, Ritchie et al., 2013). The interpretive research has emerged as an important stream in IS research in recent years (Walsham, 1995) and has gained popularity in ERP system research (Skok and Legge, 2001, Kræmmergaard and Rose, 2002, Skok and Legge, 2002). It has been utilised to study ERP system customisation (Poba-Nzaou and Raymond, 2013), ERP implementation risk (Poba-Nzaou and Raymond, 2011), ERP system's improvement of supply chain management (Jayaram et al., 2014), and organisational knowledge management (Remus, 2012). Remus (2012) argues that ERP system projects can “trigger a chain reaction” (p. 1) of activities linked to knowledge capture, sharing and integration brought about by organisational changes (Cullen et al., 2013, Nwankpa, 2015, Hong et al., 2016).

Central to the interpretivist approach is the use of evidence from a non-deterministic perspective to assist in understanding the phenomena within particular cultural and contextual background (Orlikowski and Baroudi, 1991, Walsham, 1995). This implies that the worldview is qualitatively different from other things investigated by the natural sciences and is not limited to just the principles from the natural sciences. It requires the creation of a type of unique science that portrays human characteristics and captures aspects of the world (Neuman, 2007). Generalisation from a sample to its population (from which the sample is drawn) is not sought within the interpretivist approach. Instead, the search for deep structural meanings to inform other settings is essential (Orlikowski and Baroudi, 1991). This study, which explores the phenomenon of ERP implementations in adopting organisations, aims to delve into

the structural changes occurring during the implementation process to derive meaning from the actions taken by the adopting organisations.

3.2.1 Multiple Case Study

A multiple case study approach (Eisenhardt, 1989, Eisenhardt and Graebner, 2007) complements the interpretivism philosophy underpinning for this research. Multiple cases are “a powerful means to create theory because they permit replication and extension among individual cases. Replication simply means that individual cases can be used for independent corroboration of specific propositions.” (p. 620, Eisenhardt, 1991). Through observing similarities and contrasts between cases, the multiple case approach allows the researcher to analyse a number of cases and establish findings by specifying “how”, “where” and, if possible, “why” (Miles and Huberman, 1994, Miles et al., 2013). The multiple case approach adds confidence to a research study by increasing the “precision, validity, stability and trustworthiness” of the findings (Miles et al., 2013, p. 33). Also, multiple cases provide a richer understanding of the processes and outcomes of cases, and offer opportunities to confirm hypotheses (Miles and Huberman, 1994, Miles et al., 2013).

Establishment of multiple cases relies on qualitative methods of interviewing, observing and document analysis (Yin, 2013). A case “connotes a spatially delimited phenomenon (a unit) observed at a single point in time or over some period of time. It comprises the type of phenomenon that an inference attempts to explain.” (Gerring, 2006, p. 21). While quantitative researchers use many cases to establish statistical trends, patterns or relationships, qualitative researchers only utilise one or a small number of cases to develop rich constructs (Miles and Huberman, 1994, Ragin, 2009).

Further, because qualitative and inductive research tends to be more concerned with the social context in which the events were occurring, the study of a small sample might be more appropriate than a large sample (Marshall, 1996, Saunders et al., 2009). Furthermore, the sequential analytical process in qualitative research has the advantage of allowing the researcher to revisit questions, develop hypothesis and pursue emerging avenues of inquiry in further depth (Pope et al., 2000). Miles et al. (2013) suggested that it is left to the researcher’s discretion to determine how many cases to include in a study involving multiple cases. It depends on how rich and complex the within-case sampling is. With a high level of complex data, Eisenhardt (1989) suggests between 4 and 10 cases and it is argued that a study with more than 10 cases can be challenging to analyse (Miles et al., 2013).

Gerring (2006) also suggested that cross-case studies tend to have smaller number of observations. Eisenhardt (1989) has stated that cases may be purposely selected “to replicate previous cases or extend emergent theory or they may be chosen to fill theoretical categories and provide examples of polar types” (p. 537). This study adopted the multiple case study approach with the aim of selecting a number of cases to reflect the diversity of industries in Australia (i.e. polar types) that have been

embracing ERP systems in recent years to develop rich constructs and extend emergent theory on the social aspects of ERP implementation.

The procedure used to establish the multiple cases in this research involved a 5-steps process adapted from the works of King et al. (1994), Poland (1995), Poland (2003). The five steps are elaborated in the subsequent sections.

1. **Research** – Collect and consolidate company’s publicly available information prior to interview.
2. **Interview** – Interview nominated informants of case companies at their company premises.
3. **Transcribe** – Transcribe the interviews from the audio recordings.
4. **Validate** – Validate the draft transcription with the respondents.
5. **Clarify** – Follow up on any potential issues with a secondary interview (face-to-face or phone).

3.3 Data Sources

This research used semi-structured interviews supplemented by multiple sources of secondary data (both published online and in hard copies) and on-site observations to establish cases. The semi-structured interviews consisted of closed and open-ended questions.

3.3.1 Primary Data

The primary data for this study were collected through two main forms of ethnographic research instrument: interviews and on-site direct observations. Ethnographic interviews have become a commonly used interviewing process for qualitative researchers (Aronson, 1995). Ethnographic interviews involve the collection of interview conversations, complemented by other forms of data collection such as observations (Schensul et al., 1999). The interviews with the respondents normally commence with a general topic and relevant ideas for the purpose of establishing the context and lines of enquiry (Miles et al., 2013, Lewis, 2015).

Burgess-Limerick and Burgess-Limerick (1998) contended that interview is a “powerful way of gaining access to an individual’s interpretations of his/her personal experiences” (Burgess-Limerick and Burgess-Limerick, 1998, p. 64). The use of interviews complements the interpretivist paradigm and is thus suited to study the complexities of the social and technical environments surrounding ERP implementation projects (Hirschheim and Smithson, 1987, Ballantine and Stray, 1999), which this research aims to explore.

Semi-structured interviews, which are based on a process of recursive iterations flowing from the researcher’s questions and the interviewee’s response, are the most common among the different interview formats used for qualitative studies (Neuman, 2007, Flick, 2009, Punch, 2013) and have been found to generate rich, in-depth responses to questions (Creswell and Clark, 2007). Semi-structured

interviews using open questions allow respondents to discuss a topic openly without specific line of enquiry which can provide rich insights to a particular topic (Creswell, 2009). This gives the researcher flexibility to deviate from the interview questions as needed to pursue “serendipitous findings and fruitful directions” (Vanderstoep and Johnson, 2009, p. 225). Guided by the above premise, this study employed a semi-structured interview protocol that contains a mixed of closed and open questions to collect primary data (see Appendix B for a copy of the Interview Protocol).

An interview also involves the mutual sharing of experiences, i.e. the researcher shares his/her background to build up trust and encourage openness, as part of the process of mutual discovery (Neuman, 2007). To facilitate the process of “mutual discovery”, a comprehensive literature review was undertaken to understand the complexities associated with ERP implementations prior to the preparation of the interview questionnaire. The data collection also commenced with a review of industrial whitepapers to gain insights into contemporary ERP industry trends, as well as doing background research on the ERP adopting organisations that had agreed to participate in this study prior to the face-to-face interviews. Secondary data sources, for example annual company reports or financial stock reports, were also consulted to aid the researcher to gain a clearer understanding of the plausible range of issues facing the case companies.

This study also relied on on-site direct observations of actual processes taking place within the premise of the case companies. Reeves et al. (2008) argued that observations allow researchers to study the “social interactions, behaviours, and perceptions that occur within groups, teams, organisations and communities” (Reeves et al., 2008, p. 1). On-site direct observations of workers in their workplace setting could also provide insights to meanings to the behaviour, language and interactions among members of culture-sharing groups (Creswell and Clark, 2007). In this study, an on-site, guided direct observation was conducted following each interview. Being guided, these direct observations enabled the researcher not only to maintain a “safe” distance from the observed events to minimise interruptions to on-going processes and conversations taking place among ERP users but also gain clarity to the responses provided by the informants, including specific system features and changes made to functionalities as well as issues on system usage experienced by users. Some of the typical business routines picked up during these guided direct observations included: i) end-users employing different functionalities of the ERP systems to complete a range of tasks; ii) a preview of some of the unique dashboards functionalities innovated by the adopting organisations; iii) informal conversations between different end-users about ERP usage issues and opportunities; and iv) ERP users and trainers interacting in their workplace. In six cases, a demonstration of the end-to-end work-flow involved and its relationship to the actual operations was also shown. These post-interview, on-site observations provided distinctive insights to different aspects of the implementation process, such as the context of the information system and the dynamics of the mutual influences between the system and its context, as highlighted by (Walsham, 1995), complementing the interview responses.

3.3.2 Secondary Data

Prior to the interview, preliminary background research was carried out on the participating organisations using publicly available databases and media sources. The collection of the background information on the case companies provided the researcher a clear understanding of the contextual environment under which the ERP implementation took place. This understanding assisted the researcher in building a better rapport with the respondents and allowed the researcher to contextualise the interview questions accordingly and streamlined the interview process. The major databases and information sources consulted prior to the face-to-face interviews included (but not limited to):

- Australian Stock Exchange (ASX) – information about company's financial performance;
- Annual General Meeting documents – information that entail senior management report, management strategy and asset management;
- Corporate websites – information relevant to the company's products and/or services, historical background and origin;
- Web databases e.g. Ibisworld and Factiva – information pertaining to the company's industry, competition and forecasts; and
- Whitepapers e.g. Gartner reports – information relevant to the ERP technologies and trends.

3.4 Data Collection

3.4.1 Pilot Study

A pilot study with experts was used to refine and test preliminary questions. The experts participating in the pilot study included two ERP-based academics, one ERP manager and one ERP end-user. The preliminary questions were revised in accordance with the feedback solicited from the pilot tests. Also, the refined questionnaires were checked by the researcher's supervisory team to ensure that the questions were appropriately contextualised and could be easily understood (Refer to Appendix B Interview Instrument).

3.4.2 Case Selection Criteria

Selection of cases requires definition of the boundaries (Guba and Lincoln, 2005), i.e. unit of analysis. This involves the identification of the questions to be asked and also the clarification of the boundaries of the cases, e.g. time required for study, type of evidence to be collected, relevance of the participant and priorities for doing analysis (Yin, 2003). (Miles et al., 2013) further add that the sample of the interview cases have to be conceptually driven, sequential and purposive rather than random.

A case may be simple or complex and may be a result of event that may involve single to multiple participants (Guba and Lincoln, 2005, Gerring, 2006). Furthermore, Gerring (2006) argues that "a case

may consist of a single observation (N=1)" (p. 21) where **N** represents that the number of observations. The definition of the unit of analysis is important as this will indicate the depth of data required for each case to illustrate the topic or question (Benbasat et al., 1987, Yin, 2003).

The unit of analysis determines what makes and forms a 'case', and the data collected relevant to the unit of analysis constitutes a single case (Darke et al., 1998, Miles et al., 2013). Miles et al. (2013) suggest that a case can be defined as "a phenomenon of some sort occurring in a bounded context. The case is, in effect, our unit of analysis. Studies may be of just one case or of several" (p. 28). A case can also be defined by: i) roles (e.g. CEO); ii) a small group; iii) an organisation; iv) space and environment; v) community or settlement; vi) episodes or encounters; vii) an event; or viii) a period of time (Miles et al., 2013).

Selection Criteria of Case Companies

The review of existing literature suggests that large organisations tend to be early adopters of ERP systems (Bernroider and Koch, 2001), the organisational use of ERP system tend to mature after 3 years (Bingi et al., 1999) and it will take at least 6 months to achieve some forms of benefit for the adopting firm (Snider et al., 2009). To explore the contingent organisational factors that may impact on the ERP implementation and use, this research thus targeted ERP adopting organisations that had used ERP for at least 4 years as eligible candidates as case companies, setting the following boundaries for case selection:

- i. a large organisation (based on definition given by Australian Bureau of Statistics) that has adopted ERP system;
- ii. an organisation that have implemented and used the ERP system for more than 4 years; and
- iii. an organisation is operating in Australia (may not necessarily be Australian-owned).

Selection Criteria of Informants

Research (Botta-Genoulaz and Millet, 2005, Oseni et al., 2014) strongly suggests that ERP (IT) project managers play an important role in the optimisation of ERP system performances after implementation. The competency and experience of the ERP managers have often been cited as a critical success factor for any ERP implementation (Holland et al., 1999, Akkermans and van Helden, 2002, Finney and Corbett, 2007). The lifecycle of an ERP implementation project does not cease when the system goes live (Hawking et al., 2004, Lozano and BayonaOré, 2016), but rather, the efforts of the ERP project teams turn to overcoming user resistance (Shaheen, 2016), improving user awareness, conflict resolutions and change management (Esteves, 2014) to improve system utilisation and benefits realisation (Ha and Ahn, 2014). The responsibilities of ensuring a return on investment and assisting the adopting organisation achieve a competitive advantage from ERP systems often lies with the ERP project managers during the post implementation period (Ram et al., 2014b). Further, ERP system changes, upgrades and

performance optimisation are often required after implementation (Seddon et al., 2010). Given the above information, this study thus requested the participating case companies to nominate informants that meet the following criterion:

- ERP managers who were involved with the implementation of the ERP system from project initiation (i.e. Day 1) and have been managing the same project (post implementation) at the time of the interview.

3.4.3 Process of Data Collection

A database of more than 100 participating business firms at an ERP vendor conference was used to identify the ERP adopting organisations meeting the criteria for this study. A preliminary list of 37 organisations was shortlisted and contacted. Permissions were sought from senior managers in these 37 organisations to conduct the research study. A total of 16 permissions were received. Once permission was obtained, “gatekeepers” who were often senior IT executives, were contacted to recommend relevant colleagues who had been responsible for the ERP system implementation project. The researcher then determined if the recommended employees met the criteria. If the criteria were met, permission from the nominated informants was sought to conduct the interview. Otherwise, the selected consenting company would be re-contacted to nominate alternative informants who met the criteria.

Out of the 37 potential respondents that have been contacted for the study, only 16 managers had the requisite ERP implementation and project management experience. However, only ten managers agreed to participate in this research. Participating managers were sent the Plain Language Statement (PLS) explaining the nature of research and their rights (Refer to Appendix A Plain Language Statement) prior to the interviews.

Appointments were made with all ten ERP managers who agreed to participate in this research. The interview questions were sent to the participating manager before the scheduled interview appointments. The interviews were conducted on-site of the managers in various offices in Sydney or Melbourne. In-depth interviews ranging from 2 hours to 4 hours (refer to Table 3.1) were conducted with the ten ERP managers. The interviews were audio recorded with the permission of the respondents. In six out of the ten cases, the managers provided a demonstration of the end-to-end work-flow in the ERP system and its relationship to the actual operations in addition to a physical tour of the IT department facilities, and provided the researcher with commercial-sensitive (in-confidence) documents for consultation. (Refer to Appendix D Commercial Document (Anonymised) for an exemplar.)

All interviews started off with the researcher clarifying the company’s background information that had been prepared prior to the interviews. The clarification usually lasted about 10 minutes. Interview questions consisted of a mix of closed and open questions that allowed the researcher to explore topics and issues related to ERP adoption and implementation. In the process of transcribing the interviews

from the audio recordings, it was found that one of the case companies did not yield sufficient rich qualitative data for the purpose of the study and was removed from the analysis - the manager of this case company did not meet the requirement of the selection criteria, having only joined the company near the go-live and was not able to provide a comprehensive historical background of ERP project implementation.

Despite having ten interviews, one case was dropped from the analysis due to the lack of sufficient background information pertaining to the ERP implementation. The nine case organisations were from different industry sectors in Australia, which included manufacturing, governmental, environmental services, consumer goods and services, and entertainment. A summary of the nine organisations is presented in Table 3.2. It is obvious that the nine organisations were unlike each other in their structure, products and services, thus providing an appropriate mix for a multiple case study.

The next section elaborates the process and techniques used for analysing the interview data. Table 3.1 summarises the duration of the interview at each of the nine participating organisations together with the relevant secondary sources used to create the protocol for the interview.

Table 3.1: Sources of Information Used to Develop Cases

Company	Position	Interview duration (Minutes)	Pages of transcript	Corporate Website	Australian stock exchange Report	Annual corporate report	Financial databases (IBISWorld, Factiva)	Websites / whitepapers
PipeCo	SAP Business Manager	95	31	✓		✓	✓	✓
EnviCo	Business Improvement Manager	240	71	✓		✓	✓	✓
GovDep	SAP Manager	140	35	✓				✓
EntertainCo	SAP Manager	110	22	✓	✓	✓	✓	✓
PackCo	GM (Enterprise Solutions)	75	24	✓		✓	✓	✓
ConfecCo	SAP Project Manager	85	21	✓	✓	✓	✓	✓
DairyCo	SAP Project Manager	130	28	✓		✓	✓	✓
ElectricCo	IT Manager	135	25	✓		✓	✓	✓
ClubCo	Enterprise Applications Support Manager	90	23	✓		✓	✓	✓

Table 3.2: Background of the Organisations and ERP Modules

No.	Code	Industry Classification	Ownership	Employees	Annual Revenue / Budget in AUD (,000)	Software Vendor	Go-Live	ERP Modules														
								FI	MM	SD	HR	PP	WM	PM	SCM	CRM	BI	PS				
1	PipeCo	Manufacturing	USA	2400+	\$1000,000	SAP	2006	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2	EnviCo	Waste Management	FRA	3,800+	\$800,000	SAP	2001	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	GovDep	Governmental	AUS	700+	\$7,000	SAP	1999	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	EntertainCo	Entertainment & Media	AUS	5000+	\$240,000	SAP	2001	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	PackCo	Manufacturing & Recycling	AUS	7500+	\$2500,000	SAP	1998	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	ConfecCo	Manufacturing & Consumer Goods	JAP	2500+	\$1800,000	SAP	2002	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	DairyCo	Manufacturing & Consumer Goods	AUS	1000+	\$2500,000	SAP	1993	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	ElectricCo	Manufacturing	GER	400+	\$100,000	SAP	2000	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	ClubCo	Consumer Services & Retailing	AUS	2500+	\$400,000	SAP	1997	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note:

FI	Finance
MM	Material Management
SD	Sales & Distribution
HR	Human Resource
PP	Production Planning
WM	Warehousing Management
PM	Project Management
SCM	Supply Chain Management
CRM	Customer Relationship Management
BI	Business Intelligence
PS	Project System

3.5 Analysis of Interview Data

The semi-structured interviews were audio-recorded and transcribed. The transcripts of the interviews varied from 15 to 25 pages (single spaced). An exemplar of a transcript is provided in Appendix C Exemplar of Interview Transcription (PipeCo). The cases and its findings drawn from the analysis were presented in Chapter 4 and Chapter 5 respectively.

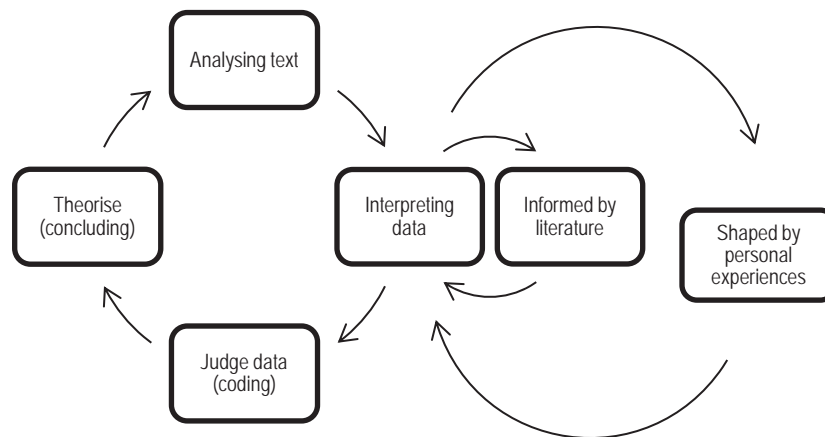
Analysis of the cases was guided by the hermeneutic principles for interpretive field research as proposed by Klein and Myers (1999), who suggest the following principles for conducting interpretive research (p. 72):

1. Fundamental Principle of the Hermeneutic Circle – All human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.
2. Principle of contextualisation – Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.
3. Principle of interaction between the researchers and the subjects – Requires critical reflection on how research materials (or “data”) were socially constructed through the interaction between the researchers and the participants.
4. Principle of abstraction and generalisation – Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.
5. Principle of dialogical reasoning – Requires sensitivity to possible contradiction between the theoretical preconceptions guiding the research design and actual findings (“the story which the data tell”) with subsequent cycles of revision.
6. Principle of multiple interpretations: Requires sensitivity to possible differences in interpretations among the participants and are typically expressed in multiple narratives or stories of the same sequence of events under study. This is similar to multiple witness accounts even if all tell it as they saw it.
7. Principle of suspicion – Requires sensitivity to possible “biases” and systemic “distortions” in the narratives collected from participants.

The technique of hermeneutics, shown in Figure 3.2 has been applied to the analysis of the interview transcripts. It involved the examination of text to draw interpretations and meanings (Lee, 1994). The purpose was to generate an understanding or description of human interactions, experiences, actions and intentions in the social environment (Myers, 1997, Klein and Myers, 1999). The iterative cycle utilised in the technique assist the researcher to understand “parts” and whole” that allows for the

contextualisation of the narratives. Parts of a story or interview can be interpreted as the initial understanding of the researchers and the participant whereas the whole consists of shared meanings that emerged for the interaction between them (Klein and Myers, 1999). Interpretation of text is conducted iteratively based on the researcher's own position and values, and understanding informed by existing literature. Interpretations are used to judge and provide context to further understand the text that leads to further reiterations and interpretations until the theoretical suggestions or conclusions are formulated.

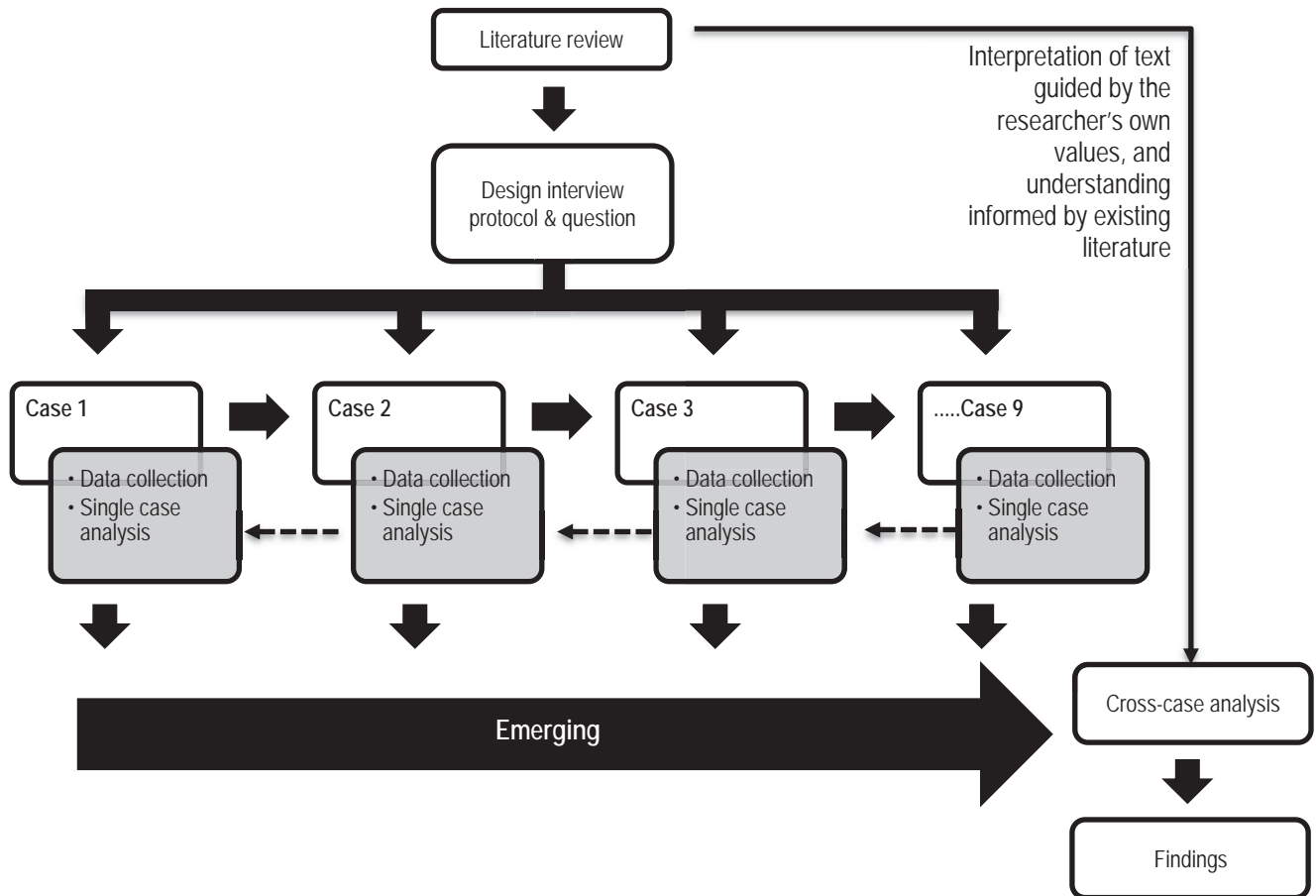
Figure 3.2: Hermeneutic cycle approach used in this research to analyse interview data



This research uses analytical categories for the description and explanation of social phenomena (Pope et al., 2000). Thematic coding (Miles and Huberman, 1994, Boyatzis, 1998) was applied to the data collected. An exemplar of analysis is provided in Appendix E Exemplar for Coding of Themes (EnviCo). Coding captures the qualitative richness of the phenomenon that assists in the identification and development of themes (Boyatzis, 1998). A theme is defined as a pattern that minimally describes or organises possible observations or interprets aspects of the phenomena (Boyatzis, 1998). Descriptive or inferential information from the analysis were labelled and catalogued. Catalogued information was organised to detect any similarities (e.g. types of benefits) to distinguish the benefits achieved by the organisations.

The techniques of pattern matching (Saunders et al., 2009), explanation building (Yin, 2003) and 'categorising and retrieving' (Williamson et al., 2002) were used to analyse the case studies. Pattern matching involves predicting a pattern of outcomes based on theoretical propositions to explain what is expected to be found (Saunders et al., 2003). Explanation building is a special pattern matching technique that analyses the data by building an explanation about the case (Yin, 2003). Code and retrieving involves the categorising and indexing of the data which allows researchers to think about their data at more in-depth level through highlighting importance of a particular issue by the amount of data available or to identify key relationships between categories. The process of analysing the interview cases is presented in Figure 3.3.

Figure 3.3: Cross-Case Analysis via Hermeneutic Principles



The analysis process started with building up an understanding of the coded themes from Case 1. The themes identified in Case 1 were used to assist in the analysis of Case 2 to determine similarities or differences. This led to building up of themes from the sequential analysis of other individual cases. As such, it could be seen that the earlier findings drawn from the previous cases contribute to a list of emerging themes or concepts that the researchers have to look out for in the newer cases. Once the analyses of all cases were done, the researcher would iteratively revisit all cases again to ensure that the themes that had been identified were exhausted. This prevented any themes identified in the later cases may have been missed out in the earlier ones.

3.6 Data Quality

An issue for qualitative research is the consideration of data quality (Neuman, 2003) and “goodness” of findings (Miles et al., 2013). Qualitative research has been frequently evaluated against criteria relevant to quantitative research and this has been found to be unsuitable (Krefting, 1991). Qualitative

researchers argue that it is inappropriate to apply the same criteria for quantitative studies due to the differing nature and purpose of the quantitative and qualitative traditions (Krefting, 1991).

Instead of discussing how “goodness of findings” criteria flow from epistemological positions, Miles et al. (2013) suggest that researchers need to address five overlapping issues in the collection and analysis of data to draw conclusions: i) confirmability; ii) dependability or audibility; iii) credibility or authenticity; and iv) utilisation, application or action orientation

Confirmability relates to neutrality and reasonable freedom from unacknowledged bias (Miles et al., 2013), or extent to which biases, motivation, interests or perspectives of the inquirer influence interpretation (Baxter and Eyles, 1997, p. 512). To ensure confirmability, the research approach and techniques have been described in detail in this chapter and the procedures followed strictly. Exemplars of the process of data collection and analyses were given in Appendix C Exemplar of Interview Transcription (PipeCo).

Findings from the analysis of the case study are explicitly explained in Chapters 4 and 5. The researcher is well-aware of the epistemological and philosophical position that guide the research, as well as the personal assumptions and values and biases that may interfere with the analysis and findings. To safeguard against such possible biases, a fellow departmental academic colleague (with ERP research experience) who did not participate in the design of the questionnaire and interviews assisted in reviewing the interview transcripts and interpreted the findings. There were debates on the meanings of the findings (e.g. classification of themes) until both parties reached a consensus. All data were retained in electronic version if required for re-analysis and audit.

Dependability or auditability determine whether the process adopted for this research study is “consistent, reasonably stable over time and across researchers and methods” (Miles et al., 2013). It also considers the consistency of data, i.e., “whether the findings would be consistent if the inquiry were replicated with the same subjects or in a similar context” (Krefting, 1991, p. 216). Baxter and Eyles (1997) suggested the adoption of low-inference descriptors (e.g. fieldnotes) in questions, peer examination and triangulation to improve reliability.

This research study has utilised a pilot study in the preparation of the interview questionnaire. The pilot study was used to test and refine the interview questions before data collection officially commenced with interviews of informants from the case companies. This ensures that the line of enquiry undertaken for the interviews is easily understood and allows for consistency of enquiries posed to other participants in a similar context. To ensure auditability, field notes were taken during the interviews and all interviews were audio recorded. Cases findings were drawn from the analyses of the interview transcripts, supplemented by secondary online data and validated by site observation notes.

Credibility or authenticity are defined as the extent which a human experience is described so that those having the experience can identify with it immediately or those outside the experience can understand it (Lincoln and Guba, 1985, Krefting, 1991). It also refers to the “experiences between groups and the concepts which the social scientist uses to recreate and simplify them through interpretation” (Baxter and Eyles, 1997, p. 512).

Purposive sampling was adopted to improve credibility for data collection phases, i.e. interviews. This is to identify both case companies that met the selection criteria and informants (i.e. ERP managers) who had full knowledge of the ERP implementation history within the adopting organisations. The data collected from the interviews were electronically recorded, stored and transcribed to not only facilitate analysis and interpretation but also provide an auditable trail for checking and referencing.

Credibility of the data is also influenced by the interview skills (Baxter and Eyles, 1997) and techniques (Krefting, 1991) deployed in the data collection. The researcher has sought to familiarise himself with the organisations that the ERP system managers were employed before conducting the interviews. This helped to build rapport with the managers. The interviews were also conducted in the managers' office or in premises close to their office locations to ensure that they were at ease and relaxed during the interview discussion and receptive to questions. The use of on-site observations also improves the credibility of the data collected. The collection of data from other relevant sources, e.g. informal conversations, and visual observation of end-users using the ERP systems in their natural workplace environment, increased the richness of the data and provided secondary sources that helped triangulate the findings.

Transferability or fittingness refers to the extent to which findings can be applied to other contexts and settings or on other populations (Miles et al., 2013) and provides the ability to generalise findings (Krefting, 1991, Malterud, 2001). However, Baxter and Eyles (1997) noted that qualitative research is less concerned about transferability than credibility. Experiences and meanings are mostly bounded by the time, people and environment of the study. Qualitative research tend to focus on a single context to explore, describe and infer, and to recreate things that are meaningful to people within the environment (Baxter and Eyles, 1997).

Lincoln and Guba (1985) suggest that the researcher's role in qualitative research is not to prove the existence of transferability but instead, provide sufficient data for others to make transferability judgements. Therefore, it is the researcher's responsibility to describe the study context comprehensively because transferability involves the others' ability to create meanings from the rich descriptions (Krefting, 1991, Baxter and Eyles, 1997). Transferability of this research study was also enhanced with the use of purposive sampling (Krefting, 1991, Malterud, 2001) where interviews data collection only involved participants (e.g. ERP system managers, academics, consultants and developers) with in-depth knowledge of the research topic and issues. Purposive sampling allowed the

researcher to obtain specific contextualised background information that offer readers insights on what situations the findings may provide applicability (Malterud, 2001). In this study, the specific contextualised background information was the ERP implementation history of the case companies.

Utilisation, application or action orientation refer to the influence and impact that the research and its process has on the researchers, participants and readers (Miles et al., 2013). Issues of ethics, accessibility, value of research need to be understood by the researcher. Potential privacy and ethical concerns were addressed in the process of applying for an ethics approval from the researcher's university. The researcher took steps to ensure that all participants were aware of their privacy rights. All cases and participants were made anonymous.

Utilisation of the research outcomes is assured through publication of the research in conference proceedings that are publicly available. The completed thesis will be available in both physical and digital versions that can be assessed by the general public. Readers are also made aware of the limitations of the qualitative nature of this research study and this has been explained in Section 3.2. In terms of contribution to literature, the research proposes a framework that can assist industrial practitioners to understand how organisational factors could affect the range of benefits obtained from their ERP system implementations.

Chapter 4 Cases

4.1 Introduction

This chapter reports on the cases drawn from the interviews conducted for this research. As outlined in Chapter 3 (Section 3.3 and 3.4), interviews were held with ERP system managers of 10 large Australian organisations in order of the interview schedule. However, one case was dropped due to inadequate background information covering the ERP implementation.

This chapter is organised into ten sections. The cases were drawn using the field notes, observations, transcripts obtained from the audio recordings, corporate documents, online websites and databases e.g. Factiva. At the time of interviews, the nine case organisations operated in different markets offering various services and products. All organisations had business operations in Australia even though not all organisations were locally owned. The criteria for selecting these nine organisations have been explained in Section 3.4.

All nine organisations met the criteria of implementing and using an ERP system for more than three years, and operated in different industries. In terms of number of employees, all organisations were relatively large (ABS, 2011), with the smallest organisation, ElectricCo, having over 400 employees, and the largest organisation, PipeCo, employing more than 5,000 people. The minimum annual turnover of the organisations is approximately AUD7 million with the largest revenue exceeding AUD2.5 billion.

4.2 PipeCo

Established in 2008, PipeCo was a major business division that belonged to a foreign-owned proprietary manufacturing company. The company produced and distributed water pipes, valves and related products and services for the water infrastructure industry. Headquartered in Rydalmere, New South Wales, Australia, PipeCo employed approximately 2,400 people across its operations in Australia and New Zealand. PipeCo's annual revenue was more than AUD1 billion in 2010. The company was one of five divisions within the organisational structure of a US-parent company. The other divisions are:

1. Environmental – Manufacturing and supply of products and services for the environmental industry which includes air purifiers and instrument systems.
2. Irrigation – Design, manufacturing and installation of irrigation systems for agriculture and horticulture purposes.
3. Pumping Systems – Design, manufacturing, supply and installation of water management products for the local and international market.
4. Water – Manufacturing and supply of pipeline systems for the transportation of water.

PipeCo division started its operations in 1971 and was one of the oldest business division within the main company. PipeCo had an annual turnover of about AUD400 million and employs over 400 staff. Due to its early establishment, PipeCo has achieved a first mover advantage in the valve and controls market and monopolises the local market in terms of product offerings and pricings. PipeCo had experienced healthy business growth in past years due to the lack of competition. Every business division had a General Manager (GM) who was responsible for the business operations of the division. The GM reported directly to the Managing Director (MD). The organisational structure in terms of reporting and divisions is shown in Figure 4.1.

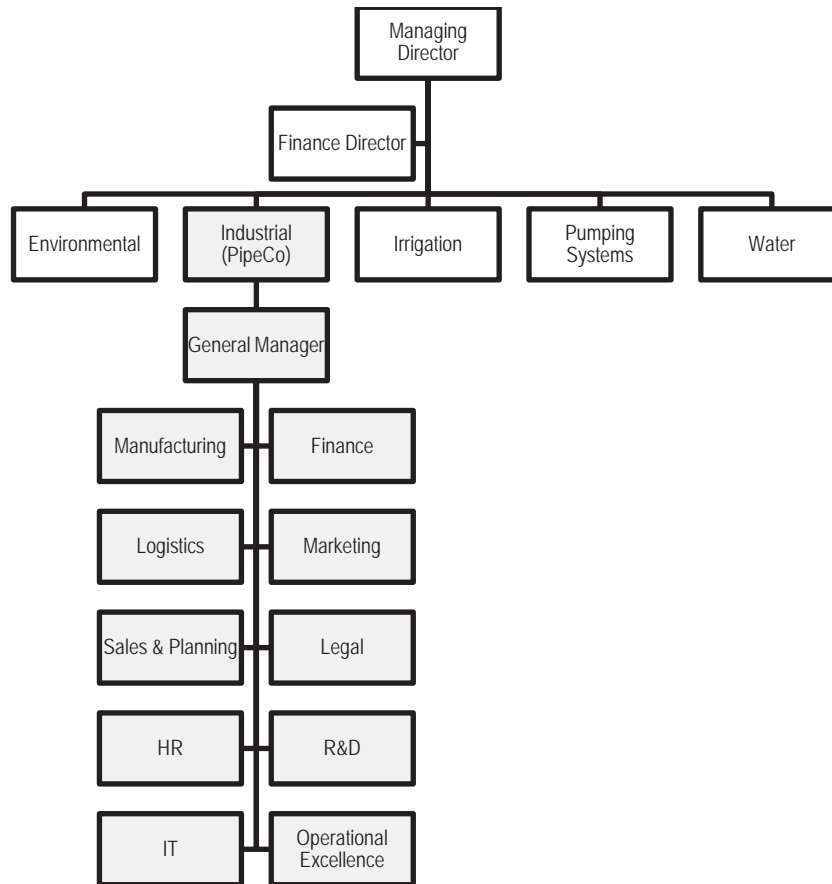


Figure 4.1: PipeCo's Organisational Chart (includes other business groups)

PipeCo's supply chain involved the procurement of raw materials (e.g. metal sheets, steel rods and components) from other raw suppliers. Other sourcing activities included the purchase of MRO (Maintenance, Repair and Operations) related supplies, as well as non-metal components required in the products from third parties/vendors. PipeCo ran a number of manufacturing facilities that produced valves and controls in the various states of Australia.

4.2.1 PipeCo's Reasons for ERP Implementation

In late 2004, the MD instructed PipeCo's GM to initiate a feasible study of ERP system investment and tasked the GM to lead the ERP system implementation. The MD was aware of the limitations of their existing technological systems and wanted to integrate PipeCo's business departments to increase operational efficiency and expand their capacity for growth. According to the SAP Business Manager (ERP System Manager):

"So we're fortunate enough to have an M.D. among (the group) that is trying to push SAP out to our businesses. He's championing it to an extent" (SAP Business Manager)

There were other reasons PipeCo wanted to adopt an ERP system, including:

1. End of life expectancy of legacy system – PipeCo had been using a proprietary software system developed by Andersen Consulting for the past 17 years. Andersen Consulting no longer supported the software. This lack of software support forced PipeCo to maintain an in-house IT team specialising in the outdated legacy system. The legacy system used an obsolete programming platform, which was proving difficult for PipeCo to source developers knowledgeable about the platform.
2. Lack of capabilities to support current operations – PipeCo's businesses had outgrown the capabilities of the legacy system. The system could no longer support current business operations. The organisation was having issues maintaining sales and customer accounts. The legacy system also lacked functionalities to cater to new markets and customer requirements, particularly in areas of demand forecasting and inventory control.
3. Support business growth – PipeCo had been experiencing a healthy growth in business since 2003 and therefore required a flexible system that could accommodate increases in customer numbers, revenue growth and business acquisitions. A more robust system was necessary to handle the increasing amount of associated transactions brought about by the growth in business.
4. Lack of communication among the other business groups – PipeCo's Australian head office had four other business divisions. Some of these business divisions were established via acquisitions of companies that had used their own proprietary software which was not compatible with PipeCo's legacy system. Communication of business information between the business groups was cumbersome and ineffective.
5. Compliance and Auditing – As a result of a US-based financial scandal in 2002, PipeCo's US-parent company was forced by American regulators to introduce greater financial transparency and undergo strict taxation audits. The rulings extended to all regional offices, including Australia. The financial controls introduced needed to be compliant with the Sarbanes Oxley Act (SOX) to allow for ease of auditing and accountability.

4.2.2 PipeCo's ERP Project

In 2004, PipeCo's senior management decided to implement the ERP system software – Enterprise Central Component (ECC) 5.0 – provided by SAP. Eight specific modules were selected to be part of the initial implementation:

1. Finance (FI-CO)
2. Material Management (MM)
3. Sales & Distribution (SD)
4. Warehousing (WM)
5. Plant Maintenance (PM)

6. Project Management (PS)
7. Service Management (SM)
8. Business Warehouse (BW)

The total cost of the ERP system implementation was estimated at approximately AUD10 million with the bulk of the expenses paying for user licences and salaries. The breakdown of the total costs is shown in Table 4.1. User licences were divided into three types: i) full licences that do not have restrictions and expiry; ii) limited licences that have expiry and; iii) short fall (temporary) licences that allow ad-hoc use with expiry.

Table 4.1: Estimated Costs for PipeCo's ERP Implementation

Project Breakdown	Estimate Costs (AUD)
Software (initial)	1 million
Manpower / labour (salaries, allowances)	5 million
Hardware (servers, workstations)	0.5 million
Others (training, traveling allowances, contract, licencing)	3.5 million
Total Costs	10 million

Wanting to have greater control and coordination of the implementation initiative, PipeCo's senior management opted for an in-house approach to system development and implementation to involve all levels of PipeCo's staff. A steering committee encompassing senior management (including the MD and CFO), as well as the departmental heads, oversaw the project management. Regular monthly meetings were set up to monitor the progress of the ERP system implementation, solicit feedback and provide a conflict resolution channel between end-users and the ERP system implementation team.

The ERP implementation team consisted of existing PipeCo's IT staff and also included external consultants and developers recruited from interstate and overseas. The ERP system provider, SAP, also sent in consultants to assist with the project. The SAP Business Manager headed the recruitment efforts personally to source the most capable personnel with the necessary technical expertise and knowledge to work in his project implementation team.

The technical implementation team had an average number of 15 permanent full-time staff, which increased to 25 with the utilisation of contract staff during peak development periods. The ERP system vendor, SAP, provided only one consultant who worked with the implementation team on workflow designs. The SAP Business Manager suggested that adopting an in-house implementation team allowed PipeCo to build its internal ERP system implementation expertise.

Change Management

Since the start of the project, PipeCo's staff had viewed the ERP implementation negatively. Though user consultations were carried out as part of the project initiation, users felt it was only a formality because one of the key reasons for the ERP system implementation was to replace all legacy systems.

The high degree of resistance from end-users during the early phases of ERP system implementations was not anticipated by the ERP system implementation team. This was attributed to many of PipeCo's long-term employees' familiarity with the legacy systems that had been in use for the last 17 years. Many of the users were reluctant to participate in the testing and trials of the ERP system prototype. The SAP Business Manager considered in hindsight that the user resistance was warranted and explained:

“So there was a very large mind-set change that I think we underestimated. We also didn't know at that point what the effect would be on people's role, yeah, what new role would be required, what would disappear” (SAP Business Manager)

Due to many uncertainties brought about by the ERP system implementation, users were reluctant even to participate in project discussions. Overcoming the resistance became a key priority for the steering committee. Believing that internal consultants and champions could motivate their operational staff to change, the steering committee ceased engaging external consultants to carry out change management and training. Despite the shift to internal consultants and champions, the ERP system was not received well. Lack of understanding and mistrust led to endless complaints from ground staff about the change in business workflows and job scopes. The majority of the mature users were unable to adapt to the new ERP system quickly. Change remained slow. The change management strategy utilised was considered ineffective. The implementation of the ERP system took 24 months to complete. The manager lamented:

“But at the end of the day, it's the businesses that suffer [due to the user resistance]. If you can use it [the ERP system] to control it better to do a job, then it would be more effective” (SAP Business Manager)

Training & Support

Part of the training and support set up by PipeCo's ERP implementation team was the appointment of key personnel from other business units to be site champions. The site champions (also known as super users) were the first users to be trained by the ERP implementation team so that they can return to their own business unit to provide training to their colleagues.

“Create a group of almost super users at every site. [And] (sic) even at sales office we would nominate one or two of these people, they became our site champions to say they effectively step up with their business process knowledge” (SAP Business Manager)

Super users carried out training sessions on-site within the business groups during office hours. PipeCo did not recruit additional manpower to cover employees undergoing training and hence training sessions were often conducted during lull business periods. Though the process had been slow, super users helped increase ERP system use awareness among employees, which in turn led to reduced user resistance in the company. This convinced more end-users to “buy-in” to the system, creating a virtual cycle of growing user awareness of the business process.

In addition, super users also held regular consultations with the ERP system implementation team to discuss end-user training progress and provide end-user feedback to the ERP system implementation team, including problems and issues that end-users experienced. The input provided by the end-users was considered valuable in shaping the final business processes embedded in the ERP system. Because of increased data visibility and process brought about by the ERP system implementation, employees’ awareness of the business process and associated work flows were further enhanced. As a consequence, end-users also gained greater control over their work deliverables due to the increased functionalities (compared to the legacy system) embedded in the ERP system:

“We have made sure that we segregated every user and every role that they have as part of that so... they’ve actually got more control and more power” (SAP Business Manager)

The SAP Business Manager claimed that training and support played an extremely important role in ensuring the success of the ERP system project even though change management had not been as effective as they had hoped. What had become more significant was that, instead of experiencing staff redundancies, PipeCo increased its staff strength after the ERP implementation and was able to restructure its business operations, such as transferring some of the staff who used to work in backend support roles to customer-facing roles.

“That would have been a bit [personnel reorganisation] from SAP [implementation]... you would see the gains (personnel) in putting back into sales or some sort of business benefits” (SAP Business Manager)

Table 4.2 summarises the benefits that PipeCo’s derived from the development stage of its ERP implementation.

Table 4.2: PipeCo’s Benefits Derived from ERP Development

Benefit	Description & Supporting Evidence/Quote (Provided by PipeCo’s SAP Business Manager)
Empowerment of employee	<p>Employees were more aware of the business process and work flows associated due to the increased visibility of data and process brought about by the ERP system implementation. The training undertaken by the end-users had helped increase awareness.</p> <p><i>“They [the users] had more visibility [although] not more control because we are a U.S. based company where we are heavily governed by SOX. Sarbanes Oxley. So every step of the way, we have made sure that we segregate every user and every role that they have as part of that (law & regulation)”</i></p>

Personnel reorganisation	<p>Instead of experiencing redundancies, PipeCo had an increased number of employees after the implementation as well as organisational restructuring. Some of the staff who used to work in backend support roles had been moved to customer-facing roles.</p> <p><i>“That would have been a bit [personnel reorganisation] from SAP [implementation]... you would see the gains (personnel) in putting back into sales or some sort of business benefits”</i></p>
Increased understanding and control of business processes	<p>There was a greater awareness of the business process for employees participating in the ERP system implementation. The ERP system implementation project team had end-users gain a considerable amount of experience with the ERP system implementation. The input provided by the end-users was valuable in shaping the final business processes embedded in the ERP system. In addition, the end-users had more control over their work deliverables due to the modern functionalities embedded in the ERP system.</p> <p><i>“We have made sure that we segregated every user and every role that they have as part of that so... they’ve actually got more control and more power.”</i></p>

4.2.3 PipeCo’s ERP System Going Operational

PipeCo’s ERP system became operational in October 2006, after 24 months of development. On the day that the system went “live”, 17 other sub-sites including their manufacturing facilities and sales centre, went online simultaneously. The steering committee reckoned that a phased approach would not be beneficial for the organisation, as the lack of integration between different sites could lead to business disruptions. PipeCo thus adopted a big-bang approach for these “go-live” operations to ensure that all integrated processes between the department or units could work to share data seamlessly from one process to another.

“It was the big bang for our industrial valve business in Australia so it was confined to the business but it was something that couldn’t be done at the phase (level). We couldn’t convert half of our business because the business (units) interacts too much” (SAP Business Manager)

The ERP implementation enabled PipeCo to enjoy the benefits associated with the use of the system. These benefits, summarised in Table 4.3, led to better communication between business units and improved data quality, which resulted in common vision and goals among staff members being established and improved shared services among the department and business units. PipeCo also experienced significant increase in manufacturing productivity, improved customer service, and greater ease of integration, scalability or portability of its IT systems as a result of the ERP implementation. Further, the use of the SAP-ERP system also made it easier for PipeCo’s financial department to be compliant with the latest taxation, laws and regulations. The vendor provided updates to the software whenever major changes to the financial or industrial regulations and rules were announced.

Encouraged by the benefits of implementing the SAP-ERP system, the core of the ERP implementation team at PipeCo went on to establish an ERP system project template for all rollouts of ERP systems in the remaining Australian divisions: i) environmental; ii) irrigation; iii) pumping systems and; iv) water. The experience gained by the ERP implementation team proved to be valuable in identifying differences

between the business process, work flows and those in the SAP modules. This helped in cutting down the time spent on implementing the ERP systems in the other business divisions.

“We basically go into a (new) business (group), we put it through data analysis, looking at what’s different in the (project) template, what’s in the business and we go implement it” (SAP Business Manager)

Table 4.3 summarises the benefits that PipeCo derived during its ERP system deployment.

Table 4.3: PipeCo’s ERP Benefits Derived from ERP Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by PipeCo’s SAP Business Manager)
Better communication between business units	Business transactions were now interlinked between departments. For example, the purchase authorisation becomes automated and the person in-charge becomes notified via email whenever a purchase order is created. <i>“Let’s say creation of a purchase order. We have a DOA so delegation of authority. So basically, what happens is if things officially go over value, they’ll actually get automated an email generated to the approver”</i>
Improved data quality	Electronic records and the use of a centralised database allowed for quicker information retrieval and also faster generation of business reports. Financial and auditing processes were streamlined as a result of the ERP system use. Time taken by tax auditors has reduced by more than 30% after the implementation of the ERP system as there is less time taken to “hunt” for the relevant finance information and to generate balance statements. <i>“We are able to submit the bank statements quickly and whereas before it was a fairly laborious job.”</i>
Better reporting and auditing	Financial and auditing reporting was less time consuming. <i>“(reporting is) strictly automated and you go in there and read the reports”</i>
Establishing common vision and goals among staff members	KPI monitoring systems built into the ERP system allowed management to set targets and goals. Middle management had a clearer view of the targets determined by the senior management and likewise the operational staff was aware of the targets designed by the middle management. <i>“Primarily, because targets and goals are much more visible now via the system use”</i>
Reduction in cycle time	There was substantial evidence of decreased production time. Although PipeCo’s manufacturing plants utilises primitive machineries that were not integrated with the ERP system, the better forecasting and procurement capabilities of the ERP system allowed the manufacturing process to be leaner. There were less instances of stock out of raw supplies. Lead time can be accurately calculated leading to higher manufacturing productivity. <i>“Lead times are calculated more accurately now.”</i>
Improved productivity	The synergy between the business units contributed to PipeCo’s overall productivity. Sales employees can respond to customers’ demands and requests in a timely manner. Quotations of sales orders can be provided in real-time via the telephone using information provided through the dashboards of the ERP system. In the past, sales employees had to get back to the customer after receiving the requests. <i>“For example, our external sales guys can just interact with the quotes relatively quickly and effectively and then be focused back here in the business and back here with customer.”</i>
Improved customer service	PipeCo was able to provide its customers with clear and reliable timelines for supplies, manufacturing and delivery times. The monitoring and tracking capabilities made it easier for the employees to provide accurate information to the partners. <i>“We could actually predict that the lead time that are delivery times so the valve guys can actually see that on the system and that makes them more confidently predict when they’re doing a product.”</i>
Conformity to new taxation, laws and regulations	The use of the ERP system provided by the vendor, SAP, made it easier for PipeCo’s financial department to be compliant with the latest taxation, laws and regulations. The vendor provided updates to the software whenever there are major changes to the financial or industrial regulations and laws. Essentially, the ERP system provided a methodology of change and control. <i>“But it’s [tax reporting is] a lot easier with SAP. Ten times easier, cause SAP even provides all the audits trails for all the things you do, it’s provides the methodology of change and control. Yeah, there’s a lot of soft benefits about SAP, past the segregation of duties.”</i>
Improved shared services among the department/units	Many of elements of IT support were streamlined and centralised as a result of the ERP system implementation. The IT department initially consisted of various teams that had to support a number of legacy software. The consolidated use of the same ERP system platform resulted in a leaner IT department that is only responsible for one technological platform. This also led to better interaction among PipeCo’s business units.

"Yeah, that's definitely a bit of fuss in there. But on the whole, I would say the interaction was probably better, because everyone knew where the lines were."

Provided greater ease of integration, scalability or portability of IT systems

PipeCo's project served as an example that allows the ERP system implementation team to design a global template for the ERP system project implementation. The template was used to allow for the effective rollouts of ERP systems in 17 other sites.

"We have been porting the same system to our various businesses. In a way it has actually made things much easier"

4.2.4 Post Implementation & Further Upgrades

The SAP Business Manager highlighted that the operational ERP system immediately brought about a greater level of visibility across all the business units in PipeCo. This was associated with the database integration. However, it was not until a further six months that additional ERP system benefits became visible. As summarised in Table 4.4, these included improved individual performance and work efficiency; improved decision making and planning; greater IT flexibility for organisational changes; business growth; business innovations; extension of market reach; improved overall profit; increased business effectiveness; improved logistics management; and improved raw materials supplies.

ERP System Review

A performance review of the ERP system was undertaken after the implementation. Despite the many visible benefits outlined above, the review found that areas in operations and demand management did not achieve the benefits in the form of efficiencies anticipated. The review also found that there were still business processes not optimised after the system implementation and this led to inefficiencies in resource allocation.

The key area that was identified as underperforming was the interaction between PipeCo, its suppliers and its customers. The SAP Business Manager also revealed that PipeCo's ERP implementation did not lead to the e-commerce (business-2-business) capabilities that the manufacturing industries required. E-hubs (also known as quadrants) were used extensively in the industry to liaise with the raw materials suppliers (e.g. mining companies), but the functionalities were lacking in PipeCo's ERP capabilities.

An upgrade to a newer version of SAP ECC 6.0 was planned within the next 12 months (at the time of interview). The newer version of the ERP system software would provide greater compatibility and more integration among the departments and business units, especially with information flows and exchange. The upgrade will also help to optimise the inefficient areas identified in the post-implementation review. The ERP system implementation team would be using this opportunity to also redesign and optimise the problem areas.

"To be honest, we still have a distance [until we reach] what we call optimisation, which we see as areas that we can improve the business" (SAP Business Manager)

Table 4.4 summarises the benefits that PipeCo derived in its later post implementation stage.

Table 4.4: PipeCo's ERP Benefits Derived from Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by PipeCo's SAP Business Manager)
Improved individual performance / efficiency	<p>Many laborious tasks were more efficient and less hours were required for completing jobs. Middle management was extremely happy with the reporting and analytical tools built into the ERP system.</p> <p><i>"There is a need to push a proven system capable to introducing the auditing controls to all the businesses [to improve the individual efficiency]."</i></p>
Improved decision making and planning	<p>PipeCo's top and middle management had a clear overview of businesses and are more informed. Information from the timely reports generated allows management to make more relevant decisions and forecasting.</p> <p><i>"Planning decisions for the procurement of our raw mats is much easier now."</i></p>
IT flexibility for organisational changes	<p>The ERP system, although did not facilitate major organisational changes during its implementation, provided the company with the flexibility to be more agile.</p> <p><i>"So that (organisational) probably hasn't changed a great deal. What it's given us is that we have the flexibility to change a business process and change the way we do businesses internally and externally"</i></p>
Business growth	<p>The ERP system provided scalability and a common platform that can be rolled out to the other business groups easily and hence provides a capability for the organisation to grow in terms of increasing customer base.</p> <p><i>"We are able to grow faster but in terms of you know, growing you know, on one platform across the whole business. Previously we were unable to put across our legacy system into other businesses because it's just didn't have the capability of doing that"</i></p>
Business innovations	<p>The ERP system implementation created awareness of other potential benefits that can be exploited. It also provided a defined framework for improving business processes. Instead of focusing on only manufacturing, PipeCo started to launch new products and that was considered not possible previously.</p> <p><i>"We manufacture, we sell it, we service it. And we also now project manage the implementation of those products. So we can revise in doing service and have visibility of things. That whole value changes."</i></p>
Extension of market reach	<p>The added functionalities embedded in the ERP system allow the executives to identify new markets and services and hence increasing market reach. A consolidated customer view allowed the executives to offer "packages" of products and services and increased their market share.</p> <p><i>"And with something that we can market, we've now grown our business to actually concentrate on two parts about in doing service. We manufacture it [product], we sell it, we service it"</i></p>
Improved overall profit	<p>There has been evidence of revenues/profits increment after the implementation of the ERP system. Although exact figures were confidential, the SAP Business Manager attributed this to the functionalities of the ERP system by identifying new customers and providing better service in the form of aggregated products and services.</p> <p><i>"Now we're gaining the first month that we sold some big sales, attributed to SAP. And then every month after that, every year after that, we've increased slightly."</i></p>
Allowed the organisation to do business more effectively	<p>There were many instances whereby the ERP system use had led to a more efficient business model for PipeCo. The automation, electronic records, centralised database led to less paperwork and a cut in hours in administrative related processes in particular customer service.</p> <p><i>"[We spend] less time on certain business processes. Getting back to customers is really faster now with SAP"</i></p>
Improved logistics management	<p>The warehousing module embedded in the ERP system provided visibility of stock levels. Raw materials, Maintenance, Repair & Operations (MRO) related materials and finished products can be easily located. This also led to a better storage space utilisation and less wastage.</p> <p><i>"There was [better] logistic control, yes, and visibility of stock levels and SKUs."</i></p>
Improved SCM for raw materials from suppliers	<p>Key suppliers and vendors were provided with demand schedule generated by the ERP system to enable them to provide timely amount of supplies required by PipeCo's manufacturing facilities.</p> <p><i>"We do actually give some of our chief vendors, and certainly those from overseas, our schedule. So when we forecast the demand then they can make that and supply to that demand."</i></p>

Experience with Multiple Deployments

The SAP Business Manager also mentioned that his ERP implementation team were still in the midst of rolling out SAP systems for the other business divisions. The Environmental, Pumping Systems and Irrigation groups were still running on their proprietary legacy systems and need to be converted to SAP software. Therefore, the planned upgrade in PipeCo had to be put on hold until all other business divisions have started running the same ERP software. The need for standardised databases among the business groups was considered crucial for ensuring a successful upgrade:

“Well the other problem is that we have small businesses within our group that are still running legacy systems. So, we are still converting them. In two weeks’ time, we’ve got another go-live of 200 users in 21 sites. It’s in Australia” (SAP Business Manager)

PipeCo had since upgraded to ECC version 6.0 and was planning to leverage on the latest functionalities of version 6.0 to extend its e-business capabilities with its key partners. The planned upgrade would also enable e-business capabilities in the long term. Discussion and planning has started to integrate the current ERP system that PipeCo uses to external e-hubs/e-portals so that it can more efficiently and effectively communicate with their suppliers from the mining industry as well as their customers. Their key suppliers were invited to participate in this project upgrade initiative and to create a common information exchange platform. However, the manager stated that it would be some time before integration and e-business links can be established with their key suppliers.

PipeCo’s US-parent company also operated a number of regional offices in different parts of the world. At the time of the interview, the regional offices were also implementing their own ERP systems and had to undergo significant organisational change. The manager considers PipeCo’s ERP implementation a success model that helped justified and pave the way for all future ERP investments in Australia. PipeCo’s success story was used to champion the causes for other business divisions. The implementation methodology and template that PipeCo deployed to implement its ERP system had been also utilised in the rollouts of other sites. Likewise, PipeCo’s European counterpart was also running a trial with its own implementation template. The American office is also planning to migrate to SAP’s ERP system and abandoning its legacy systems.

Regional offices in other parts of the world had heavily localised operations that catered to the local market. As a result, regional offices share accounts and data structures but have different business processes. The US-parent company has intentions to consolidate the different ERP system templates into one global template.

“So it comes to a point when we, say four or five years’ time, we are going to have to try to consolidate all those regions into one global template. It’s going to be a difficult challenge. We pretty much created our own problem” (SAP Business Manager)

4.2.5 PipeCo Summary

PipeCo's existing legacy system was becoming increasingly difficult to maintain and could no longer keep up with the division's current business operations. It was experiencing business growth and the legacy system would not support the growth. Communication with the other divisions was troublesome as each division had its own legacy system and they were not compatible with each other. There was also the need to have proper auditing and accounting, which was enforced on PipeCo by its parent company.

The ERP project for PipeCo had a precarious start as change management was not managed well. Many end-users perceived the ERP implementation as a senior management driven initiative with limited feedback. Using external consultants for the project further exacerbated the situation. The situation improved only when the steering committee decided to replace the external consultants with internal ones. It helped alleviate the high user resistance that the implementation team was experiencing. The change management and training program, supported by super-users, which the implementation team came up with, ultimately regained control of the ERP implementation.

In the most recent performance review, the ERP system was found to be under-used, with many ERP capabilities not exploited to further deliver business benefits for the organisation. Likewise, there were many technical areas where the system workflows and processes could be further streamlined. There would be a planned version upgrade for the ERP system in the next 12 months. PipeCo believed that the upgrade would provide the optimisation it needed for the areas which were found to be inefficient.

4.3 EnviCo

EnviCo was a proprietary company that offered a full range of services in the fields of waste and recycling management solutions, energy solutions and transport services. The ownership was French and the parent company was listed in Euronext Paris Stock Exchange as well as the New York Stock Exchange.

Globally, its French-parent company generated annual revenue exceeding EUR29 billion. Within Australia, EnviCo generated approximately AUD1 billion annual revenue in 2015. Headquartered in Sydney, EnviCo had operated in Australia and New Zealand for more than 40 years and had over 3,800 employees (including contractors). It operated in more than 150 locations in Australia and serviced a clientele base consisting of the heavy industries, retailers, commercial business and government. EnviCo's French-parent company controlled three other business divisions in Australia and New Zealand:

1. Water – Provided innovative water solutions for municipal and industrial customers
2. Energy – Provided heating, ventilating and air conditioning solutions to retail, commercial and industrial customers
3. Transport – Provided train, bus, ferry, light rail and monorail transport services

EnviCo was the world second largest waste management service company that collected, treated and recycled waste on behalf of companies and local authorities e.g. town councils. It specialised in the management, treatment and disposal of solid and liquid waste. It handled both hazardous and non-hazardous waste, with the goal to reduce pollutants in the waste, so that its environmental effects were lessened. The company also managed recycling, reclamation and re-use of waste products.

EnviCo aimed to provide a fully integrated waste and recycling solution to its clients, by offering “one-stop” solutions for waste management that were catered specially for their clients' operations and waste requirements. EnviCo's “one-stop” solutions included resource recovery (recycling), which helped to improve recycling processes in the recovery of materials and resources for its clients. EnviCo operated several resource recovery facilities across Australia. EnviCo's operations were divided in five business groups (illustrated in Figure 4.2):

- **Industrial Services** offered facilities management, industrial cleaning, refractory management, waste and resource management (including hazardous materials) and protective coatings;
- **Commercial Services** provided comprehensive waste management services including collection, recycling and processing as well as full facilities management services. This included venue management services from pre-event preparation, waste management during the event and post-event clean-up.

- **Residential Services** provided local governments and councils with residential waste and recycling collection services. The company also offered private bin hire for construction and renovation waste.
- **Specialty Services** offered emergency response, soil remediation, special waste (including hazardous materials such as asbestos and clinical waste), event services and laboratory services for waste identification.
- **Recycling Services** provided specialised resource recovery facilities that included composting, materials recovery, construction waste, electronic waste, bioreactors and alternative waste processing facilities.

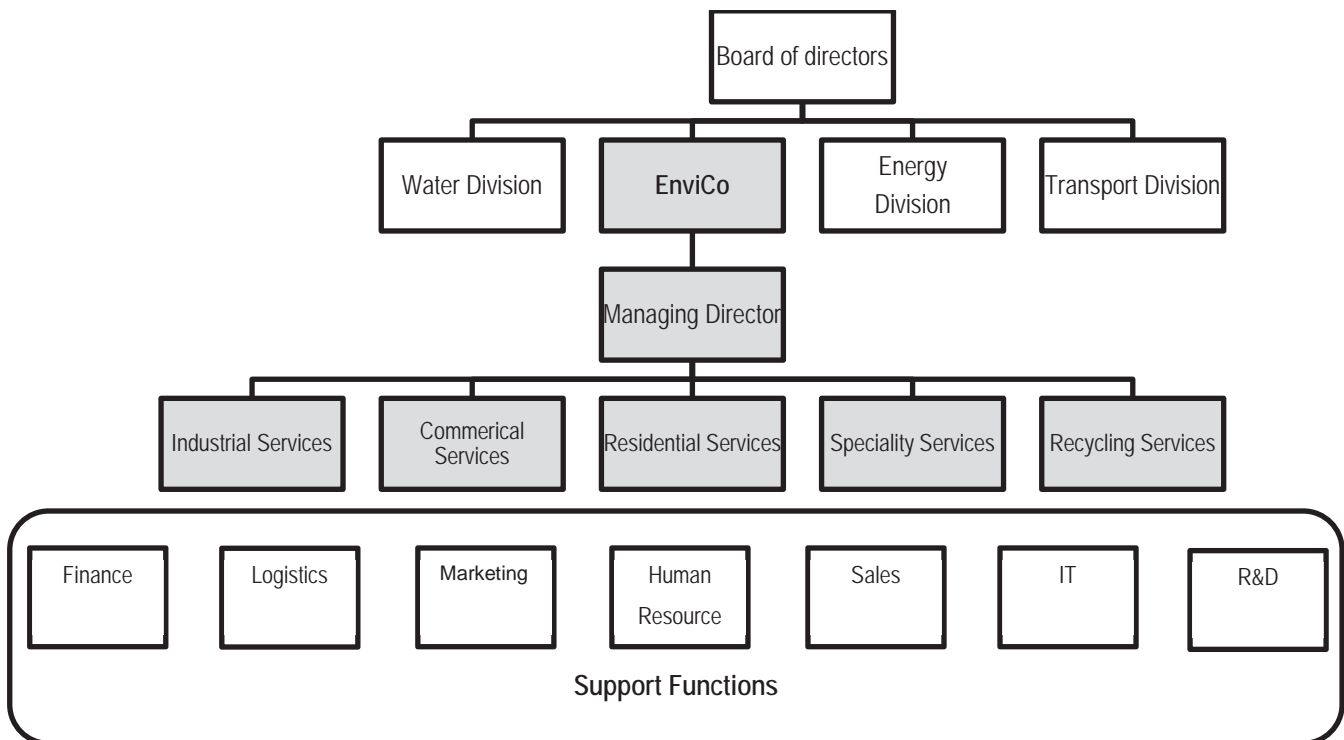


Figure 4.2: EnviCo's Organisational Chart

EnviCo outsourced most of its IT services to third-party IT companies. HCL Technologies was the primary vendor that provided Level 2 and Level 3 support for its waste and recycling software applications. The Business Improvement Manager (ERP System Manager) involved in the interview, explained the high degree of outsourcing was due to the lack of in-house expertise and it was more cost-effective. The IT vendor, HCL Technologies, had the necessary IT expertise to help them deliver their IT requirements readily.

“And we use a number of different companies, sort of have particular expertise. So you know, there’s one that seems to be the best that SAP HRM and we just use it.” (Business Improvement Manager)

EnviCo also used subcontract arrangements to service customers in regional areas of New South Wales (NSW). These customers included medical facilities, town councils and corporations, as it did not have the necessary transportation and logistics networks in these areas.

4.3.1 EnviCo's Reasons for ERP Implementation

Prior to the ERP implementation, EnviCo was using an American-built proprietary software called RMS (Refuse Management System), which was installed 14 years ago. The senior management had asked the IT department to conduct an ERP system feasibility study as the existing legacy systems would not be able to support the growing IT requirements to meet future business needs. The study also found that extending the capabilities was not viable as it was difficult to find the appropriate vendors and expertise required to support the legacy platforms. The feasibility study led to the senior management concluding that the RMS had outlived its usefulness.

"The legacy systems, we just felt, you know, 14 years they've been used in this company and they, in the end, when we installed them, we've thought getting seven years out of it so we thought 14 was a very good result." (Business Improvement Manager)

Two other reasons given by the Business Improvement Manager included:

1. **Lack of system integration** – The existing legacy systems utilised by the EnviCo corporate office and state offices were decentralised, which made consolidation of information laborious. With a centralised ERP system, the management believed that the company would be able to grow further from the benefits of integration.

"The legacy system separate database by state and variations in how the database was used and how the system was used by the state." (Business Improvement Manager)

2. **IT maintenance and support** – It was becoming challenging for EnviCo to find the necessary expertise to support and maintain their legacy systems, whereas the ERP system platform provided by the selected ERP system vendor allowed EnviCo the flexibility of choosing the implementation partner. There was also readily available SAP technology expertise (human resources) in the open market for EnviCo to recruit or outsource the implementation to.

"While there's still plenty of skills out there for the legacy system, but it was old enough that no one would put it on their C.V. anymore. So even if people could do it, [they] weren't interested in doing it." (Business Improvement Manager)

4.3.2 EnviCo's ERP Project

EnviCo's Managing Director was the main sponsor for the ERP system implementation project. The technology platform selected for this project was SAP and the version was Enterprise Core Components (ECC) 4.6. After a tendering process, HCL Technologies was selected to be EnviCo's implementation vendor. The original implementation required three SAP modules to be implemented:

1. Plant Maintenance (PM)
2. Sales & Distribution (SD)
3. Human Resources (HR)

The total cost of the ERP system implementation was estimated at approximately AUD27 million. However, the manager was unable to recall the exact breakdown of the implementation costs.

The implementation team consisting of mainly HCL Technologies employees numbered approximately 20 members at the peak of the project implementation. Besides the HCL implementation team, EnviCo also employed a team of in-house developers who worked on support related tasks, such as third-party applications. It was estimated that close to 80% of the development work was conducted on site by members of the HCL implementation team, which included functional and technical consultants and developers. EnviCo offshored the data migration and conversation work in the late stages of the system implementation to save costs.

From a project coordination perspective, EnviCo's Business Improvement Manager and the HCL team's Project Manager reported to the committee headed by the CIO and CFO. The CIO was primarily responsible for the allocation of project resources and ensuring that deliverables were timely, whereas the CFO monitored the allocation of project costs. Senior managers from other business units were asked to actively participate in the early discussions to ensure that all user requirements and interests were adequately scoped and met during the implementation.

The original system implementation at the corporate head office in Sydney that went live in 2000 had opted for a big-bang approach. It was considered a clean slate implementation as the system did not have any dependencies with the existing legacy systems. However, in subsequent rollouts across the different sites, facilities and states offices, a phased approach was used. The phased approach for all non-corporate head office installations was preferred because businesses in the other states or sites were highly decentralised. The implementation of ERP system in one state region did not have an impact on other state offices. The phase approach allowed the implementation team to focus on the installation of ERP system within a state at any one time.

One of the challenges which the implementation team encountered during the implementation stages, was that some state offices still required some of the legacy system functionalities, especially the

operational systems. This made integrating the legacy system database into the SAP database difficult. The decision was made to run a parallel implementation i.e. the legacy system and ERP system running side by side to prevent any instability within the business operations.

“Every state runs their own show. It’s a good degree of delegation. So instead of the business structure, go by state firstly. Second thing, the legacy system separate database by state and variations in how the database was used and how the system was used by the state.” (Business Improvement Manager)

During the scoping of the project requirements, it was found that the transport management system (vehicle dispatch) was inadequate for EnviCo’s business requirements. To overcome the shortcoming of the SAP platform, the management decided that the company needed to develop its own customised solutions for dispatching vehicles.

The need for third-party applications (e.g. the dispatch system) reinforced the decision to use a phased approach for the non-head office installations. In some facilities, the ERP system functionalities were not able to fully support the business needs and hence customised solutions were developed and integrated with the ERP system.

There was also a requirement to ensure that the data linkages between the ERP system and third-party applications were properly established. However, the third-party applications that were developed for EnviCo also changed the ERP system platform design at the business process and technological infrastructure level. The phased approach allowed the implementation team to test and ensure the individual ERP system rollouts at the state offices and sites were functional before continuing to another rollout.

Change Management

There was strong evidence that change management was carried out well. The implementation team made it a priority to understand the business impacts of the ERP implementation on all stakeholders. Analysis of the organisational change was done in consultations with the end users. The Business Improvement Manager mentioned that overcoming user resistance was a matter of instilling confidence in them.

“Our approach was to get people to, actually confident in the business to work with the people in the business, to work with people in the business” (Business Improvement Manager)

There was also heavy involvement by the management of the state offices to ensure that there was sufficient end-user “buy-in” to the ERP system implementation.

“In terms of getting management to buy in what we had, good buy in at all stages, to actually implementing any stake, you had to get the local state management team on board.” (Business Improvement Manager)

Previously, EnviCo’s businesses in all states were decentralised and largely delegated to the management of the state offices. The senior management understood that the implementation of the ERP system would require the business units and state offices to properly mitigate the impact on the users. The business processes embedded in the SAP ERP system were rigid and business units could not implement the ERP system without undergoing major business changes.

Key end users were selected from various business units and state offices to provide input to the business changes. The implementation team consulted these key users on how the newly designed business processes might impact the various employees and their job scopes. Instructions were relayed to the local management team to drive their respective change management after the impacts and risk to the business had been analysed and understood.

“If you work in the logistics department, how is their life going to change? If you were in the resource recovery, how is their life going to change? If you were a sales person, how is their life going to change?” (Business Improvement Manager)

To avoid disruptions to the end users in their job scopes after the implementation of the ERP system, the implementation team endeavoured to inform them in advance of changes which would be made. Once the ERP system had been fully implemented, the end users were next involved in the design of third-party applications to streamline the existing business processes. Their involvement was highly important to the implementation team as they would assist with the creation of new business processes, which were “owned” by them. At the same time, the implementation team wanted to ensure that the end users would use the new ERP system and its processes after it had gone live, as it was found that they had not been using the legacy systems in the past and had resorted to manual processes instead.

“Half of the challenge in implementing there was to get them off the manual procedures to actually use the system. We’ve had the legacy system they actually weren’t using. They were just typing and billing at the end of the business process so they weren’t actually using any of the business process at all.” (Business Improvement Manager)

Training & Support

The resources allocated for the training were determined by the Business Improvement Manager. The training of the users was carried out by EnviCo’s IT department personnel with assistance from the implementation partner, HCL. A training team consisting of 12 IT staff members was created.

Occasionally key users who were found to be training-centric would be recruited to provide additional support for the training programs.

“We found someone who’s a key user in Tasmania who loved to do training. She’s now a national waste and recycling training person in the IT team. So we picked her up.” (Business Improvement Manager)

HCL also provided specialised trainers for the third-party applications that were created along with the ERP system implementation.

“We made the implementation of the on-board solution almost just a “put-the-computers-on-trucks-training-drivers trainer” (Business Improvement Manager)

EnviCo’s management placed huge importance on user training for the ERP system implementation. Training sessions were conducted during office hours over two to three weeks in a classroom-based environment. End-users were required to practice daily for an hour after their training programs had ended. The intensive training and practice sessions were created to ensure that every end-user knew how to handle customer data from the moment they had transitioned to the newly implemented ERP system without the need to revise or revisit the instructional manuals.

“Practice is really important in our change management approach. Training was finished two to three weeks before go-live and then people had to come and practise daily, so maybe an hour a day.” (Business Improvement Manager)

Actual customer cases and data were used for the training and practice sessions so that the end-users would be able to experience the actual tasks to be performed in processing customers in the new ERP system. At the same time, the use of real data in the training sessions allowed the end-users to identify any potential errors or exceptions that the implementation team failed to address in the ERP system.

The primary (Level 1) ERP system support was provided by EnviCo’s IT department. As part of the contractual agreement with HCL, issues that were beyond the scope of EnviCo’s IT support would be referred to HCL for resolution. HCL provided a team of four IT personnel who were based in EnviCo’s IT department to support (complicated) issues that had been escalated to Level 2 (troubleshooting) or Level 3 (advanced troubleshooting).

Table 4.5 summarises the benefits that EnviCo derived from the development stage of its ERP implementation.

Table 4.5: EnviCo’s ERP Benefits Derived from Project Development

Benefit	Description & Supporting Evidence/Quote (Provided by EnviCo’s Business Improvement Manager)
Personnel reorganisation	There was reorganisation of personnel in the organisation. Employees that demonstrated ability to understand the newly designed ERP system business processes were retrained to be site champions. <i>“If someone leaves in another department, let’s take this person who knows the business, has got a good attitude, good work ethic and we’ll train them into other positions.”</i>
Business innovations	The ERP implementation indirectly led to purchase creation of highly customised third-party solutions that were specific to their business operations. <i>“We don’t need to have a really good dispatch portal in SAP and there are (third-party) portals available (for us to customise and integrate)”</i>

4.3.3 EnviCo’s ERP System Going Operational

EnviCo’s ERP system implementation commenced in 2000 and took three years and three months to complete. The system went live in April 2001 and included a version upgrade to ECC 4.72. At the time of go-live, the system was only adopted by EnviCo’s corporate office. EnviCo’s Industrial Services’ ERP system adoption went live at a later stage in 2004. Waste and Recycling Services’ ERP adoption commenced in November 2007 and was completed in May 2009. The Waste and Recycling adoption underwent six go-lives in 18 months.



Figure 4.3: ERP System Implementation Stages at EnviCo

Experience with Multiple ERP Implementations

The original implementation in 2000 had enabled the implementation team to better understand the implications of the installation. It allowed the team to better manage the future implementations at other sites. The phased approach had allowed the implementation team to constantly review the requirements for the later implementations. The initial implementation at the corporate office served as a learning opportunity for both the implementation team and senior management. The experience gained led to the creation of more efficient and streamlined processes, which were not part of the initial planning e.g. the finance-control module within the system was found to be heavily under-utilised.

“For instance, we changed FI-CO resources halfway through the project, the basic is we found out after the first go-live, finance wasn’t utilised at all in all the waste and recycling.” (Business Improvement Manager)

The increased knowledge was recognised as a vital element in assisting the implementation team in getting the requirements correct and enabling the end-users to use the ERP system well. The implementation team understood that many members in the team were technical system developers and lacked the knowledge in business processes, especially regarding recycling and waste management. Insights and feedback from the end-users on existing processes were crucial in the identification of bottlenecks and inefficiencies within the ERP platform.

“They’re [developers who are] very strong technically but haven’t been business users at any significant part of their career. They got to try and perceive what it’s like for these persons to work here in their day to day job.” (Business Improvement Manager)

Likewise, EnviCo’s ERP internal support team and end-users needed to understand how the newly designed business processes would affect them in their job scopes. The Business Improvement Manager had also discussed about the importance of knowledge exchange between the implementation team, the support team and the end-users. It was seen as essential for the facilitation of an effective ERP system to support the organisation.

Continuous Improvements of ERP System

One outcome from the phased approach used at the different offices and sites was the sequential continuous improvement of business processes in newer installations of the ERP system. Lessons learnt from the previous ERP system installations were quickly incorporated into the next installation project. Functionality requirements for the newer ERP system installations were constantly changing due to the knowledge brought about by the earlier installations. Later ERP system installations had more refined requirements incorporated, especially for niche customers.

“And finally we found that, as we have went (implemented ERP system) through each state, we analysed their business and their data, specifically with them (for their own requirements), they all come with new requirements. Things they’ve never told us about and all about up front analytical blueprints in sections” (Business Improvement Manager)

EnviCo’s ERP support team was constantly engaging with HCL to improve the planned business processes. Through the learning from earlier ERP system implementations, the top management was also proactive in identifying areas for improvement.

“You know we’ve get regular suggestions from business sort of on the whole.” (Business Improvement Manager)

The finance module that EnviCo implemented for the head office did not align with their waste and recycling business processes. The CEO personally put in recommendations for improvements to be made to the finance area using the newly implemented ERP system by reshuffling personnel and subject matter experts to assist with the design of the business processes. This enabled knowledge of existing best practices to be incorporated into the ERP system design.

“CEO once recommended this (reorganisation of experts) could be done and you know, making it (the process) happen appropriately (would be) in getting knowledge transferred” (Business Improvement Manager)

ERP System Performance Monitoring

Given that it was the first time EnviCo adopted the use of SAP’s ERP system, the steering committee for the ERP system implementation tasked the Business Improvement Manager and his team to review and evaluate the ERP system implementation and performance improvements after the ERP system went live. The review process involved identifying and highlighting to the steering committee the business improvements brought about by the use of the ERP system in EnviCo. A cost benefit analysis was carried out by the Business Improvement Manager in the business areas that were supposedly to be improved by the adoption of the ERP system.

The review exercise gave the Business Improvement Manager and his team an opportunity to determine areas that had already provided EnviCo with a return on investment as well as areas that had yet to deliver benefits. The ERP system support team would reassess areas that failed to deliver benefits and further action would be taken to optimise the ERP system use and to educate users to utilise the ERP system tools more effectively.

“I spent two days in one particular department here in Sydney, looking at how it works and showing how it could work smarter” (Business Improvement Manager)

Table 4.6 summarises the benefits that EnviCo Australia derived during its ERP system deployment.

Table 4.6: EnviCo’s ERP Benefits Derived from ERP Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by EnviCo’s Business Improvement Manager)
Empowerment of employee	<p>Drivers for the collection trucks were able to receive bin collection job requests electronically via the on-board system in the truck, which was linked to the ERP system. There was no need to manually call back to the office to check for job requests and to have to write down the job request details while on the move. This enabled the drivers to prioritise their jobs and to service the customers in a prioritised manner.</p> <p><i>“We don’t want our driver to look at the screen if he’s driving. When he’s driving, the screen goes blank. The</i></p>

	<p><i>job comes in, it reads it to him verbally. And that's great. He doesn't have to try and find time to write all those stuff down. He doesn't need that grief. So, the drivers are really enabled by this and there's a lot of operation alerts and stuff in there for them as well."</i></p>
Establishing common vision and goals among staff members	<p>The ERP system had enabled employees to have transparency in their customer service operations. Information regarding the bin collection jobs was readily available to the staff, which allowed them to be aware of the progress of the jobs.</p> <p><i>"they (employees) were aware is that (customer) service (level) is up to, it's made a big difference... which is a huge sort of financial benefit. But because there's this transparency, there's almost an accountability (for the employees to perform)"</i></p>
Improved communication among employees	<p>Communication between the collection truck drivers and logistics staff had been improved with the ERP system and the on-board system that was linked to it.</p> <p><i>"Logistics staff want everyone to know something, I can just type the message, hit the dispatch button, it will just dispatch the message, read it onto all the drivers, leave it on screen until they acknowledge it."</i></p>
Better communication among business units	<p>Sales and CRM became shared services which enabled EnviCo to share customers across the states in Australia. There was no need to keep a separate customer account in each state now.</p> <p><i>"There used to be every state was assigned one (database). There was no share of customers, in the sense to share the information systems... But now you can have one head account which everyone uses nationally in the on-board to bill into whatever they want, if that's what the customer was never told to agree."</i></p>
Improved quality of work life	<p>There was less paperwork for the collection truck drivers and operators to handle. The job role for the logistics staff had also changed. There was no longer the need to spend time liaising with the collection truck drivers for bin collection requests. They could focus their time on reviewing the service provided by the drivers and looking on ways to improve it.</p> <p><i>"The logistics people's role also changed noticeably. But not so much reorganised into new positions, but where they spend their time, it's changed. They used to spend a lot of time trying to get information out through the two-way radio, so the customer could get service, now they're actually more in the position to review how the service was provided and look at deficiency outcomes they came to and the customer service outcomes they came on to. Look at how to do it better, not just trying to do it, they're actually trying to think about how to do it then."</i></p>
Improved individual performance / efficiency	<p>The collection truck drivers used to need to spend time putting in the paperwork for the bin collection jobs they had done for the day's work. Some drivers used to have difficulties with the paperwork. Now with the on-board system that is linked to the ERP system, the drivers were able to file the completion of each job online as they collected the bins.</p> <p><i>"The best example is the confirmation process where previously we had multitudes of issues. One is the truck driver didn't know what to fill in the paperwork as he went. So he gets to the end of the day and goes about doing paperwork. But now he can put the bins as he goes, so it's better in accuracy. Because it helps see the next job on TV's the current one."</i></p>
Business innovations	<p>The ERP system had allowed EnviCo to adopt common "best practises" across the operations of each state in Australia.</p> <p><i>"We've been driven clearly about which one we call the best practice in an area and then as we implement each state, we try to get them to do that process that way."</i></p>
External linkages to other organisations	<p>The ERP system's integration with financial institutions enabled EnviCo to process various types of electronic payments like phone banking payments, internet banking payments and in-store payments.</p> <p><i>"We are integrating with the bank, so that we can make credit card payment over phone, direct online, at any depot."</i></p>
Improved customer service	<p>The estimated time of arrivals (ETAs) for the collection trucks were timelier.</p> <p><i>"We still get a reasonable amount of phone calls about ETAs before, estimated time of arrival... Because they're really smooth now. If something's going wrong in an area, it comes obvious very quickly, so we know if a driver's broke down or there's been a vehicle accident somewhere."</i></p>
Business learning within the organisations	<p>The ERP learning that occurred from the accumulation of experience gained by the ERP system implementation team allowed the team to implement and install subsequent ERP systems more efficiently in other sites.</p> <p><i>"People who were involved in the go-live probably learnt a lot and at each stage had its own implementation and then with the project team joining them for that period at that stage they developed some expertise in that"</i></p>
Standardised user interface	<p>There was an ERP standardised user interface across the whole company. Employees in different job roles, like the call centres, sales and operations, were able to obtain all customer information from a single interface. Previously, employees had to switch between different interfaces to obtain different information on customers.</p> <p><i>"We did a lot of work on customer interactions on the screen and the people that are doing customer based activities, call centre, sales and operational activities, they tend to all work from that one screen and they like that because in the legacy system, it's actually two different fronts and interfaces. And in this part of the service, you got to go into this screen and if you get into this part of service, you got to go to other screen and actually have to find out what kind of service that works before they can do the customer's work in the old system. Now they find the customer and they can get all the services from the one (interface)."</i></p>

Improved data quality	<p>There was a massive increase in the quantity of data provided by the ERP system, which allowed EnviCo to perform data cleansing to obtain better quality in the data. This improved the information on the tracking of collection trucks, collection confirmations and credit notes.</p> <p><i>"The first thing I would say is as part of the implementation, we did a lot of data cleaning. In our legacy system, the actual fact, the quality of data improved dramatically even before we went live"</i></p>
Increased understanding and control of processes	<p>The ERP system had enabled better control of processes across departments and states, where it was not possible in the past with the old legacy systems. It had allowed for Sarbanes Oxley (SOX) compliance. With the old legacy systems, the credit note approval process used to require manual paperwork processing. It was now possible to process the approval of credit notes in the ERP system and the ERP system would be able to provide audit information on it.</p> <p><i>"You can look at any credit note and see who approved it. In actual fact, it's hard to know why're your auditing it, because if I don't release it, it can't be processed. So it's sort of the audit is not a standard audit, it's a control process audit"</i></p>
Improved shared services among departments / units	<p>EnviCo had implemented the CRM unit as a centralised shared service across the states in Australia.</p> <p><i>"We did implement within states more centralised and shared service department, so it's in the customer creation area. The customer's been centralised, which has never been centralised before."</i></p>
Better reporting and auditing	<p>The ERP system had allowed for SOX compliance and it was now possible to obtain audit information for the credit note approval process. The revenue cycle used to be documented on paper, but its information could now be accessed in the ERP system, as the collection trucks were linked to the ERP system and payments could be processed immediately now. Audit information was easily accessible in the ERP system. Customer reporting had also improved.</p> <p><i>"That's change (after the ERP system implementation), it's a lot more auditable now, because you know the data's out of the trail. Before (the implementation) it's all about paper."</i></p>
Reduction cost in operations	<p>The ERP system had brought about reductions in costs in logistics for EnviCo. There was also substantial savings from the automation of paperwork and document processing.</p> <p><i>"For instance, so here's a truck driver, here's your run sheet, go and do all these jobs, might be a hundred jobs on there at the end of the day, bring it back in and someone would type in at the end of the day, type in one bin, two bins whatever... With the on-board system, the drivers put in one bin straight in, you're not going to need people in the office to do this anymore"</i></p>
Reduction in cycle time	<p>The waste collection cycle times for the collection trucks had been reduced by approximately 25%. The financial reporting cycle times had also been substantially reduced.</p> <p><i>"They've actually got all that (process) automated, we're effectively recording on tape for, we're hoping to get it down by day. 25% reduction"</i></p>
Improved overall productivity	<p>Productivity was increased for the logistics management in EnviCo. The collection trucks were now able to perform a higher number of bin collections in the same amount of collection time.</p> <p><i>"The administration and revenue cycle improved dramatically as well. They're the main (productivity related) ones for now"</i></p>
Improved product and service quality	<p>The bin collection service had been timely and customer enquiries were promptly handled. EnviCo was able to send out collection trucks upon the customers' requests for bin collections within a short time, providing the customers with fast and efficient service.</p> <p><i>"You've seen in more manual detail what's going on like (with SAP), if your goal is to deliver a 3-hour service to construction customers. It's never a record of exactly when the customer calls (before SAP). Because someone put it in SAP, you get a call and they got a record of it exactly when the truck did the service"</i></p>
Improved logistics management	<p>Allocation of trucks and resources to customer requirements became more accurate. There was less wastage of resources through the control of ERP system. Logistics department employees had identified bottlenecks and addressed deficiencies in their logistics process more effectively.</p> <p><i>"It's definitely less paperwork. The logistics people's role also changed noticeably... where they spend their time, it's changed. They used to spend a lot of time trying to get information out through the two-way radio, so the customer could get service, now they're actually more in the position to review how the service was provided and look at deficiency outcomes they came to and the customer service outcomes"</i></p>

There were also unplanned ERP system benefits that came out of the ERP system implementation. These benefits were a result of a better understanding of the ERP system capabilities through the increased knowledge from multiple implementations and also from the learning and knowledge transfer between the vendor and EnviCo's employees. As the ERP system implementation team gained experience with more ERP system project installations, subsequent rollouts were quicker and

management of the installations were more efficient. The increase in experience also enabled the ERP system implementation team to come up with better solutions for their logistics, truck fleet management and customer relationship management.

Two separate solutions were innovated due to the availability of information provided by the ERP system. EnviCo utilised the database of its ERP system to create a web/telephone front-end for its customers to track their jobs. Another example of a benefit that was not anticipated was the implementation of a third-party application (on-board) for all the trucks operated by EnviCo to allow for real-time tracking and relay of customers' and tasks' information. The initial ERP system implementation project planning requirements did not consider the need for third-party applications to further enhance their capability. However, the implementation of the ERP system itself gave EnviCo the opportunity to capitalise on the information that had been centralised and consolidated and to use the information to improve their business.

“The actual fact, the quality of data improved dramatically even before we went live” (Business Improvement Manager)

There was also improved authorisation and auditing control as a result of ERP system use. The lead time for approval had shortened and employees' productivity had increased.

“the process of approval credit note for instance, in the legacy system, to approval in that type of system, the guy that orders it had to go and order the paper trail in business. SAP whenever you use that instance in the system, you can order it, whether or not this credit note is approved by the local manager.” (Business Improvement Manager)

4.3.4 Post Implementation & Further Upgrades

EnviCo's ERP system implementation project officially concluded in June 2009, with all sites that were planned having their ERP system operational by this date. After the last go-live in 2009, all sites underwent a version upgrade from 4.6 to 4.72 to improve compatibility and there were further improvements made to functionalities during 2010 to 2011. Given that the ERP system platform installed in all the sites had become a critical component in the business, the ERP system team is finding it problematic to find time to upgrade the system without disrupting the daily business operations. This explained for the long delay in the version upgrading efforts.

Post-implementation review of the ERP system showed that the recycling and waste management business processes were found to be not efficiently handled by the ERP system. There was a misalignment between the ERP system workflows and the business processes utilised by the recycling and waste management. As a result, an investigation was carried out by the implementation team to find

where the problems were and to resolve them. The implementation team spent close to a year post-implementation attempting to optimise the usage of the ERP system.

“A lot of that happened during the project, could be after 18 months of go-live. I’ll probably spend optimisations tweaking, call it what you will, that was exactly done during that period. The project team that we have around was not solely around implementation in that period. There were still a lot of improving solutions at that time” (Business Improvement Manager)

At the time of the interview in 2011, the Business Improvement Manager had stated that there was a planned version upgrade to the latest version ECC 6.0 within the next few months. There was also discussion among the senior management to implement business intelligence capabilities via the installation of the SAP’s Business Warehouse (BW) module.

Table 4.7 summarises the benefits that EnviCo derived in its later post implementation stage.

Table 4.7: EnviCo’s ERP Benefits Derived from Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by EnviCo’s Business Improvement Manager)
Business growth	The ERP system had enabled the identification and acquisitions of new customers. It also provided EnviCo with logistical knowledge of its customers, both existing and new, which allowed for the ability to send out collection trucks in a disciplined approach. <i>“We also have more activities in there around sales leads and sales opportunities and again... making sure that everything is followed up, the more you would convert”</i>
New business alliances / partnerships	Partnerships were now easily established as the ERP system provided a similar format of data that could be utilised by EnviCo’s business partners to enable data consistency. <i>“We do business at all states and previously with the database, it’s fragmented by state. There was actually a lot of effort from both sides (between partners) in order to get the other consistent reporting, mainly around the environmental outcomes, how much waste went to landfill, how much waste went to recycling... and (this) has been identified to have beneficial use found (to establish new partnerships)”</i>
Provided greater ease of integration, scalability or portability of IT systems	It was possible to have more nationally shared processes now, like cash reporting, customer reporting and marketing analysis. The ERP system had also allowed for scalability in the business. <i>“SAP’s a scalable solution... We don’t have a concern about whether we could run 50% more customers on our system than what we do run now.”</i>
Conformity to new taxation, laws and regulations	The ERP system use enabled EnviCo to conform to new changes when needed and was also Sarbanes Oxley compliant. EnviCo was able to have good control flow over the business regardless of changes to taxation, laws and regulations. <i>“It’s (the ERP system) seen a lot of different tax processes and structures and it’s got handling (of taxation) and we have to do it on just once.”</i>
Improved decision making and planning	The increase in availability of information improved decision-making and planning at the operational level, allowing many tactical decisions to be made. <i>“Definitely there’s more information available and that’s going to continue to be the case... In terms of (assisting with) the overall strategic planning of the company”</i>
Product / Service differentiation	EnviCo could offer more comprehensive services to the customers and could provide more detailed information when requested by the customers. <i>“The other companies can’t do (offering customisation solutions) everything that we can do. What they can do it for, I can get it customised”</i>
Increased customer satisfaction	Surveyed customers generally were satisfied with the new services provided through the ERP system. With the ERP system, they were able to contact and remind customers of bin collection schedules. <i>“We still actually do surveys on our customers and the last one I think we felt the results were good, realistic.”</i>

Organisation changes	The ERP system has allowed for centralisation in EnviCo within and across the states in Australia. <i>"They centralise now more things than they did before. And across states, we're centralising more things than did before."</i>
IT flexibility for organisational change	Flexibility for organisational change was provided by the ERP system but was not fully utilised. The ERP system implementation for EnviCo was regarded more of an operational need rather than a business reengineering effort. There was no major organisational restructuring after the implementation of the ERP system. <i>"It's certainly given us more flexibility in that stage... (but) we're not growing very severely (to undergo organisational change)"</i>

4.3.5 EnviCo's Summary

EnviCo was facing challenges maintaining its legacy system. There was also a lack of integration between the separate legacy systems used by the corporate and state offices. Information consolidation was difficult. The senior management wanted an IT system which would support EnviCo's future business needs. EnviCo's ERP system implementation was a complicated rollout that involved eight installations in different states and business units. Despite the complexity in the implementation plans, the implementation team successfully implemented the ERP systems at all sites by adopting less risky phased approach. The experience obtained from earlier installations was critical in assisting the implementation team with more efficient utilisation of resources in later installations.

EnviCo had a methodological and robust governance of the projects, which allowed the organisation to reap most of the anticipated benefits. There was a strong emphasis on organisational support (buy-in) for the ERP implementation due to the effective incorporation of key users in the development stages and the deployment of a formal training team that supported the end-users. Organisational knowledge obtained from the implementation and use of the ERP system also led to innovative projects, which further enhanced EnviCo's business operations, via the development of third-party application add-ons for the ERP system. The third-party applications were also created to provide functionalities that the ERP system lacked. After the ERP system went live, the focus of the organisation was to create a continuous improvement culture and mechanism that allowed the EnviCo to further exploit the hidden capabilities of the ERP system.

4.4 GovDep

GovDep was established in June 2009 from the merger of two Australian state government departments. With the merger, GovDep's responsibilities were extended to the following:

1. Maintenance of the environment for the state;
2. Management of the state's natural resources;
3. Conservation of natural vegetation including national parks, reserves and marine parks;
4. Management of cultural heritage in the state's land and waters;
5. Promotes environmental sustainability and waste management;
6. Management of activities to minimise climate change; and
7. Implementation of policies and regulations.

The head of GovDep, the Director General, reported to two state ministers who were responsible for: i) climate change environment; and ii) water resources. GovDep managed a number of assets in the state which included botanic gardens and nature parks. GovDep comprised of a number of governmental agencies and statutory boards. These agencies and statutory boards were managed by their respective Deputy Director Generals and Executive Directors. The agencies and statutory boards were described as follow:

- **Botanic Garden Trust (BGT)** operated the parkland areas in the state;
- **Office of Water** was responsible for the management of state surface water and groundwater resources;
- **Environmental Protection Authority (EPA)** managed all regulatory matters for environmental protection;
- **National Parks and Wildlife Service (NPWS)** handled all national parks and wildlife matters;
- **Marine Park Authority (MPA)** coordinated and oversaw the establishment and management of marine parks;
- **Catchment Management Authority (CMA)** managed the water catchment areas in regional areas;
- **Environmental Trust** was a statutory body established to fund a broad range of organisations to undertake projects that enhanced the environment of the state.

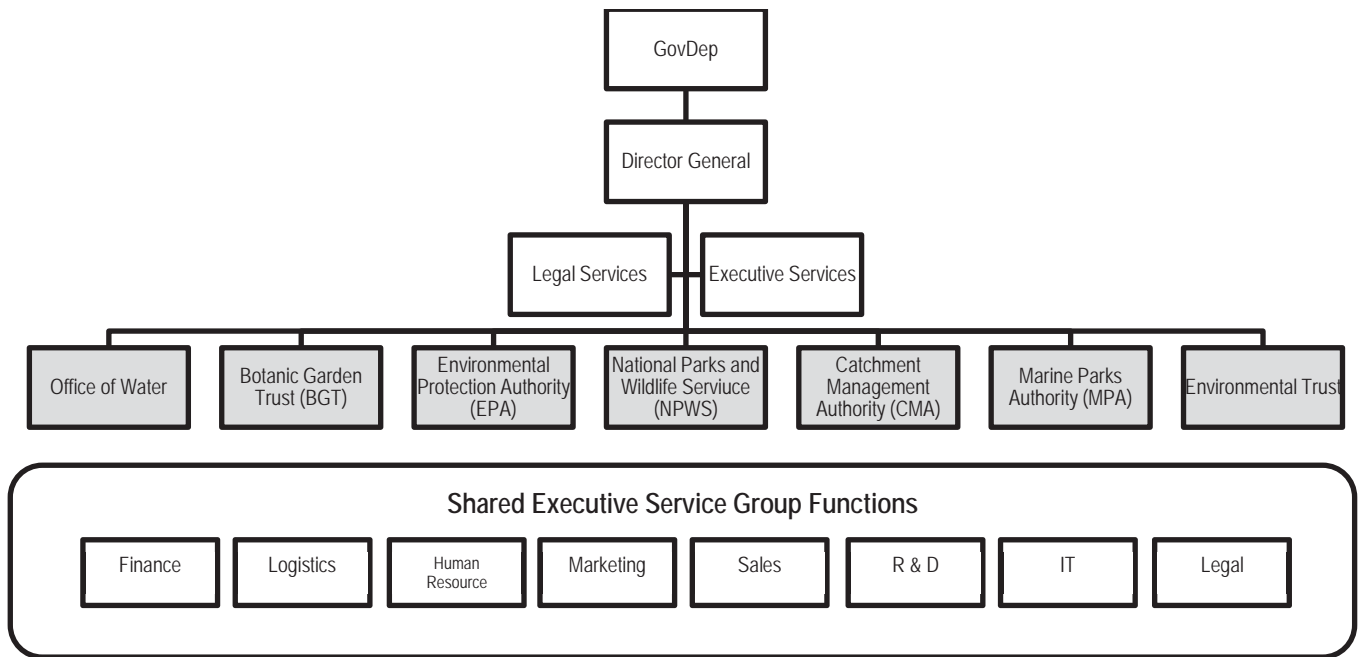


Figure 4.4: GovDep's Organisational Chart

GovDep generated the bulk of its revenue via the management of state assets as well as governmental funding. The state parks and facilities were leased to commercial entities for business operations and events. In 2011, GovDep generated AUD131 million in revenue, prior to the 2011 state elections. GovDep had eight departments that provided support functions to all the agencies and statutory boards (Refer to Figure 4.4)

4.4.1 GovDep's Reasons for ERP Implementation

The creation of GovDep allowed it to inherit the ERP system that was implemented by NPWS in 1999. Previously, NPWS implemented an ERP system from the vendor, SAP, to enable better financial information processing and to allow for better transparency and auditing. NPWS's implementation of the SAP platform was a result of a governmental initiative that was championed by the Department of Commerce. The initiative was to get all state departments and agencies to review their IT arrangements and vendors, and to consolidate different Government Selected Application Systems (GSAS). The consolidation would standardise the reporting tools and applications used by the various state governmental departments. There were three business rationales for this initiative:

1. Enabling standardisation of reporting tools and templates;
2. Lowering operating costs associated with IT upgrades and support; and
3. Improving the ease of maintenance and support for all software packages used by Government employees.

Prior to SAP's ERP platform, NPWS used a primitive in-house accounting package that provided limited support to the financial services and daily operations. NPWS came under the control of GovDep in 2003 as part of governmental restructuring. GovDep then further undergone restructures in 2007 and 2009. The current organisational structure came about from the consolidation of state departments, agencies and statutory boards (refer to Figure 4.4). NPWS's SAP platform (from 1999) was then pushed into the newer acquired agencies and statutory boards, and supported all business operations in GovDep (not limited to financial ones).

4.4.2 GovDep's ERP Project

The original SAP R/3 ERP platform purchased by NPWS in 1999 primarily focused on financial activities and only had the FI-CO module installed. After NPWS joined GovDep in 2003, the SAP system was upgraded to incorporate more modules to support the business operations of all agencies and statutory boards that GovDep had to manage. All upgrades were carried in-house by GovDep's IT department, supported by consultants from the software vendor, SAP. The latest version of SAP was run on Enterprise Core Component (ECC) version 4.6 and comprised of the following modules:

- Finance & Controlling (FI-CO)
- Material Management (MM)
- Project Management (PS)
- Business Warehouse (BW)
- Plant Maintenance (PM)

GovDep's SAP Manager (ERP System Manager), who was interviewed for this case was unable to provide an accurate picture of the implementation costs for GovDep's ERP implementation, due to the complex political history of governmental restructuring. In addition, there had been a lot of small-scale upgrades done to the SAP platform since 1999, through the installation of new modules to add more capabilities to the organisation. However, it was estimated by the manager that the fees spent on upgrades and installations by GovDep, since taking over NPWS's SAP platform, amounted to more than AUD15 million. The current licencing structure for the use of SAP was primarily a full licence whereby it allowed users full usage without restrictions and expiry date.

The implementation team consisted mainly of in-house employees whom were sourced and recruited by the IT department. A minority of the ERP system implementation team were consultants and the developers on the project were provided by SAP. The in-house IT implementation team was responsible for: i) *data conversion and migration*; ii) *assisting with post implementation support and training*; and iii) *further upgrades and the implementation of enhancement packs provided by SAP*. Contract-based developers were recruited at the later stages for the implementation of newer modules such as Business Intelligence, as the in-house implementation team lacked the necessary technical expertise.

All upgrade projects were monitored by the steering committee, which comprised of the Director General, Deputy Director Generals and Executive Directors. Due to the complexities arising from the mergers and consolidation of various agencies under GovDep, end-users played an important role in ensuring that the business processes and workflows were streamlined and standardised. Representatives from each agency and statutory board (illustrated in Figure 4.4) within GovDep were consulted and feedback was solicited from them to ensure that there was no conflict of interests, and at the same time for respective agencies to be aware of the changes.

The SAP ERP system used by GovDep started off primarily as a financial backend support system that had to comply with the state treasury's regulations and standards. Hence the state treasury personnel were also heavily involved in the initial implementation in 1999 and the subsequent upgrades. Treasury personnel were responsible for the mapping of financial workflows and the design of reporting templates, and the Government Information Group (GIG), which managed the information flow to the public. The treasury personnel ensured that all information generated by the information systems used by the governmental departments conformed to the standard templates and reporting. Some elements of the commercial information generated and processed by the ERP system were required to be publicly available and the GIG ensured that the public information about all the departments was kept consistent and updated.

Change Management

GovDep inherited NPWS's SAP platform in 1999 and since then had undergone a number of versions and functionalities upgrades due to the organisational restructurings that had taken place. The SAP Manager highlighted that there was an absence of a proper change management strategy to assist with the impacts of ERP adoption. The situation was further exacerbated as the portfolio of the governmental organisation had to constantly undergo restructuring, and along with it had increasing complications with integration and streamlining of existing business processes.

The newcomer agencies that were absorbed into GovDep as part of the centralisation, had to abandon their legacy systems, unlearn old business processes and learn the SAP ERP platform that GovDep provided. The newcomers were forced to embrace the processes that GovDep had already built up around the SAP ERP system. There was little flexibility for the new agencies to undertake process reengineering, as the consolidation was a move towards standardisation of processes and forcing all governmental agencies and statutory boards within GovDep to embrace a new common ERP system.

“We did minimum process re-engineering or process changes to take on board prior to the implementation and we marked certain process reviews for re-engineering later on” (SAP Manager)

However, one area that GovDep reengineered was the design and implementation of a new financial framework that provided standardised workflows between the various finance teams that worked across the agencies, statutory boards and function groups in GovDep.

“We’re all SAP users so just consolidating, that is, giving them a new financial framework, new cost settlements, GL account and probably some training on, cause two of the three are same group, were using project systems” (SAP Manager)

From GovDep’s ERP implementation team’s perspective, change was managed by educating end-users on the new business process that they were required to adopt. Users were told that there was only a standardised way of conducting business operations through the use of the SAP ERP platform. It was a top-down driven directive. The end-users from the newly absorbed agencies or statutory boards due to consolidation were required to attend training sessions to learn GovDep’s way of business operations. GovDep’s SAP ERP system was sold to the end-users as a more efficient way of running their units. GovDep’s ERP implementation team had to educate the users, identify the redundant processes and consolidate the operational units e.g. shared services, every time the portfolio of GovDep increased.

Training, Support & Maintenance

GovDep’s ERP system implementation team provided training and support. Training sessions were available to the end-users in two modes – online or face-to-face workshops. Online training sessions provided greater flexibility for staff members who wanted to do their training in their own time or required training urgently and could not afford to wait for a workshop session. Face-to-face workshops were conducted in training room facilities and were carried out by trainers from the ERP implementation team. The trainers moved around the various different facility locations in GovDep to provide training to relevant employees on site. Face-to-face training workshops were conducted during office hours so that it would not increase the workload of the employees attending the sessions.

There were also designated SAP training groups based in the regional areas to cater to employees working in the outer regions of the NSW state. These regional offices’ financial management accountants were also capable of providing training to their office’s staff members. In the event should there be inadequate trainers, the SAP Manager personally conducted workshops. The ERP system implementation team was also responsible for the implementation of change requests to the ERP system functionalities. There had been instances whereby employees requested for modifications to the reporting applications embedded in the ERP system.

Table 4.8 summarises the benefits that GovDep derived from the upgrade and integration its ERP systems.

Table 4.8: GovDep's ERP Benefits from Planned System Upgrades (Including Consolidation)

Benefit	Description & Supporting Evidence/Quote (Provided by GovDep's SAP Manager)
Personnel reorganisation	<p>There was a need for more SAP-knowledgeable personnel as more modules were being implemented. Shared services functions like the accounts payable function was created to centralise all the accounts among different divisions, reducing overall manpower required for this particular task. There was no retrenchment as the organisation had been growing, adding more agencies and portfolios to it and the redundant manpower was redirected to other tasks. The state consolidated 17 agencies into a super-agency, GovDep, which was responsible for multiple areas.</p> <p><i>"We're having more and more functions (people) come on board, so we really need more SAP BW, visual comparisons, resources, they're more at doing that all the time."</i></p>
Business learning within the organisations	<p>Due to the number of restructures that had happened in the last ten years, GovDep has had considerable experience in managing mergers. A shared service group called ServiceFirst was created to facilitate any mergers or consolidation of agencies into GovDep.</p> <p><i>"Yeah, I think the people that did the merger, they've been doing that (business learning) so often now. So it's become a bit of a process streamlined through and then they're in the shared services, they run those shared service, they group it. Service First."</i></p>
Organisation changes	<p>The ERP system imposed a certain discipline and governmental organisation changes. Although the ERP system used by GovDep centralised the operations of all agencies, statutory boards and groups under it, the use of a centralised ERP system might be complicated by policies that the State Government implemented. Sometimes, the State Government might create policies that did not apply to all groups or agencies. An example was the travel management system where the standard rates did not apply to all employees. This complicated the standard travel authorisation process because it increased bureaucracy.</p> <p><i>"It imposes a certain discipline and process and that can work both ways, cause sometimes it's hard to change here, change that. Changing the system might be the easiest thing to, but changing them (users), changing the users has the bigger issues and some government policies are also changed."</i></p>
Improved shared services among the units	<p>Shared executive support services were created as a result of the restructuring and consolidation of operations via a centralised ERP system deployed by GovDep. There was minimisation of duplications of work and responsibilities via using shared executive support services.</p> <p><i>"With the shared services group again, they are specialised in their functions. It's used to be spread all around the state and you have, I mean the experts, now with experts, they don't have the experts, they have specialists in accounting state-wide doing part of accounting as their work."</i></p>
Increased understanding and control of processes	<p>The creation of shared executive services to provide support to all agencies, statutory boards and groups in GovDep led to a greater understanding and control of centralised business processes.</p> <p><i>"They have specialists in accounting state-wide doing part of accounting as their work."</i></p>

4.4.3 GovDep's ERP Upgrades Going Operational

GovDep's implementation of its ERP system was not considered a clean-slate approach, as it was built on an existing SAP platform that was already in use at NPWS. The SAP Manager interviewed for this case did not work on the 1999 implementation, but took over the management of the system when NPWS joined GovDep. The current state of the SAP platform came about from a series of in-house upgrades performed on NPWS's existing system. The most recent upgrade project was done in 2007 when GovDep underwent another restructure, to implement the Business Intelligence module from SAP – Business Warehouse (BW) 7.0 and also Credit Management (FI-SD). In the last five years, there was no major version upgrade.

The consolidation efforts resulting from the restructuring in 2003, 2007 and 2009 brought about an immediate impact on the benefits realised. According to the SAP Manager, resourcing and cost related benefits were the most prominent. There were obvious reductions in duplication and wastage of resources. The financial changes implemented gave greater transparency in GovDep. It had been

emphasised that benefits were driven not just from the financial module, but also from the interaction of this module with the other enhancements added. The consolidation of the backend system into one single version of ERP system owned by GovDep had reduced the costs of maintaining the ERP system. The state government was able to negotiate with the vendor, SAP, to provide greater discounts on licencing, due to the formation of shared services across the NSW state government’s departments. Although the restructurings and mergers of agencies were expected to drive standardisation of business processes and workflows across various divisions in GovDep, they also unexpectedly brought about a greater flexibility to the workforce. Standardisation of business processes and reporting meant that employees could also be deployed to assist other agencies in GovDep, not just their own. The integration efforts also forced the ERP system implementation team to streamline or redesign existing workflows. The recent upgrade also included an enhancement implementation to add the Plant Maintenance (PM) module to the ERP system.

Management of ERP Capabilities

The SAP Manager commented that to ensure that GovDep’s ERP system was optimised, it was crucial that IT policies to enforce the utilisation of the ERP system were designed because it ensured that there was a proper and methodological manner to govern changes such as upgrades. Frameworks such as ITIL (Information Technology Infrastructure Library) provided guidelines for building up IT capabilities through the acquisition of new IT products or services. The frameworks also prescribed approaches on how new requirements and requests should be scrutinised to see how they fit with the current ERP system and to prevent unnecessary customisation to the current ERP system configuration. This allowed users to familiarise themselves with the system before disruptive changes associated with new products could occur.

Table 4.9 summarises the benefits that GovDep derived during its ERP upgrade deployment.

Table 4.9: GovDep's ERP Benefits from Upgrades Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by GovDep’s SAP Manager)
Empowerment of employees	<p>Employees were able to customise information and to use it for various reports. They could select the fields which they wanted and were able to drill down information in reports.</p> <p><i>“We being able to customise then and use being within various, so drill down a report, report information, but there are our entry so they’re quite very different one”</i></p> <p><i>“A training application called RWD is used for communication among employees and to facilitate training for employees in upgrading their skills. Employees can register for courses they are interested in and they will be informed by the system when courses are available.”</i></p> <p><i>“So if you as a user, your interest in say, FI-CO system, FI-CO courses, you can register yourself for anything FI-CO at any editions or bulletins of changes in the FI-CO area.”</i></p>
Establishing common vision and goals among staff members	<p>Dashboards for both finance and HR had been created to highlight areas where attention should be given. Program management was implemented to manage improvements in the organisation and to act as a commonality across divisions to avoid overlapping of things.</p> <p><i>“We built a dashboard for finance and that’s going highlight things and we’re doing a dashboard for HR which will highlight the number of people or KPIs”</i></p>

Better communication among business units	<p>All agencies and functional groups used and communicated on the same ERP system. Finance and accounting process had been standardised and used the same cost elements, GL accounts and WF elements. Dashboards provided visibilities like budget, among all employees and the next level down the organisation. Other agencies and executive groups were able to see (to a limited extent) the activities in other agencies. The senior management had monthly meetings where the executives were expected to submit their various copies of the dashboard.</p> <p><i>“We’ll send quite an amount of percent of email out to those company users, so communications would be improved considerably towards when we would roll out RWD. Good job, I suppose, on SAP “</i></p>
Improved quality of work life	<p>The use of the travel management system had streamlined the authorisation process for travel.</p> <p><i>“And we’ve been quite amazed the bulk of them could have been quite critical of SAP and they didn’t use it very much... we just created a guidance procedure to facilitate data entry.... we’ve had them very positive comments about how the SAP system was quite good”</i></p>
Improved individual performance / efficiency	<p>Applications embedded in the ERP system had reduced the hours needed for tasks. Reporting in some functional areas now took less than 15 minutes compared to 3 days previously, when using Excel spreadsheets. The dashboards eliminated the effort needed for preparing paper packs of monthly and quarterly reports for the executives. Hours were now spent on analysing reports instead of producing them. There was improvement in the manner of operation and achievement of objectives.</p> <p><i>“We’re not wasting resources on things we shouldn’t be wasting resources, not wasting time on things we shouldn’t be wasting time (by providing the right information)”</i></p>
External linkages to other organisations	<p>Although the ERP system used by GovDep was not integrated with the state treasury’s ERP system, GovDep was still required to provide its financial data to the state treasury. Instead of signing into the treasury’s ERP system, a manual process was designed to generate a daily data file to be transferred via FTP from the state treasury’s server.</p> <p><i>“There’s been a request to report treasury data in our dashboard in our business warehouse or on our dashboard, so which meant we requested Treasury to provide the data so that we can load it into our system, rather than having to sign in to their system”</i></p>
Standardised user interface	<p>The ERP system provided a standardised user interface and the flexibility to customise it. Reports could be customised and imported to Microsoft’s Excel software.</p> <p><i>“But as you write something, a portal or something like that, at least it’s standardised and there’s sort of flexibility to clean the system. “</i></p>
Better reporting and auditing	<p>The use of the ERP system had led to the standardisation of reports and transaction codes. In addition, the reporting applications within the ERP system allowed the employees to generate reports in a timely manner. Reports generated by the ERP system could be easily exported to other governmental departments for use.</p> <p><i>“All we need to connect them, check the data and bingo, we’ve got them included and visible in our SAP reporting, where as if we were to go to the process of manually moving them over.”</i></p>
IT flexibility for organisational change	<p>The use of the ERP system made it easy for new agencies/portfolios to be merged into GovDep. Migration of data from the newly absorbed groups or agencies was relatively simple with the loading of the master data file into the ERP system used by GovDep. For example, the data from the ERP system of the Office of Water was easily extracted and loaded into the dashboard using standard business content and BW tools. It was as if the whole system of the Office of Water was manually moved over to the ERP system.</p> <p><i>“So having one, two or one SAP applications is helping with that organisational change process going on”</i></p>
Provided greater ease of integration, scalability or portability of IT systems	<p>Data from newly acquired agencies could be easily imported into GovDep’s ERP system for use. The use of SAP’s ERP system in the other agencies that were joining GovDep also facilitated the migration process through the standardisation of system structure, data format and codes.</p> <p><i>“Scalability, the examples, there are I presume when you’re merging several departments into one. If they’re all the same function, like their account code is by definition 10 numerals whatever and everyone is the same, even though one organisation might be different, the other one might be four numerals, so I know what you’re going to have.”</i></p>
Easier maintenance of IT systems	<p>Minimal customisation was required for the ERP system software provided by the SAP vendor. The ERP system allowed for configuration to meet the specific needs of the employees of GovDep and avoided the need for development of in-house feral applications.</p> <p><i>“You don’t have to do customisation and the system is quite flexible (for maintenance) and it might just have been a little bit of configuration rather than actually doing redevelopment”</i></p>
Conformity to new taxation, laws and regulations	<p>The taxation laws, financial regulation and accounting rules had already been embedded in the ERP system functionalities provided by SAP. Any changes in taxation laws, financial regulations or accounting rules would be managed by SAP. These changes were included in enhancement packs which could be installed remotely by GovDep’s ERP system administrators.</p> <p><i>“SAP has HR. Then SAP has an on-going support to provide related superannuation and tax changes”</i></p>

Improved decision making and planning	<p>There was minimum planning of resources allocation done in the past. A forecasting system was now utilised for planning of resources as a result of the ERP system upgrade project.</p> <p><i>“So just by the implementation of forecasting using standard SAP functionality being forecasting, as in it’s the planning as in previously.”</i></p>
Reduced cost in operations	<p>Due to the availability of applications with better capabilities and accelerated tools for project management, it was evident that resource allocation and use was being optimised. The better use of resources inevitably reduced cost of operations in terms of the work hours required.</p> <p><i>“If everybody’s using the same system and that system’s consistently there and you put together accelerated tools that you know they can draw on, such as it break down structures, templates or whatever. Then there would be reduction in operation.”</i></p>
Reduction in (information) cycle time	<p>There was faster reporting from the use of the ERP system applications. Some executive functional services had their reporting time reduced from 3 days to 15 minutes.</p> <p><i>“Three days were in extracting the data, running the report with different groups, different divisions, put it into Excel and then they’re using standard SAP reports for that.”</i></p>
Improved overall productivity	<p>With the recent upgrades and inclusion of new modules from SAP, employees now had access to more efficient applications. As a result of using the applications, productivity was increased from a time usage perspective. Employees were able to perform more tasks compared to in the past.</p> <p><i>“The tools were like, compared to what they used to have, were a lot more efficient, a lot better than initial.”</i></p>
Improved product and service quality	<p>The planned CRM module would allow GovDep to improve its service quality to its commercial customers.</p> <p><i>“So pros is of course you’ve got so much power and varieties there, you couldn’t possibly provide that if you were using some of these smaller or legacy systems that were around, so quality, continuing improving products from manufacturing point of view.”</i></p>
Allowed the organisation to do business more effectively	<p>From a resource perspective, the number of hours required for transactions and tasks were reduced substantially via the use of the ERP system. The creation of shared executive services had allowed for the streamlining of business processes.</p> <p><i>“So to be able to financially report like GST in all the same system and having them in disparate systems, it’s much easier to manage an organisation. So all together will be more cost-effective”</i></p>
Achieved Return on Investment for the system	<p>It was the SAP Manager’s opinion that the senior management believed that a return on investment was achieved on the ERP system implementation.</p> <p><i>“From the management perspective, it has given them more information to make decision on procurement”</i></p>

4.4.4 Post Implementation & Further Upgrades

After the most recent restructure in 2007, GovDep’s SAP ERP platform underwent further functionalities enhancements to provide capabilities in managing the environmental assets of the State. Since then, minimal upgrade had been done on the SAP platform. The ERP implementation team deemed that there would be no major business benefits associated with additional upgrades for the ERP platform. The SAP platform’s primary role in GovDep was to provide a common IT support platform that facilitated the business processes and operations.

“there was a need to push them all together as soon as possible, because the main modules that were implemented were financial modules. (To be able) to financially report, we have to get them all in the same system (sic) and adding them in the batch system and much easier to manage in organisations.” (SAP Manager)

Although there were no more functionalities upgrade done, it was decided by the SAP Manager to do a version upgrade. The SAP platform had been on version 4.6 since 2007 and in recent years, it made the installation of newer patches increasingly complicated. Hence the SAP ERP platform was upgraded to

version 6.0 to ensure compatibility with future patch releases and also to reduce the costs associated with licencing support. In addition to the version upgrade, infrastructural hardware upgrade plans were in the pipeline as well. The in-house hardware that was used to run the SAP software had to be replaced as the capacity of the hardware resources was being pushed to the maximum. The hardware that was used to run the SAP software was the original one that NPWS had purchased in 1999 and was more than 10 years old. Despite GovDep's SAP ERP system being required to support more end-users (due to increasing numbers of agencies), there were no additional investments made on the IT hardware resources. The hardware resources were working at over-maximum capacity at times to service all the end-users within GovDep.

GovDep's SAP ERP platform was found to be underutilised. The finance-control (FI-CO) module that GovDep inherited from NPWS in 1999 had a credit system that was primarily used by finance end-users, which could have been adopted by other end-users for project management in the areas of engineering and operations. However, the uptake of the credit system by the non-finance users was slow.

Further Business Change for ERP Improvements

There was also evidence that the serendipitous use of the ERP system's data started the ERP system implementation team on thinking about how business processes and information could be integrated and how various modules could work together to deliver more value. One example of usage of the ERP system that changed over time could be demonstrated via the heavily customised real estate management system implemented for NPWS in 1999. The real estate module which was currently integrated with the ERP system, was cumbersome and rigid in functionality. An upgrade was planned to replace the customised real estate management system with a new module provided by the ERP system vendor, SAP. The new module would not contain any form of customisation, but unlike its predecessor, would have more functionality and a higher degree of flexibility due to the availability of rich information provided by the integration. The new module would allow greater transparency of NPWS's commercial leasing and records for its land assets management. The planned version upgrade not only included new estate management capabilities, but would provide the department the necessary platform to implement the CRM module which was useful for managing the customers better. The information collected from the customers would provide insights to leasing arrangements and their revenue and profit margin.

Another example whereby the benefits achieved from the ERP system use had changed over time was through the increased system acceptance and usage of the travel management function in the HR module. Initially travel management was planned for 600 users, but had increased to 2,000 users due to the increased number of employees at GovDep after the restructurings. Most new users had no prior experience with the travel system in the HR module and the majority of them provided positive feedback regarding the user-friendly interface and automated capabilities embedded in the travel management function after their usage.

Table 4.10 summarises the benefits that GovDep derived in its later post implementation stage.

Table 4.10: GovDep's ERP Benefits from Post-Implementations

Benefit	Description & Supporting Evidence/Quote (Provided by GovDep's SAP Manager)
Business innovations	The travel management system and the dashboard which hadn't existed previously in the organisation, were implemented as part of increment upgrades to the ERP system. <i>"The travel management project management system, dashboard (were not planned)"</i>
Reduction in lost sales from lost orders	The reports generated by GovDep's ERP system allowed its partner, PRG-Schultz, to analyse and find finance data entry errors. PRG-Schultz specialised in the audit of financial records to process finance overpayments and recoups.

4.4.5 GovDep Summary

GovDep inherited an extremely complex ERP ecosystem. It stemmed from an ERP system that one of its agencies used in 1999. In order to consolidate all the various agencies and business units, the 1999 SAP platform was pushed out to other organisational units for adoption. Prior to the consolidation project, the various agencies and functional departments had been using bespoke and outdated ERP systems. Throughout the span of 2003 to 2009, GovDep underwent a number of organisational restructuring, leading to complex organisational change associated with ERP implementation. The restructuring included consolidation of various governmental agencies and statutory boards.

Through upgrading projects, GovDep implemented five other modules besides the core finance (FI-CO) module, which were Material Management (MM), Project Management (PS), Business Intelligence (BI), Credit Management (FI-SD) and Plant Maintenance (PM). The capabilities of the new modules improved the functionalities of the existing ERP system used by GovDep. With increased access to the new applications included in the ERP system, GovDep's employees uplifted their productivity. Ultimately, the ERP system delivered its expected benefits of providing a technological platform that standardised governmental reports and templates, lowering operational costs associated with IT and improving the ease of maintaining and supporting software packages used by GovDep.

End-user training and education became an innate component of the restructuring process of ERP restructuring. End-users, from various agencies and statutory boards, were required to undergo training sessions to familiarise themselves and be made aware of the implications of integration brought about by the ERP implementations and the creation of shared services to consolidate many of the duplicating business operations. Due to complex nature of its ERP ecosystem, IT policies were formalised to streamline the utilisation of ERP system to avoid costly and unnecessary ERP improvements.

4.5 EntertainCo

EntertainCo was a business division that was owned by an Australian-listed company, ELimited. ELimited, founded in 1954, was considered Australia's largest media and entertainment company and it was ranked 430 out of top 2,000 companies in Australia in 2011. ELimited was a major cinema operator with more than 580 cinema outlets in Australia, Singapore and USA. Besides operating cinemas, ELimited also managed film licence distribution, provided films and music, and operated theme parks in Queensland, Australia. ELimited generated majority of its income from film distribution and production in Australia. Its business classification based on ANZIC was J5511 – Motion Picture and Video Production. ELimited generated annual revenue of more than AUD250 million and employed more than 5,000 employees across the various business divisions in different areas of the entertainment industry. ELimited had five main business divisions (including EntertainCo) in Australia (illustrated in Figure 4.5):

1. **Cinema Exhibition** – operated and managed the cinema outlets in Australia and overseas. In the Singapore and USA markets, ELimited operated joint venture with local partners.
2. **Film Distribution (EntertainCo)** – managed the sales and distribution of films to other cinema operators, and also the movie DVDs to retailers.
3. **Theme Parks** – managed theme parks in various states in Australia.
4. **Film Production and Music** – the film production and music division comprised of a movie production company and music production company. The movie production company produced and financed feature films for cinematic exhibition in international markets to be released in different formats including DVDs and television.
5. **Radio** – ELimited also controlled a major share (more than 50%) in an Australia radio company that is listed on the Australian Stock Exchange since March 2001.

EntertainCo

The film distribution division of ELimited, EntertainCo, consisted of two business groups – Pictures and Entertainment. EntertainCo's Pictures group provided movies to cinema, video, pay TV and free to air television in Australia and New Zealand. The Pictures Group was also contracted to distribute movie films in the Asia-Pacific region (including Australia) on behalf of international movie production companies. The Entertainment Group was responsible for distribution of DVDs to retailers and rental operators throughout Australia. EntertainCo runs six business units as part of their business operations and they are illustrated in Figure 4.5.

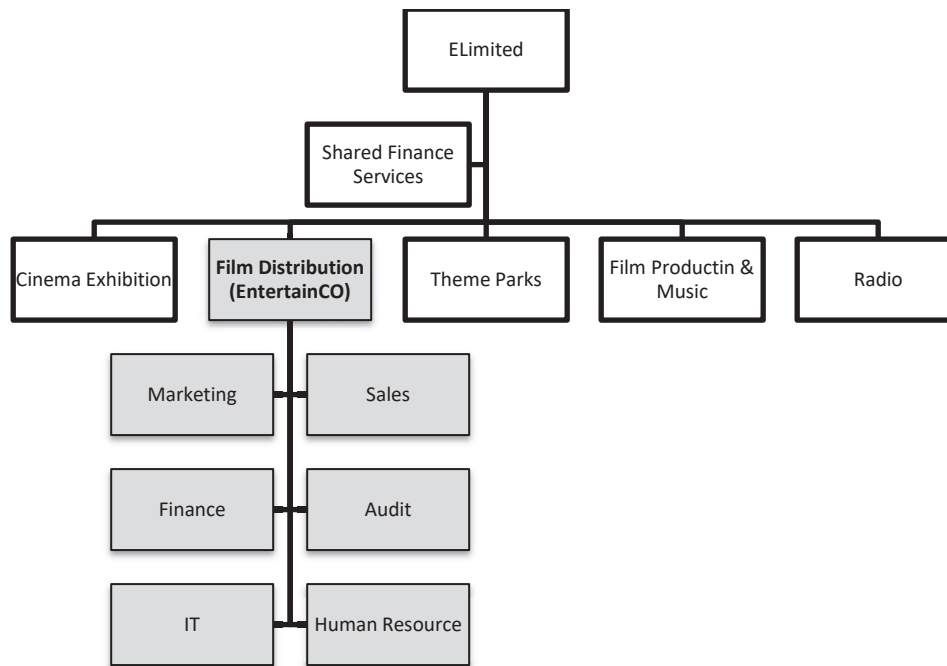


Figure 4.5: EntertainCo's Organisational Chart

4.5.1 EntertainCo's Reasons for ERP Implementation

ELimited implemented an ERP system provided by the technology vendor, SAP, in 2001 to remove its aging finance system, FMS. FMS had outlived its capabilities and was not able to provide the financial support required for all five divisions in Australia. The finance-controlling (FI-CO) module was purchased from SAP to centralise all financial business operations. The adoption of the SAP platform provided the corporate office a greater detail of its finances and operations.

"It was mainly around an aging historic system in GST or the core versions." (SAP Manager)

Other reasons given by the SAP Manager (ERP System Manager) who participated in the interview included: i) centralise and automate other business operations such as purchasing (e.g. sourcing of materials) and payroll; and ii) enable more efficient GST reporting.

4.5.2 EntertainCo's ERP Project

When ELimited implemented the SAP platform in 2001, its primary purpose was to modernise its finance operations. Since then, the system has undergone a number of upgrades to incorporate new modules, thereby increasing the system capabilities. At the time of the interview, EntertainCo's SAP platform contained the following modules:

1. Finance & Controlling (FI-CO)
2. Materials Management (MM)

3. Sales & Distribution (SD)
4. Business Warehouse (BW)
5. Human Resource (HR)
6. Customer Relationship Management (CRM)

Besides SAP modules, EntertainCo had developed a customised module, IPM (Intellectual Property Management) to link up with its SAP platform that handled the intellectual rights of contracts used in film distributions. IPM also handled the royalty payments to film production companies which EntertainCo distributed for. The IPM module was built by SAP Germany from scratch as there were no off-the-shelf solutions that met EntertainCo's media business requirements. This module was proposed by EntertainCo's SAP solution architect to solve the shortcomings which were identified from the existing legacy system.

“What we had built was a 3rd party application to manage the royalty payments to producers and we identified a need to change that in some respects” (SAP Manager)

The estimated implementation costs for the original project was approximately AUD5.5 million and the breakdown of the costs is given in the following Table 4.11.

Table 4.11: Estimated Costs for EntertainCo's ERP Implementation

Project Breakdown	Estimate Costs (AUD)
Software (initial) – FICO Module	1 million
Hardware (servers, workstations)	Not Available
Manpower / labour (salaries, allowances)	4.5 million
Others (training, traveling allowances, contract, licencing)	
Total Costs	5.5 million

SAP was selected to be the ERP platform vendor in 2001 by an evaluation committee that comprised of mostly senior management and headed by the Finance Director. The ERP implementation team consisted mostly of consultants and developers employed by SAP. As EntertainCo lacked the SAP expertise, the decision was made by the committee to outsource the implementation to SAP. The technical manager heading the implementation team was also provided by SAP and reported directly to a steering committee. The steering committee was also headed by the Finance Director, and included the CIO and other middle-level managers from the business units.

The SAP Manager involved in this interview, headed EntertainCo's in-house IT team which was trained by SAP to provide post-implementation support to end-users. Given that EntertainCo was abandoning its legacy finance system for the SAP platform, the steering committee was keen to utilise this opportunity to reengineer its existing business process, adopt industrial “best practices” and remove redundant

processes. End-users involvement was limited and they were consulted only when the feedback was necessary for the newly created workflows.

Change Management & User Acceptance

The SAP Manager elaborated on the importance of managing change and the relevance of an appropriate strategy to support changes to ensure that the system implementation did not disrupt business operations. The SAP Manager advocated that the strategy adopted should be driven by management and business needs. From the manager's perspective, change management was not just about getting the users on board and using the system. It should also encompass the "fitting" of the system to meet the demands of the business model and its users. EntertainCo's change management strategy involved three key elements:

1. **"Blueprinting" of business solutions** – Whenever there are changes to be made to the ERP system, it is essential that the requirements for the functionality are developed as accurately as possible with the input from all relevant stakeholders;
2. **Confirmation of proposed solution** – Ensure that the solution and functionality to be delivered is aligned with business needs. Functionalities developed must be mapped directly to the solution so that there will be no unnecessary scope creep.
3. **Acceptance testing** – End-users need to be heavily involved in all newly developed functionalities to solicit feedback and at the same time create acceptance of the delivered functionality.

"We'd generally engage the new business so I guess change management is involved in terms of blueprinting a solution, getting their confirmation around a proposed solution and getting them involved in user acceptance testing. We'd identify in terms of the blueprint and if it's changing to scope or scope group and so forth. We from the development perspective, we're in charge of our development services so we need to be fairly clear about what is in the scope, out of scope and what's in the blueprint, what's going to be delivered and change management is sort of part of that in terms of delivering the solution that is ready for the users, the users are provided the training and the change details." (SAP Manager)

Training, Support & Maintenance

EntertainCo's in-house implementation team carried out the training, post implementation support and maintenance of the ERP system core finance module. The in-house team had 13 members, of which five were responsible for SAP system support. The members of the support team were mostly recruited externally and were SAP-certified or qualified IT professionals with a proven track record.

The in-house team provided end-user training via the use of workshops that were conducted onsite at the IT department premise, offsite at the end-users' premises or online via teleconference. Onsite training involved conducting workshop sessions in computer labs. Online training was conducted via a web-based training interface over the Internet. Rollouts of new functionalities were often accompanied by on-site training workshops.

EntertainCo recognised the importance of allowing end-users to explore and exploit the capabilities within the SAP platform. The SAP Manager felt that an open approach to solicit user feedback was required. Changes to the system after implementation were often expensive and time-consuming, but the in-house implementation team was prepared to implement the user-driven changes if they bring value to the business. The end-user support for EntertainCo's in-house ERP team was not limited to only trouble-shooting but also served as a channel for feedback to refine the SAP platform.

"An example is CRM, where some of the businesses are saying we want to do CRM, we say, 'We can put in CRM, we'd buy a server, we'd develop it for 3 months and it will cost you 200,000 dollars.' Well I can pay 50 dollars a month to a Software-as-a-Service (SaaS) to provide and implement CRM and it will be running in a week... In the first measure it's not cost effective but it might be once you delve down into the real costs of running the other solutions or you have a look at the benefits of running SAP over those other provisions providers." (SAP Manager)

Table 4.12 summarises the benefits that EntertainCo derived from the development stage of its ERP implementation.

Table 4.12: EntertainCo's ERP Benefits from Project Development

Benefit	Description & Supporting Evidence/Quote (Provided by EntertainCo's SAP Manager)
Personnel reorganisation	New job scopes were created as a result of the implementation of the ERP system and new modules. The new jobs were required to maintain data and hence employees were required to be retrained or learn new skills. <i>"They'd be people who needed to learn new skills."</i>

4.5.3 EntertainCo's ERP System Going Operational

The initial ERP system implementation that involved the FI-CO module in 2001 was done with a big bang approach. The justification for the roll-out across all divisions was to enable unified GST reporting for the divisions and their business units. The implementation took approximately a year to go-live. Subsequently after the initial implementation, there were additional upgrade projects that were carried from 2002 to 2010. The duration of the smaller scale projects varied from six months to a year. The upgrades were to incorporate MM, SD, BW and HR via a phased approach.

"We're always developing new functionality, but the core systems were implemented across the whole division and then rollout of different functionality (modules) as we go along" (SAP Manager)

It was observed that operations had become more efficient due to the reengineered workflows for many of their business processes. This was apparent from the creation of a shared finance service for EntertainCo's corporate office, ELimited. The shared finance service is now able to provide support to all the subsidiaries including EntertainCo without redundancies. Procurement processes have also been streamlined and automated with the ERP system use. Purchase orders and authorisations are now electronically created and monitored by the ERP system with the relevant employees informed in a timely manner.

Table 4.13 summarises the benefits that EntertainCo derived during its ERP system deployment.

Table 4.13: EntertainCo's ERP Benefits from Project Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by EntertainCo's SAP Manager)
Establishing common vision and goals among staff members	Company goals and monthly targets can be efficiently tracked and articulated to the managers and supervisors. The information presented by the ERP system dashboards allows employees to know what areas require improvement. <i>"They get one common set of data"</i>
Better communication among business units	Common data set and standardised business processes allow for the ease of comparison results and to track the progress of jobs across different departments. <i>"I guess there's improved information among employees, like one subset of data. I don't know if it's enhanced the communication but ideally it has."</i>
Improved quality of work life	The use of the travel management system had helped streamline the authorisation process for travel. <i>"And we've been quite amazed the bulk of them could have been quite critical of SAP and they didn't use it very much, having used it cause of, we just created a guidance procedure to facilitate data entry.... we've had them very positive comments about how the SAP system was quite good"</i>
Improved individual performance / efficiency	End-users had a greater access to information particularly for business transactions. The implementation of the ERP system also enabled a greater transparency of personal HR details and materials. <i>"It's putting processes in the hands of the user rather than just sending a form to payroll."</i> Manhours required for some jobs were reduced as result of the automation brought about by the ERP system. <i>"We've been able to drop our accounts payable numbers so they are more efficient. I think within payroll it has because of ERP system"</i>
Organisation changes	Finance and IT services have centralised with the creation of the shared services. There were some job scope changes to cater to the needs of maintaining the use of the ERP system. <i>"So previously they might have to actually stamp and get someone to sign two bits of paper and send it somewhere for payment. Now they do a purchase order, so it's just adding technology to that process"</i>
Standardised user interface	The use of ERP system provided users the same standardised interface that was easily recognisable. This also allowed the end-user flexibility in terms of changing their job scopes or responsibilities. <i>"Additional things like change logs and audit profiles and enhanced security definitions within SAP over the old system"</i>
Improved data quality	Quality of information had improved, brought about by the automation and less errors occurring. This was evidenced by the decreasing errors associated with the use of manual paperwork for processing payment. <i>"Definitely, SAP has enhanced that functionality. I think all of these would be a definite yes in some ways, so improved data and information quality, absolutely."</i>
Improved shared services among the units	Shared finances (e.g. Accounts Payable), HR, Audit and IT support services were created as all divisions in ELimited were using the same ERP system. Having the same shared services allowed divisions to run standardised reports that accurately reflect the status or the figures in the company from an updated and consistent database. <i>"All of IT is so are non-SAP services are shared. You've got the accounts payable functions, imaging, audit and HR"</i>
Increased understanding and control of processes	Control and transparency increased from ERP system use. The ERP system provided better controls to avoid any exploit of finances.

	<i>"Concerns of transactions that might be deemed inappropriate in terms of having the ability to say create a vendor and also a payment. So it is definitely enhanced increased understanding and control"</i>
Better reporting and auditing	<p>Yearly audits could be carried out easily with the user groups and checks on user controls were clearly defined. Accountability with authorisation and approval had increased. Internal audits for authorisation and controls could be carried out with greater ease with the use of the ERP system. Other aspects of better reporting and audit could be seen from the tools that were compatible with the ERP system that interpreted data and allowed for easier analysis.</p> <p><i>"They've also purchased a third-party analysis tool that interprets SAP audits or SAP data... you can buy these little tools and extract table list 1,2,3,4 using SE16 and we'll analyse the data for you and spit out results"</i></p>
Easier maintenance of IT systems	<p>It was easier to maintain the systems with the in-house ERP system team. It was perceived as costly initially but it was more cost effective in the long run in terms of problems or issues resolution. The ERP system vendor would be able to provide comprehensive support for any issues that may arise from the use of the ERP system. However, it was noted that it was difficult to quantify whether the maintenance was cheaper.</p> <p><i>"So it might be more cost initially but in terms of problems or problem resolution, it is easier to maintain that system than spend the money to maintain that 3 tier landscape rather than deploy packages and production systems that bring down hardware, have people running around at all hours."</i></p>
Conformity to new taxation, laws and regulations	<p>SAP vendor provided support patches or enhancement packs for changes to laws and regulations.</p> <p><i>"In the SAP being quite large and so forth, they bring out their relevant OSS (Online Service System) notes and support packages to ensure that taxation laws are updated and so forth"</i></p>
Improved decision making and planning	<p>The ERP system provided updated and accurate information to the management for decision making. Tools provided by the Business Warehouse (BW) module allowed management to customise their reports so that segmentation of customer needs or demands could be better understood.</p> <p><i>"Although we're not sort of stopping and then we doing projects in BW to enhance corporate reporting performance. We haven't stopped it all but it's definitely improved decision making, to have one common source of data for all systems"</i></p>
Reduction in cycle time	<p>Less time on manual paper work was required for making payments to suppliers. The ERP system automated the process and all the relevant documents were digitised and imaged into softcopy versions hence reducing the time in the process to procure materials. Suppliers were billed automatically based on accurate purchase orders generated digitally.</p> <p><i>"It'll be a normal invoice and will generally say things like PO or purchase order or something, it'll have 45 and whatever. It'll have 1,000 dollars, units 1 unit or one day or whatever. So basically it's got OCR, optical character recognition software and looks for data maps within this field like PO or purchase or something. Then it'll look for a number so it'll identify its purchase order 45, does it exist? Yes it exists. There's an open purchase for 1000 dollars for quantity of 1 and it's been goods receipted. So it'll just allocate that to that purchase order and it matches and it will pay it without any human interaction."</i></p>
Improved overall productivity	<p>Management has improved productivity from less time spent on generating reports for their unique needs. Management also spent less time handling administration work for their subordinates. For example, employees spent less time on their HR issues by using the ERP system portal. Instead of filling up paper form applications and sending it manually to the HR department for processing, it is all automated in ERP system. Without the ERP system, employees in the past had to print out document forms to fill up manually and submit to the management for approval, which then required the approval to be forwarded to the HR department.</p> <p><i>"Everyone applies for leave via the portal now instead of going to the intranet, printing out a bit of paper, writing a bit of paper, sending it to your manager, then approving it, sending it down to payroll. All that sort of stuff, it's just all automated so there are significant gains there"</i></p>
Improved partner's services	<p>The finance (FI-CO) module linked up with EntertainCo's financial institutions and allowed suppliers to be paid promptly through the use of EDI technologies.</p> <p><i>"I'd hope it would help them in getting paid properly. Properly and promptly but that's somewhat dependent on the partner following the process."</i></p>

4.5.4 Post Implementation & Further Upgrades

EntertainCo considered its ERP project as an on-going project. The in-house ERP implementation team is always constantly developing the system by adding new functionalities or optimising existing processes to drive further improvements. The development of the IPM after the deployment of the IPM module could be considered to be one such initiative that was driven by end-users and business requirements. Other extensions included the adoption of SAP's Employee Self Service (ESS) from the

HR module that replaced their in-house legacy system in 2005, sales and distribution in 2006, and the version upgrade to ECC 6.0.

It took at least six months for the employees to familiarise themselves with the use of the ERP system. EntertainCo's employees' initial impression of the ERP system was not positive. Hence, it was necessary for the end-users to take some time to accustom and familiarise themselves with the new ways of doing business using the ERP system. The SAP Manager suggested that benefits obtained from the modules varied. In the case of the finance module (FI-CO), it was considered more of a standalone module that contributed financially-related benefits to EntertainCo. The CRM module, on the other hand, was associated with benefits that were derived from the integration of information and the synergy of other modules e.g. SD.

“You don't do real benefits with CRM until you see integrated sales information populating the CRM information. So it's probably more around integrated, lots of modules.” (SAP Manager)

User Driven ERP Improvements

There were also instances whereby ERP system solutions (change request based) that were designed after the ERP system was implemented, were delivering benefits for EntertainCo. One example was the development of the customised module, IPM, that managed the sales and distribution royalties for film producers. Other initiatives that were not planned as part of the SAP implementation were the document imaging solution and the HR module. The SAP team is currently in the process of reviewing the feasibility of implementing BPC (Business Planning & Consolidation).

The SAP Manager stated that the users and their input were crucial in helping the SAP team come up with new useful functionalities, *“If the user base is challenging the design, system and processes, it sometimes then generates the benefits or optimises those benefits”*.

“I tend to think we are always further developing and rolling out to new businesses” (SAP Manager)

Table 4.14 summarises the benefits that EntertainCo derived in its later post implementation stage.

Table 4.14: EntertainCo's ERP Benefits from Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by EntertainCo's SAP Manager)
Empowerment of employees	The inclusion of the ERP system business intelligence (BW) module allowed managers to run their own customised reports and this helped them to consider more issues before making an informed decision. <i>“An example is BW reporting where they can define and run a subset of data and manage it into their own requirement. It's a key example”</i>

Business growth	Use of B2B and EDI technologies together with the ERP system has allowed EntertainCo to increase its sales over time. <i>"We do about 60% of sales via EDI and we ship about 1 million DVD units a month, so it's a considerable amount of growth and efficiencies that EDI allows."</i>
New business alliances / partnerships	The ERP system technology platform had allowed EntertainCo to partner with other film companies e.g. Warner Bros and Paramount for distribution of films in Australia and exchange sales information. <i>"B2B and EDI and all that sort of stuff, it probably has allowed the business to grow"</i>
External linkages to other organisations	Sales and distribution information are exchanged with other partners e.g. Paramount and Warner Bros. <i>"Providing customers the ability to trade with us electronically via EDI and things. Same with our suppliers, we can send purchase orders to them either by fax, email, EDI, any of those methods."</i>
Extension of market reach	The creation of B2B sites, using the ERP system platform that links with retailers was attributed for increasing DVD sales volume. The B2B sites allowed for customers to make orders online bridging the need for face-to-face communications and hence allowed for the extension of market reach. <i>"We've got B2B sites operating or B2B website operating for sales. that may extend the market reach."</i>
Increased customer satisfaction	Customised information or flexible services could be created for customers who have unique needs. <i>"A customer will come in and say, "is it possible to get an extract of data into this format for our internal reporting purposes" and we can develop that sort of things fairly regularly."</i>
Business learning within the organisations	The end-users constantly request for new functionalities not in the ERP system or improvements to processes as a result of their experience with the ERP system. <i>"We've just developed a web-based or portal-based write-off process for Exhibition, like their concession sales, like popcorns and drinks. There was a process in SAP that existed already, which was a little cumbersome"</i>
IT flexibility for organisational change	The ERP system allowed new business functionalities to be incorporated with ease and catered for any potential organisational change. This was evident in the phased upgrades done over the past years to the ERP system. <i>"We always make a comment that anything in SAP is possible but it's really just how much the business wants to spend but basically it can do anything you want"</i>
Provided greater ease of integration, scalability or portability of IT systems	Upgrading to a newer version of SAP ECC 6.0 was carried out with relative ease across the company. <i>"Our recent upgrade to ECC 6.0 was relatively painless, unless they move forward, they aren't really upgrading so much, but providing these enhancing packs they speak of, so it becomes easier to manage and provides a lower total cost of ownership"</i>
Improved product and service quality	The ERP system provided the company the ability to actively search for business opportunities and enhance their service quality by catering to the demands of customers. The ERP system also provided the company to conduct "smart pricing" or "dynamic pricing" to cater to the unique needs of different customers – discounts could be applied depending on purchasing history or volume. <i>"The advantages are that, like Big W, we might be able to provide or prompt greater discounts for them based on reporting of what they've previously purchased."</i>
Improved logistics management	The MM module interfaced with a third-party application, Manhattan, which provided the platform with more efficient distribution of products and materials. Less wastage incurred with storage of products. <i>"We do have a third-party application running the warehouse management, Manhattan, but in terms of the interface process with Manhattan, it works efficiently."</i>
Improved supply chain management	The ERP system platform enabled EDI links with other partners e.g. Paramount and Warner Bros that resulted in efficient distribution and delivery of products to Australian retailers. <i>"Yep, more than Paramount and Road Show distribution process. We do have a 3rd party application running the warehouse management, Manhattan, but in terms of the interface process with Manhattan, it works efficiently."</i>

4.5.5 EntertainCo's Summary

Originally, EntertainCo implemented a SAP-based ERP platform to replace its legacy system and overhaul its finance operations for GST reporting in 2001. The same SAP platform was then extended to assist with other business operations, with upgrades being done sporadically. With the finance module, it was obvious that benefits associated with reporting and automation were achieved. The newer modules, such as CRM, however, had yet to show substantial business improvements. Also, the SAP platform had

helped EntertainCo innovate its system capabilities, by collaborating with the vendor to jointly develop an IPM module for its unique film licencing business.

Unlike traditional approaches to ERP implementation, EntertainCo's management considered that the system's contribution to the business was constantly evolving. It was not just a one-off implementation but an iteration of multiple upgrades to enhance the system capabilities to support EntertainCo's business growth in the ever-changing business environment. The senior management, in particular the Finance Director who sponsored the project, did not think that the return on investment was met and the anticipated benefits delivered, and allowed the ERP team and end-users to further refine the system performance.

EntertainCo relied on end-users to drive many of its ERP benefits. An "open-door" culture was enforced to allow end-users to bring their ideas to the implementation team during development and post implementation stage of its ERP project. This allowed the ERP technical team to troubleshoot issues before the system go-live as well as make further refinements to the system after going-live to enhance its performance.

4.6 PackCo

PackCo is one of the seven divisions that belonged to an Australian privately-owned packaging and recycling company. PackCo's corporate company was established in 1948 and had grown to be one of the world's largest packaging and cardboard processing firms, with an annual revenue that exceeded AUD2.5 billion (in 2011) and controlled assets worth more than AUD3 billion. The corporate company derived the bulk of its revenue from its operations in paper, packaging and recycling and is classified as C1510 under ANZIC codes.

Headquartered in Australia's Melbourne, the corporate head office employed more than 9,600 employees in Asia-Pacific, Oceania and North America regions. Most of its major customer were manufacturers that produced fast moving consumer goods such as soft-drinks, diaries, confectionaries and canned food. PackCo provided labelling, packaging (including boxing) and shipping services to its customers. Most of the products that PackCo managed are shipped to distributors or retailers. The organisational structure for PackCo is given as follow:

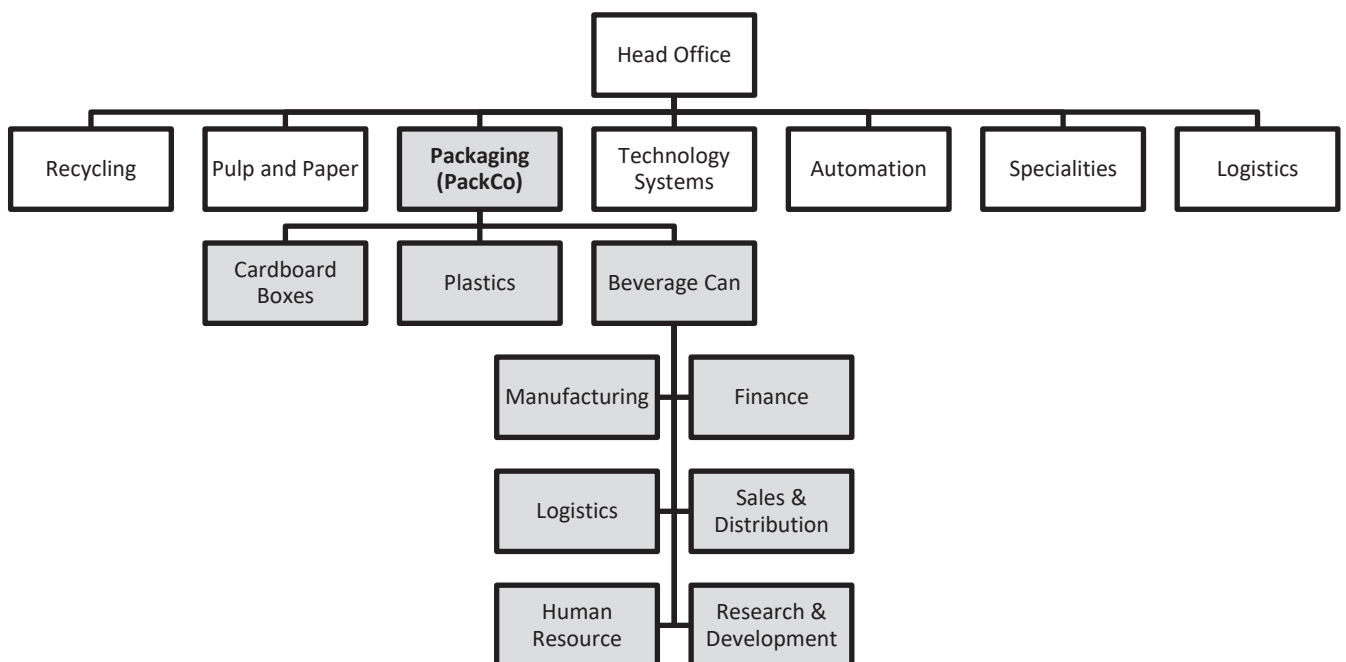


Figure 4.6: PackCo's Organisational Chart

PackCo division controlled three business groups that handled different types of packaging materials: i) *cardboard*; ii) *plastics* and iii) *beverage can*. Although the General Manager (GM) (Enterprise Solutions) of the head office was interviewed, this case only covered the ERP implementation that occurred at PackCo. The main reason for this was because the very first ERP system that was implemented by the head office was adopted by the *Beverage Can* group in PackCo. The *Beverage Can* group was responsible for the production of aluminium and tin can containers that were used for the packaging of

drinks and food for its manufacturing customers. Most business operations in *Beverage Can* group were conducted in-house, with the exception of non-critical manufacturing that were outsourced to smaller raw pulp producers. Marketing activities were managed at the divisional level and mostly outsourced to public relationship companies. Within the *Beverage Can* group, there were six business units that supported the daily operations:

1. Manufacturing
2. Finance
3. Logistics
4. Sales & Distribution
5. Human Resource
6. Research & Development

4.6.1 PackCo's Reasons for ERP Implementation

In 1998, senior management at PackCo's corporate head office in an attempt to consolidate the finances and reporting across all the divisions, decided to purchase an ERP platform. This would give the head office more visibility over the budgets and financial status.

"Financial was the primary reason. They (divisions) were using different systems, they wanted to centralise into a single (reporting) system." GM (Enterprise Solutions)

The board of directors were of the opinion that the finance consolidation was necessary for the purpose of enabling them to formulate strategic plans for the organisation and give in-depth information about their financial position. The existing legacy IT ecosystem that PackCo operated within consisted of a number of bespoke systems that were developed organically due to business requirements. Business units in different divisions were using their own software that were acquired due to arising needs. Due to usage of different systems for accounting, it made it difficult for finance teams to provide accurate and timely reports to the senior management. And this ultimately affected the quality of the decisions made by the managers.

4.6.2 PackCo's ERP Project

PackCo's ERP project commenced in 1998 after a series of vendor evaluation studies. The senior management decided that the project would involve two external vendors. PriceWaterhouseCoopers (PWC) was selected to be the technical implementation vendor and SAP was to be the software vendor. The SAP-based ERP platform to be purchased was SAP R/3.

PackCo's *Beverage Can* group was picked to be the beneficiary of the ERP implementation. Given that most of the business groups within PackCo were silo-based and had their own unique business

operations, the ERP implementation for the *Beverage Can* group was to be considered a standalone implementation with no impact on others i.e. *Aluminium* and *Cardboard*. Although it would have been ideal to consolidate all the divisions under a single platform, evaluation studies done indicated that it would be an extremely risky implementation. Furthermore, the operations of *Beverage Can* group were considered substantially large and complex that it would require its own ERP system to operate. The data files that PackCo's ERP system generated could be easily imported by the corporate head office for consolidation of finances.

Two modules, Finance-Control (FI-CO) and Material Management (MM), were selected for the initial implementation. Since then, the SAP platform had undergone further enhancements by installing the following modules:

- SD (Sales & Distribution)
- WM (Warehouse Management)
- PM (Plant Maintenance)
- CRM (Customer Relationship Management)
- PS (Project System)
- BW (Business Warehouse)

The latest SAP platform that PackCo used was also integrated with other third-party applications that provided other business capabilities that the SAP software did not have:

- Millwise – Developed by ABB for mill operations and control;
- Manhattan – Developed by Manhattan Associates for warehousing operations;
- Hyperion – Developed by Oracle for business intelligence.

The estimates for the original implementation that consisted of FI-CO and MM, was close to AUD5 million and the breakdown is given in Table 4.15.

Table 4.15: Estimated Costs for PackCo's ERP Implementation

Project Breakdown	Estimate Costs (AUD)
Software (initial)	1 million
Hardware (servers, workstations)	0.25 million
Manpower Others (training, traveling allowances, contract, licencing)	3.75 million
Total Costs	5 million

The project implementation was managed by an in-house manager (GM, Enterprise Solutions) and another project manager whom was provided by PWC. Both managers had to report to the steering committee. Consultants provided by PWC conducted the initial business requirements and “blueprinting”

process. The technical implementation team members comprised of mostly employees from PWC, who were responsible for the configuration and customisation of the SAP R/3 system. PackCo's IT staff were primarily involved at the pre- and post-implementation stages of the project to provide end-user support. Also, some members of PackCo's IT team were trained to take over the technical support of the SAP R/3 system after the system had been deployed.

PackCo's end-users were heavily involved in all stages of the design and development of the SAP platform. There were active consultations with the end-users to solicit feedback on business processes and workflows that the SAP R/3 was to support or replace. Any new business workflows required the endorsement of the middle management to ensure that they are more effective than the existing ones. End-users involvement for PackCo's ERP implementation was considered extremely important because it did not utilise the standard manufacturing operations. Many of PackCo's business operations were designed organically and unique, hence the need to customise the ERP system provided by SAP.

Change Management

PackCo's ERP implementation team had utilised a soft and proactive approach to manage the changes arising from the ERP adoption. The rationale was that the management did not want end-users to feel that their daily work and operations were being intruded by external parties (e.g. PWC consultants). A change management team involving consultants from PWC and IT employees was created to oversee and manage change. This team was to study change impacts and find solutions to mitigate the disruptions. The deployment of the SAP platform was seen as a big "milestone" for the IT infrastructure. The end-users and middle management buy-in was critical for the successful deployment and usage of the system.

"Especially if you're changing the processes, change management is a big part of it." GM
(Enterprise Solutions)

The steering committee made the ERP implementation team prioritised their key deliverables. The deliverables were reported in meetings that were held regularly which involved the project managers and the committee members. The meetings were also used to evaluate and endorse any new workflows that were created by the implementation team, especially finance-related processes. Central to the change management strategy was the requirement mandated by senior management, that middle managers needed to have "conversations" with the implementation team to ensure that there was common understanding of all newly mapped business processes and workflows. This was done so that the designed processes and workflows conformed to the business needs. Often the "conversations" also included end-users, who were selectively recruited to provide feedback on the changes to their job scopes and responsibilities. Such consultative sessions were seen as crucial in winning their support for the ERP system adoption.

“Change management consists of consultative sessions with all the super-users and soliciting their inputs for the new functionalities and workflows (to ensure their needs are met).” GM (Enterprise Solutions)

Training, Support & Maintenance

The training, post-implementation maintenance and support of the SAP platform was carried out by the in-house implementation team with support from PWC consultants. The consultants’ role in PackCo’s ERP project was to transfer technical and functional knowledge to the members of the in-house implementation team. The SAP expertise of the in-house implementation team was cultivated through the transfer of knowledge and training members of the in-house team.

End-user training, conducted by the in-house implementation team, commenced weeks before the system went live. PackCo’s end-users were trained in various delivery modes depending on their locations and job scopes. Training was delivered either through face-to-face workshops or the use of PackCo’s e-learning platform. Super-users, often team leads or supervisors, were also nominated as part of the training program. The super-users were educated by the in-house implementation team on the business process changes and associated impacts on their respective business units. The super-users would become an informal trainer in their own business units and often act as a first point of contact. Super-users were required to spend extra time in workshops to fully understand the workings of the modules to be implemented for their units.

“They learned while doing the implementation and of course, we had training courses and things like that. But we have had also new people (super users) come in.” GM (Enterprise Solutions)

Table 4.16 summarises the benefits that PackCo derived from the development stage of its ERP implementation.

Table 4.16: PackCo's ERP Benefits from Project Development

Benefit	Description with Supporting Evidence/Quotes (Provided by PackCo’s GM Enterprise Solutions)
Business learning within the organisation	<p>Access to more useful information promoted learning among employees as less time was required to understand the processes, customers and suppliers. End-users, through the implementation of the ERP system, were learning more about the business through the training workshops.</p> <p><i>Example: The training provided to the end-users was also seen as an important step in providing greater know-how and transparency of business processes and workflows. Training sessions conducted were not just seen as part of educating end-users to use the ERP system but also educating them on the changes in the businesses due to the ERP system implementation which contributed to end-users’ expectations and increase in functionalities request.</i></p>

4.6.3 PackCo’s ERP System Going Operational

After close to 12 months of development, a big-bang approach was selected by the organisation for the ERP system implementation in 1999. Given that the main goal of the ERP implementation was to enable

better finance reporting, the big-bang approach was selected to allow all business units affected by the FI-CO and MM modules within the division to go live at the same time. This would permit the head office to collect real time data from PackCo for their budgeting and planning. The approach was also seen as a low risk approach given that only two modules, FI-CO and MM, were required to go live.

“Because initially for the financials, you aren’t going to get any benefits if you are to use a phased approach.” GM (Enterprise Solutions)

The immediate benefits of PackCo’s ERP system deployment were increased accuracy in financial transactions, reporting and accountability. The accounting executives were able to generate reports that used to take weeks to consolidate, in a few hours or days depending on the complexity of the reports. Given that a big-bang approach was adopted for this ERP system implementation, the management was able to quickly get reports that were accurate reflecting on their cash flows and revenues.

Table 4.17 summarises the benefits that PackCo derived during its ERP system deployment.

Table 4.17: PackCo's ERP Benefits from Project Deployment

Benefit	Description with Supporting Evidence/Quotes (Provided by PackCo’s GM Enterprise Solutions)
Empowerment of employee	Empowerment in terms of authorisation and the value of allowing managers to manage their own budget and targets based on their cost centres. <i>“They manage their budget and having an ERP system allows you to have that top down set in the budgets based on what the company budget is and then gets broken down into the lowest level cost centre and then each cost centre manager is empowered to manage a budget.”</i>
Establishing common vision and goals among staff members	Company goals were translated to business processes and incorporated into the ERP system. End-users were able to monitor if the departments or units had achieved their monthly or quarterly targets. <i>“Definitely because we do have to follow our values and we are measured on it as employees”</i>
Better communication among business units	Business units such as manufacturing, sales and procurements were highly integrated and information access between the units improved the supply chain across the various departments. <i>“The sales (department) need to put in their forecasts and do their planning and budgeting which then feeds into the manufacturing team for their planning, which then flows to the procurement team to buy the raw materials and the primary materials required for manufacturing.”</i>
Personnel reorganisation	Job descriptions were revised after the implementation of the ERP system, particularly in the finance department. Finance officers now have the capability to oversee the financial transactions of all divisions instead of individual sites, which used to be more time consuming. <i>“...somebody was looking after one particular site in terms of finance is no longer looking at that one site; they might be looking at the whole division now because it’s centralised, they don’t have to go through various spread sheets and whatever they used beforehand”</i>
Improved individual performance / efficiency	Administration staff had information available to them when dealing with a supplier or customer. They had up to date information available and could deal with customer or supplier issues more appropriately. <i>“For example, if you’re talking to the customer, they will know exactly how many invoices are outstanding, what value is it, what is overdue.”</i>
Increased customer satisfaction	Better access to data by sales staff via the centralised database made response times faster and this led to improved reverse logistics i.e. return of defective goods. <i>“Improved customer service as well, for example, if they were to return some goods that were damaged in transit, we can provide a customer with credit straight away or handle customer complaints quicker”</i>
Organisation changes	Shared services were created in the areas of IT service and support as well as the financial services which led to lower operating costs. Shared services were the consolidation or centralisation of the departmental functionalities across the divisions.

	<i>"We have shared service centres and in that sense, it has centralised certain functions, not all of it."</i>
Improved overall profit	Reduction in operation costs increased the profit gained. <i>"With the inventory reductions and all that, it should reduce costs"</i>
Standardised user interface	Allowed users to move from one division to another with ease due to the similarity of the system and its interface. <i>"It (ERP system) allows users to move from one division to another or one role to another since they're all using the same system."</i>
Improved data quality	Financials were automatically updated real time and information obtained from the system was accurate. <i>"One of the biggest benefits of an ERP system is that when you're processing sales and posting invoices, your financials are automatically updated so you don't have to wait overnight for some interface to update your financials"</i>
Improved shared services among the units	Shared finances and IT support services were centralised in Melbourne. Instead of having an IT team in the different divisions in PackCo, the implementation of the ERP system led to the formalisation of a single IT team to oversee the ERP system infrastructure in PackCo. <i>"We are part of a shared service group, from here we support the whole country but there are also accounts payable and accounts receivable functions that are part of the shared service."</i>
Increased understanding and control of processes	Increased control of business could be observed from the auditing perspective. There was greater accountability with the use of the ERP system. <i>"I can go into SAP and I know who posted a sales order or who changed a sales order there. All that ability is there."</i>
Better reporting and auditing	Reporting applications available from the ERP system provided greater flexibility and customisation. Information could be easily customised with the reporting tools available in ERP system, which was accessible to end-users, management and accounting firms. <i>"If they want to analyse their sales by certain customer segments or via divisions they can do that themselves."</i>
Provided greater ease of integration, scalability or portability of IT systems	Reports generated by standalone business groups or divisions can be immediately utilised by the corporate head office. The finance modules of the subsidiaries and divisions in other region were linked to the corporate head office's ERP system. <i>Example: Evidence of IT scalability, integration from adding acquisitions (companies) to the ERP database</i>
Conformity to new taxation, laws and regulations	The ERP system vendor provides patches or enhancement packs for changes to laws and regulations. <i>"They (SAP) will provide patches or service packs or whatever they are called, enhancement packs for those changes. GST was reflected once."</i>
Improved decision making and planning	Managers had access to more useful information made available to them via the ERP system reporting tools. <i>"information is available to them to make better decisions."</i>
Improved overall productivity	Overall, there was increased productivity from a decision-making perspective because of the availability of centralised information and less time required to make business-critical decisions. <i>"They (management) have information that centralise, because they don't have to go and run 20 different reports and combine them to get the one piece of information that they need. It's all central."</i>

Governance of ERP Implementation

Although the in-house ERP implementation team did not have a formal or structure evaluation tool to review the ERP system performance, informal feedback from middle managers were solicited to determine the performance of ERP use. The feedback indicated that there was a great level of end-user satisfaction with the automation of many financial transactions and the ease of finance reporting.

The governance of the ERP system, in particular the management of use and performance monitoring, was seen as important elements for the successful implementation and use of the SAP platform. The key areas found to be important for governance were:

1. Constant review – reviews of existing business processes were undertaken regularly with reengineering to fit or extend the ERP system’s functionalities;
2. Adhering to the ERP system’s best practice model – use of an established model as a basis for benchmarking business processes. Benchmarking allowed the company to have a basis of comparison to determine if any improvements have already been achieved;
3. User training & documentation – proper use of the ERP system to reduce errors and more efficient use of the ERP system;
4. Maturity of usage – allow learning and innovation to occur so that users would be increasingly well-versed in the use and capabilities of the ERP system implemented;
5. Innovation – allowing change requests and the IT team to engage with business to come up with new initiatives.

“Streamlining the end-to-end processes and getting a best practice model will help bring out more benefits” GM (Enterprise Solutions)

Reengineering of the existing business processes became intricately part of the implementation efforts because PackCo’s in-house implementation system team and management realised that, despite implementing a number of ERP system modules, not all the functionalities and applications were planned to be utilised. The ERP system modules that were installed contained a set of industrial “best practices” and processes that were not considered during the ERP system project initiation. The early stages of the ERP system implementation focused primarily on financial workflows, processes and reporting. PackCo’s ERP system manager claimed that not all functionalities and applications found in the modules that have been installed were utilised. There is still potential for improvement by reviewing the ERP system performance and identifying what can be changed to conform to the ERP system’s practices.

4.6.4 Post Implementation & Further Upgrades

PackCo’s ERP post-implementation arrangement was to have their own in-house implementation team to manage and support the system. This resulted in new hires, through the recruitment of new personnel that had the technical knowledge to support SAP R/3 system. As part of the contractual agreement, SAP was also required to provide on-going support and software updates.

The post-implementation efforts were also overseen by the same steering committee that included the CFO and CIO. The CFO was particular active after the implementation in the monitoring of the SAP R/3 performance as he was the primary sponsor for the project. There was a strong need to understand the returns on investment on the system.

Although being considered a successful on-time implementation by the PackCo’s ERP manager, the SAP R/3 has further undergone enhancements and version upgrades. The SAP platform version that

PackCo originally implemented was R/3, and undergone an upgrade to version 4.7 in 2004, with plans to further upgrade to version 6.0 (at the time of the interview). The in-house implementation team was also constantly reviewing and adding new functionalities to enhance its capabilities and ensure that there was compatibility with other emerging technological platforms.

“We are adding more functionality, so the initial financials and procurement implementation was completed, but now we’re adding more and more functionalities [e.g. CRM capabilities].” GM (Enterprise Solutions)

The SAP platform that PackCo initially purchased to consolidate finances have now been extended to an enterprise-wide platform that automate many aspects of its business operations. This was also driven by top management who have realised the potential of the ERP system to deliver more value for the business. Hence, there was strong justification for PackCo to further improve its SAP capabilities by installing CRM, SD, PM, PW and PS modules. While the implementation of the original SAP R/3 did not address the need to improve sales and distribution business operations, the senior management recognised the potential of data quality that the SAP platform could deliver for other business units.

The subsequent installation of the new modules led to further reengineering of processes and this had a huge positive impact on the sales and distribution performance in PackCo. The reengineered efforts resulted in a “leaner” supply chain, with less inventory levels held by the PackCo. There were less instances of overstock due to the planning capabilities provided for sales and distribution as well as the adoption of “best practices” embedded the SAP modules.

A meticulous approach in governing the ERP use and constant review of system performance helped PackCo optimised many of the functionalities that were included with the modules. The in-house ERP implementation team was on the constant lookout to identify under-utilised functionalities, and attempted to find solutions to encourage business units to use them. In one instance, the in-house implementation team managed to convince end-users to adopt a functionality that was embedded in the sales module that allowed sales orders to be directly transmitted to the finance (billing) department.

Other future approved plans for PackCo was to move its IT infrastructure towards a Service Oriented Architecture (SOA) and also implementing a cloud-based solution in the next few years. A SOA will provide PackCo greater flexibility to integrate its non-SAP applications into the ERP system and also allow customers and suppliers to exchange data with its ERP system. Although the plans have been approved, the ERP manager claimed that PackCo’s IT infrastructure was not ready for adoption of SOA as its SAP platform needs to be further enhanced to ensure its compatible with other SOA technologies.

Table 4.18 summarises the benefits that PackCo derived in its later post implementation stages.

Table 4.18: PackCo's ERP Benefits from Post Implementation

Benefit	Description with Supporting Evidence/Quotes (Provided by PackCo's GM Enterprise Solutions)
New business alliances / partnerships	Use of ERP system allowed for new e-commerce partnerships to be established with suppliers and customers on a large scale. <i>Through E-commerce I'd call it [...] some of them (suppliers) are but not all.</i>
Business innovations	The ERP system provided the ability to develop and deliver new products to the market and become faster and more responsive. New markets were identified and new product lines created to cater to emerging markets and fast changing demands. The ERP system implemented allows PackCo to identify key areas of customer needs and develop better products to cater to that needs. <i>An example is the implementation of an e-commerce platform based on the information from ERP system for customers to order online, which allows PackCo to respond more quickly to customer orders. Speed to market and new product creation is faster via e-commerce platforms.</i>
Cost leadership	ERP system allows for the optimisation of the inventory holdings to reduce the long lead times for inventory. Costs are reduced due to less inventory storage of raw materials. <i>"We can plan working backwards, say when do we need what stock at what time, rather than saying you might take 6 months and put it there and waste the space in the warehouse. That helps in space, the payment office, all of that"</i>
Product / Service differentiation	From a service perspective, new e-Commerce services and other EDI initiatives are now being offered to customers and suppliers with the help of the ERP system. <i>"New service, yes. In the e-commerce, space is an example but not in terms of a product itself."</i>
External linkages to other organisations	CRM related information was relayed to other partners using EDI and the ERP system platform, providing a channel for information exchange to improve the supply chain performance. <i>"Providing customers the ability to trade with us electronically via EDI and things. As with our suppliers, we can send purchase orders to them either by fax, email, EDI, any of those methods."</i>
IT flexibility for organisational change	Acquisitions or establishment of new business groups can be easily integrated with the ERP system due to its scalable nature. There will be no need to recode or program the application. <i>"It's just a matter of adding another company code and creating a structure within SAP."</i>
Reduction in cycle time	Forecast and planning has been improved. Customer responsiveness also improved as a result of better forecast and planning. <i>"Instead of telling customer say we can give you something next week, we can pretty much, because we are planning as well ahead."</i>
Improved product and service quality	The use of ERP system provided the ability to maintain proper stock levels and assurance processes for inventory via the WM module. <i>"Simple thing like being able to maintain a bit of materials and have quality assurance process behind that."</i>
Allowed the organisation to do business more effectively	In the ERP system manager's opinion, financial and automation related benefits allowed PackCo to become more streamlined and effective. Senior management, on the other hand, recognises the timesaving benefits and some of the soft benefits associated with ERP system use. <i>Example: Due to the increased productivity of the management as result of the FI-CO and MM implementation, the senior management decided to implement other modules to extend the capabilities of the SAP platform.</i>
Improved supply chain management	Reduction of costs associated with inventory storage as forecast and business intelligence capability has improved. Less wastage on storage costs and more optimisation of stock levels for manufacturing. <i>"A lot (benefits) given for the transportation planning because it's integrated, you have the manufacturing forecasts and plans in place, the logistics planning can happen as well."</i>
Improved partner's services	ERP system use allowed partners to deal with PackCo in a more timely and accurate manner. The EDI service offered by PackCo and used by partners allows them to communicate more efficiency, providing mutual improvement in services. <i>"Yes. It has improved but can be improved more [...] deal with us better."</i>

4.6.5 PackCo's Summary

PackCo's ERP implementation was driven by the management needs to consolidate their finances across a number of divisions and business units, but the SAP platform originally purchased had evolved to an enterprise wide platform supporting its critical business operations. The senior management played a crucial role in extending the ERP capabilities of the SAP platform by sponsoring the installation of the new modules on top of the existing FI-CO and MM modules.

Change management and end-user training played important roles in ensuring the successful big-bang deployment of the ERP system. Besides PackCo's senior management driving improvements, the in-house implementation team was also proactive in continuous improvements efforts to ensure that the functionalities in the ERP system were optimised for performance. The in-house implementation team championed a number of improvements (e.g. post-implementation business reengineering) that led to the streamlining of the business operations that ultimately provided greater customer responsiveness and a more efficient supply chain.

PackCo's ERP implementation also resulted in a change in the manner the organisation managed its IT assets. A formalised IT governance structure was created as part of its learning outcomes to ensure that its IT assets are performance managed and well utilised. The governance structure also helped ensure that end-users were well trained and provided business units opportunities to further enhance their business process.

4.7 ConfecCo

ConfecCo was one of the largest food manufacturers in Australia that produced fast moving consumer goods (FMCG) e.g. chocolates. Its history could be traced back to 1922, when its owning UK corporate office set up an office in Australia through the acquisition of two other local Australian companies. Its first Australian office and factory was situated in Tasmania, Australia. In 1967, it further acquired another local chocolate company and this acquisition provided ConfecCo with another manufacturing facility in Victoria, Australia. The Australian office continued to report to the UK head office.

ConfecCo's UK head office had a merger with another FMCG company, DrinkCo, in 1969. The merger between ConfecCo UK and DrinkCo increased the product lines substantially. The newly created company produced soft drinks and confectionaries, including chocolates. There was little change to the organisational structure until 2007, when senior management in the UK head office decided to separate the company into divisions to allow for more focus within the business operations: i) confectionaries; and ii) beverage. The demerger took place in 2008, leading to two separate divisions in the UK.

The demerger was similar for the Australia and New Zealand (ANZ) office. However, instead of just having two business entities like in the UK, there were three entities for the ANZ office. The demerger led to the creation of ConfecCo in Australia, a New Zealand counterpart for ConfecCo and an ANZ beverage division. The ANZ beverage division was later sold to a Japanese company in 2007, and the Australian, New Zealand and Japanese-owned business entities officially separated in February 2009. Both the Australian and New Zealand divisions continued to report to the UK head office. Later in 2010, the UK owner of ConfecCo was to be acquired by an American FMCG company. With the latest acquisition, this meant that ConfecCo in Australia and its counterpart in New Zealand had become American-owned.

ConfecCo's confectionary products could be found in all major Australian supermarkets and grocery shops. It had two other primary competitors that sold similar confectionary products. With the exception of cocoa beans which are sourced from overseas, most of the raw ingredients and materials used in its supply chain were primarily sourced locally in Australia.

Despite having a comprehensive organisational structure (See Figure 4.7) that covered all business functionalities, ConfecCo did outsource some of their activities to third party providers. The key activities and functions which were being outsourced were backroom processing, accounts management and basic IT support.

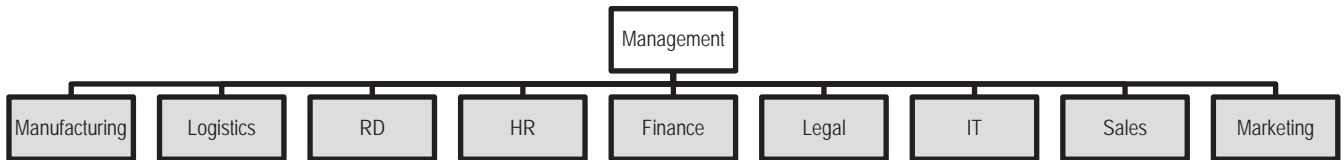


Figure 4.7: ConfecCo's Organisational Chart

4.7.1 ConfecCo's Reasons for ERP Implementation

ConfecCo's ERP implementation was first initiated in 1993, when the confectionary and beverage divisions were under the same Australian office, to provide integration between the divisions and to promote automation and efficiency. The areas which were identified for ERP improvement were finance, sales and manufacturing operations within the Australian office. Due to the 1969 merger, there were a lot of duplications within their business operations (for confectionary and beverages) and the management wanted to remove the redundancies in the organisational setup.

The senior management wanted to push for business process reengineering and integration to drive organisational efficiencies and to enhance the quality of information. Before the adoption of the ERP system, the IT systems used by the company were diverse and consisted of various "custom-made" systems. These custom-made systems were provided by a number of different IT vendors (international and local), using dated programming platforms such as COBOL. There was a strong push by the management to consolidate these IT systems into a single system to facilitate communications and integration between the business units and to have standardisation of business processes.

"It [IT infrastructure] was a real mix-mash before SAP [therefore] we needed a solution" (SAP Project Manager)

4.7.2 ConfecCo's ERP Project

SAP Australia was selected to be the ERP vendor for ConfecCo's 1993 ERP project and the version that was implemented was SAP R/3. The project commenced in 1993 and went operational in 1995. ConfecCo's senior management decided that four SAP-based modules were necessary to bring about the improvements that they required for its integration and automation efforts:

1. Finance & Controlling (FI-CO)
2. Materials Management (MM)
3. Sales & Distribution (SD)
4. Production Planning (PP)

After the deployment in 1995, ConfecCo's SAP platform underwent further enhancements that saw the installation of four other modules into the system. They included:

1. Customer Relationship Management (CRM)
2. Human Resource (HR)
3. Advanced Planning & Optimisation (APO)
4. Business Warehouse (BW)

The estimated project implementation costs for the project which began in 1993, was close to approximately AUD5 million and took close to 2 years to go-live. A breakdown of the costs could not be obtained. ConfecCo's SAP manager whom was being interviewed, could not recall the exact figures, for it had been almost 15 years since the project went live. Since then, ConfecCo's SAP platform had also undergone a number of upgrade projects which varied from AUD200,000 to AUD7 million. To-date, the total costs spent on ConfecCo's SAP platform amounted to more than AUD10 million.

The ERP vendor, SAP, provided most of the manpower required for the technical development of the IT platform. An implementation project team, comprising of SAP-employed consultants and developers, and ConfecCo's IT staff worked on the project development. ConfecCo's SAP manager was part of the implementation team, that also managed in-house IT staff members whom provided mostly end-user support. The implementation project had involvement of ConfecCo's end-users at all levels, and senior (e.g. CEO, CFO, CIO) and middle management were also included. However, the involvement of end-users was considered fairly limited, as the implementation was to drive business reengineering by redesigning existing business processes from bottom-up.

Among the senior management who had participated in the project, the CFO was most active as he was the main sponsor behind the ERP implementation. Although the adoption of the SAP-based ERP system affected many stakeholders, both internal and external, the involvement of suppliers and customers were limited. Only a few major suppliers and customers were consulted on changes made to the existing business operations.

Change Management

Despite the ERP system being prioritised by senior management, change management was not carried out efficiently when the ERP system was deployed in 1995. The key reason was that the many legacy systems to be replaced by the SAP platform were owned by the Finance group and the group was not a strong advocate of change management. The managers in the group did not understand the implications of change well. In addition, the implementation team experienced a strong resistance to business changes and reengineering from the finance staff.

Despite the strong user resistance, the management valued the opportunities provided by the new ERP system for consolidating operations and reporting within the two divisions (confectionary and beverage). The lack of buy-in from the finance managers led to the senior management taking a more active role and a more “hands-on” approach to convince the finance staff to change their mind-sets, to be receptive to business changes, and to embrace the newly designed processes that the SAP R/3 used. Since then, the lessons learnt from the 1995 deployment had helped ConfecCo to build up its own SAP-based competencies and knowledge, and improved its management of business changes and reengineering.

“It’s a competency that we built up a lot since initially, particularly as we understood more about the SAP piece. Originally, a lot of the IT systems in the early 90s, they came under the finance group.” (SAP Project Manager)

Change management had been prioritised in every subsequent upgrade implementation. It not only included user training, but also end-user feedback mechanisms which assisted the implementation team to incorporate end-user feedback into the design of the workflows and job scopes. Managing change was no longer the sole responsibility of the implementation team; an L&D (learning and development) group was established to implement change strategies and to govern changes. The L&D group created a sense of inclusivity through heavy end-user involvement, that enhanced the change management strategies.

Training & Support

The tasks of training and providing end-user support were divided between the implementation team and the L&D group. Subject matter experts (super-users) from business units were nominated by the managers and trained to be ERP implementation champions. Super-users were required to educate their colleagues within the same business units on the business changes that arose from the ERP adoption. The role of the super-users was primarily to create awareness and prepare the end-users for the organisational changes when the business units adopted the use of the SAP platform for their operations.

“We’ll get subject matter experts; they come from various business functions. They are not just champions but know the stuff, but they also champion back to the business units. Fairly easy to understand stuff, nothing unusual there.” (SAP Project Manager)

Training was conducted in workshop sessions by the implementation team or L&D group, with the help of external contracted trainers occasionally. ConfecCo’s implementation team primarily provided the ERP system support and maintenance. The implementation team served as the first point of contact for all technical issues pertaining to the use of the ERP system. Limited aspects of ERP system support such as data conversion and migration, were outsourced to third party SAP support providers.

“The project team which may call on the learning development people, they may call on some external trainers.” (SAP Project Manager)

Table 4.19 summarises the benefits that ConfecCo derived from the development stage of its ERP implementation.

Table 4.19: ConfecCo’s ERP Benefits During Project Development

Benefit	Description & Supporting Evidence/Quotes (By ConfecCo’s SAP Project Manager)
Personnel reorganisation	Nature of jobs was changed and more users were being trained to use the ERP system rather than performing manual reporting. <i>“The nature of people’s jobs has changed. Like if you can’t use a computer (ERP system), you’re not going to get an office job these days.”</i>

4.7.3 ConfecCo’s ERP System Going Operational

Due to the wide-ranging implications of the ERP implementation, the senior management opted for a lower-risk approach to go-live. The deployment of the SAP R/3 system and the four modules were done in stages – a phased approach. The first module that went operational was SD, followed by FI-CO, then MM and lastly, PP.

The key rationale behind a phased roll-out was to minimise the risks associated with a big-bang approach. The SD module was selected to be the first module to be implemented as there was less disruption if the module failed. When the SD module went operational, only a selected few customers were asked to participate in the new SAP system. Most of the customers were still being managed by the legacy system. It was only when the SD module was stabilised, then were the rest of the customers moved to the new SAP platform.

The phased approach extended the implementation time, but it allowed the implementation team to test the modules and to identify technical glitches on a more manageable scale, and avoid the risk of total project failure. With the final delivery of the PP module in 1995, the original modules that were selected had all been successfully installed. The ERP implementation project was considered to be within budget and on-time.

The SD module was seen as the key module that was driving the benefits of the ERP implementation. In the context of ConfecCo’s FMCG business operations, the SD module managed the sales, procurement and logistics activities, which directly impacted the revenue of the company. The FI-CO module was not seen as a main contributor of the core benefits, instead it was only considered a back-end support module that tracked and monitored the finances.

Table 4.20 summarises the benefits that ConfecCo derived from its ERP system development.

Table 4.20: ConfecCo's ERP Benefits from Project Deployment

Benefit	Description & Supporting Evidence/Quotes (By ConfecCo's SAP Project Manager)
Empowerment of employee	Empowerment was perceived to be improving individual productivity. Individuals' productivity (output) increased overall. <i>"At the end of the day it's about getting more output from a person."</i>
Establishing common vision and goals among staff members	To a limited extent, the reporting tools in the ERP system provided a platform for relaying a common vision and goals. The ERP system allowed the employees to respond to changes in market demands and provided flexibility to make decisions to achieve the goals. <i>"Yes, it does supports a bit of vision. It's, once again, the IT system is the tool that supports the business vision."</i>
Better communication among business units	Updated and accurate information provided by the ERP system gave employees a "single version of truth". The ERP system monitored and tracked business units and individuals' targets and provided transparency for the information collected. <i>"In the planning functions, where you got what they call a single version of the truth, so when your people are chasing a particular sales number, or a particular target that everyone knows what that target is and the system actually tracks against that target."</i>
Improved individual performance / efficiency	Due to the availability of better information, the management expected users to increase their individual productivity and to make less mistakes or errors associated with reporting. <i>"The reason of putting in a lot of computer systems, is to make things faster, quicker, more productivity, but in order to achieve that, you got people actually have to be, they have to be able to respond faster, they have to actually work harder"</i>
Increased customer satisfaction	The ERP system provided the platform for collecting information from various parts of the supply chain, which in turn improved customer service e.g. timely delivery of products. However, customer expectations had also grown as a result of better customer service. <i>"Because they (customer) expect you with a computerised system to tell them when and where their products are"</i>
Improved customer service	From a logistics' perspective, there was more timely delivery of products, and better customer account management and trade rebates. <i>"It's also increased customer expectation as well. Because everyone is chasing the on time and full."</i>
Standardised user interface	The standardised interface provided users with a commonality among the various systems and enabled an ease of interpreting and reading of information generated. <i>"People once again become so specialised and focus whether they use one system or another, it probably doesn't really matter because they are feeding information to a common data model"</i>
Improved data quality	The improvement of data quality brought about better efficiency and productivity within the various business units in the organisation. However, tolerance for uncertainty dropped as expectations for accurate data had increased. The impact of data error became larger as many business processes were interrelated and dependent on the same data. <i>"it increases our sensitivity to data quality. So where you have good data quality, things work well but similarly because you are so reliant on that, our sensitivity to that, when things go wrong, it's much higher."</i>
Improved shared services among the units	Shared finances were created across all key departments and allowed for easy consolidation of financial information for reporting and for the management to make decisions. <i>"Shared services created across all the key departments, and we got finance business partners for supply chain, commercial, marketing. And they are able to pull financial information out of the system to support."</i>
Increased understanding and control of processes	Managers had a greater visibility of their groups or departments, e.g. the sales director would know the total inventory value and be able to manage that. However, the implementation of the ERP system also brought about the dangers of "silos" of knowledge – specialised knowledge workers. <i>"It creates a significant risk because you have these people that have key knowledge, and it becomes so lean and specialised, and if that person leave it's a significant loss of knowledge quite often (sic)"</i>
Better reporting and auditing	Auditing could be carried out with greater ease due to the reporting tools incorporated into the ERP system. The downside of the ease of reporting was that it brought about an increase in the number of audits. <i>"We are at the point where they have so much information that it's hard to decided what is important information, they don't discriminate (sic)"</i>
Conformity to new taxation, laws and regulations	The ERP system vendor provided support patches or enhancement packs for changes to laws and regulations. <i>"SAP have to achieve that (conformity) irrespective (sic)"</i>

Improved decision making and planning	The management had access to consolidated reports and was able to see information from other departments and units. This allowed managers to have a better overview and led to better planning. <i>"In a forum where they say it, yes."</i>
Reduction in operation costs	The ERP system provided visibility of resources and raw materials, and allowed the organisation to operate leaner with a lower inventory. <i>"You do track a lot of your resources, raw materials, it certainly does allow you to run a lot leaner."</i>
Reduction in cycle time	Monitoring and tracking capabilities improved performance with respect to logistics, resulting in the reduction of cycle time. <i>"It is more cost effective due to the information available to us. And the same thing applies for cycle times."</i>
Allowed the organisation to do business more effectively	There were improved efficiencies associated with i) reduction of office staff numbers overtime; and ii) total overhead reductions. <i>"Reduction of office staff numbers overtime, total overheads reductions."</i>
Improved supply chain management	The use of the ERP system's standard reporting metrics to evaluate the service delivery had indicated that all deliveries were on time. <i>"It's interesting. When it (SAP) works well, yes (supply chain is improved)."</i>
Reduction in work in progress	Better forecasting and planning enabled by the ERP system brought about leaner manufacturing, resulting in lower inventory and hence reducing the amount of work in progress. <i>"Because you keep less inventory. But you can keep less inventory and you do planning, a lot of it comes down to good planning."</i>

4.7.4 Post Implementation & Further Upgrades

ConfecCo's ERP system had undergone various enhancements and version upgrades since operating in 1995. Enhancements to improve business capabilities were implemented to assist with market growth. New modules of BI (Business Intelligence), APO (Advanced Planning and Optimisation), HR (Human Resource) and CRM (Customer Relationship Management) were added. The ERP system platform also underwent version upgrades from SAP R/3 to 4.0 to 4.6, and to the latest 6.0 (ECC 6.0). The upgrades were required to standardise different versions of SAP systems within the company and also to improve supportability and functionality. Despite undergoing a number of upgrades, the senior management felt that the ERP system had yet to deliver its return on investment. ConfecCo's SAP manager claimed that it took ConfecCo three years to achieve some form of return from its SAP platform. He attributed it to the phased implementation approach, which delayed the integration between the modules and thus impacted on the quality of information that was provided by the ERP system.

Initially, the implementation team thought that only training and support for end-users was essential for implementation. They gradually realised that the user-resistance to business change was impeding the progress of the ERP project. Likewise, the senior management had misunderstood the role of change management for its ERP implementation, which further exacerbated the delays of reaping benefits from the ERP system use. Delays were also attributed to the need for the end-users to be overcome with resistance and to embrace the SAP platform, as well as, their training to be proficient users of the system. The end-users' knowledge of business changes and expertise with ERP was seen as important enablers for using the system efficiently to improve productivity

ERP System Performance Monitoring

ConfecCo's SAP manager suggested that benchmarking and monitoring the system performance was more important than change management, training and support.

“End-users could use competently but not deliver benefits to the business” (SAP Project Manager)

In the case of ConfecCo's ERP implementation, the benefits were achieved by streamlining business processes and removing redundancies. The SAP platform was seen as a tool and provided a mechanism for achieving the results.

The use of the ERP implementation business case and from comparing those outcomes that had been delivered by the SAP platform, provided the management with a basis of what returns had been achieved. ConfecCo's implementation team would use industrial benchmarks to monitor and evaluate the performance improvements delivered by its SAP platform. The use of benchmarks was necessary to track areas that still required attention for optimisation and fixing.

“It's (ERP system) a mechanism to achieve greater visibility, quicker information, better management of your resources ... or whatever. But setting your benchmarks within the system is probably one of the key things (and provides) visibility of what's going on in any particular business process or business system, you can then from a management perspective, track and manage against that to deliver the benefits” (SAP Project Manager)

Channel for ERP System Improvements

As part of the L&D group establishment, ConfecCo had also created formal and informal channels/mechanisms to allow business units or end-users to propose enhancements that could be applied to the SAP platform. There was a formal channel, between the implementation team and business units, that would facilitate discussion on how the applications and tools embedded in the system could be improved for better reporting and decision making. End-users, on the other hand, were able provide their feedback informally via email to the implementation team. Such formal feedback would allow the implementation team to identify areas for improvements and to determine how resources could be prioritised for the relevant enhancements or projects.

“Absolutely, things like promotional management activities, sales and operational planning, some of the recipe management stuff. Users are the ones driving them (changes).” (SAP Project Manager)

ConfecCo's SAP platform had also brought improvements to some unforeseen business areas that included promotion management, sales and operation planning, and receipts management. The implementation of the new business processes for these areas were driven by the end-users and the new processes were found to outperform existing ones. This could be attributed to greater end-users' awareness that permitted the end-users to apply their ERP expertise in more innovative ways.

Table 4.21 summarises the benefits that ConfecCo derived in its later post implementation stage.

Table 4.21: ConfecCo's ERP Benefits Post Implementation

Benefit	Description & Supporting Evidence/Quotes (By ConfecCo's SAP Project Manager)
Business Growth	The use of the ERP system had allowed ConfecCo to increase the return on assets (ROA). <i>"It allows us to be a little more creative with how our supply chain is organised and knowing how we can best utilise our assets, so it's around the business growth comes through getting a greater return on assets."</i>
External linkages to other organisations	Limited form of EDI technology was implemented to exchange information with customers e.g. Coles & Woolworths. <i>"We do EDI, it (SAP) has enabled that"</i>
Business learning within the organisations	Business units and end-users were willing to improve the functionalities and capabilities of the SAP platform via submitting change requests. Likewise, the implementation team had been proactive in assessing the performance of the system based on industry benchmarks to improve glitches, enhance functionalities and minimise bottlenecks within the system. <i>"To an extent, they're tweaking bits and pieces here and there. Trying to improve some of the functions which takes steps out of tasks that would previously take longer."</i>
IT flexibility for organisational change	The ERP system provided ConfecCo with a consistent software platform to carry out organisational change e.g. acquisition or change in business functionalities of units. <i>"(It comes down to) a consistency of a software platform."</i>
Provided greater ease of integration, scalability and/or portability of IT systems	Extension of operations, creation of new manufacturing plants and the incorporation of new products, customers and suppliers became easier with the ERP system. <i>"Because where you expanded operations, you extend the functionality, you extend new plants, new products, new customers, new materials, so it's, from that perspective yeah, but kind of a so what, so it should."</i>
Easier maintenance of IT systems	It was easier to maintain the systems initially, but not in the long term. The upgrades and enhancements required for the ERP system over the long run made it expensive and complex to maintain. Complexities build up over time as more and more features were added to the ERP system, and the implementation team was reluctant to remove any redundant functionalities because of the lack of knowledge in those functionalities. <i>"Because of the specialisation of knowledge, people are then fearful of moving out elements that are now redundant"</i>
Improved product and service quality	There is evidence of higher quality and consistency of customer service brought about by the use of the ERP system. Quality control could be better managed with the use of the CRM module. <i>"Yes, it does allow a high degree of consistency of that. Quality control is much better now."</i>
Reduction in lost sales from lost orders	Monitoring and tracking capabilities prevented any error associated with customer orders. <i>"Because you can track things and lost sales can be avoided."</i>

4.7.5 ConfecCo's Summary

ConfecCo's ERP implementation project of a SAP-based system was driven by the senior management's effort to streamline the company's business operations and processes. Due to a merger in 1969, the Australian company had to operate two divisions – confectionary and beverage – which ran many duplicated and redundant business operations. Although ConfecCo's original implementation was concluded in 1995, the SAP platform had, since then, undergone a number of version and module upgrades, and had cost the company more than AUD10 million at the time of the study.

The project had a shaky start that made the senior management realised the importance of change management. The lack of end-user support led to senior management taking an active approach (e.g. participating in training program) during the ERP implementation. Despite heavy user resistance, the system went live with four modules using a phased approach.

Although the phased approach did not deliver all the ERP benefits associated with modules integration, it did promote business learning of ERP usage and minimised the risks associated with an ERP implementation. The organisation, as whole, understood the business-related impacts of ERP projects better. The accumulation of "lessons learnt" (organisational learning) within ConfecCo led to the establishment of an L&D group that supported with ERP change management, end training and business requirements analysis. This inevitably created a culture of innovation and formal ERP governance within the organisation.

4.8 DairyCo

DairyCo was a private company that was collectively owned by Australian dairy farmers. Besides being a major dairy producer in Australia, DairyCo was also one of the largest exporters of processed dairy-based products, to all international markets. DairyCo was established in 1950 and operated a single dairy factory in Victoria. Since then, DairyCo had experienced a healthy increase in its membership and had acquired a number of factories in its growth. DairyCo's owners consisted of over 3,000 farmers, who were also shareholders in the cooperative business model. In 2011, it had an annual revenue of AUD2.5 billion and employed about 3,000 employees (including contract) located across all its facilities in Victoria, Australia.

Although DairyCo operated in domestic and international markets, it was the export business that contributed to bulk of its revenue. It was estimated that 60% of its revenue was generated from its overseas markets. Its biggest overseas competition was based in New Zealand, which was responsible for approximately 30% of the global dairy exports. DairyCo managed its own brands for the local Australian market and its major local customers were supermarkets and formula milk manufacturers. DairyCo operated processing plants and manufacturing facilities throughout the state of Victoria. These facilities produced a range of products that included cheeses, milk powders, baby formula milks, pasteurised milks, spreads, creams and specialised milk powders.

DairyCo possessed a traditional organisational structure (See Figure 4.8) with most of the business units being operated in-house. The only outsourced activities were legal and auditing.

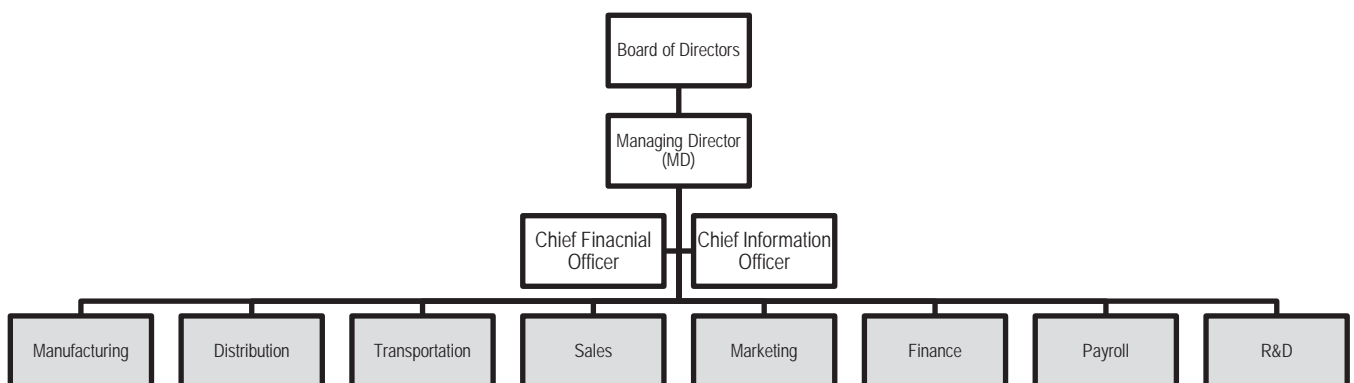


Figure 4.8: DairyCo's Organisational Chart

4.8.1 DairyCo's Reasons for ERP Implementation

The primary reason for the ERP implementation was the lack of integration between the business units that operated within DairyCo. Another important reason was the high business risk of depending heavily on outdated legacy systems for the daily business operations. Many of these legacy systems were

purchased prior to 1987. The finance, sales, production and distribution business units all ran their own internal IT systems for their own operations.

It became obvious to the management after the 1990s that the outdated systems did not have the capabilities to support DairyCo's business growth. The legacy systems also lacked the ability for integration as they were uniquely developed or purchased for the needs of the adopting business unit. Furthermore, some of these systems were heavily customised by DairyCo's IT department.

"We have got lack of integration and that we are exposed to substantial risk having too many legacy systems, so to mitigate that was the main reason behind it." (SAP Project Manager)

These outdated IT systems that DairyCo used required a high level of support and maintenance, especially with hiring staff who possessed the necessary expertise. To recruit and find IT employees possessing the knowledge associated with these outdated systems and obsolete programming platforms was becoming harder for DairyCo's IT department. Therefore, the business case to implement a new ERP system was approved by the CEO in 2001, to modernise the IT systems in DairyCo and to eliminate the issues with IT support and maintenance.

4.8.2 DairyCo's ERP Project

The business case for an ERP implementation was proposed by the SAP manager in 2001. The proposal was approved by the Managing Director (MD). A consulting firm, EY, was approached to conduct the feasibility study. A Request for Tenders (RTF) was initiated by EY to identify the potential list of ERP vendors that DairyCo could consider. Ultimately, EY shortlisted SAP to be the system vendor for DairyCo's ERP implementation. The SAP platform selected for implementation was ECC4.6 and it included two modules: Finance and Control (FI-CO) and Materials Management (MM).

Subsequent upgrades were carried out on the SAP platform and these upgrades expanded the number of modules with the following: i) Sales & Distribution (SD); ii) Production Planning (PP); iii) Plant Maintenance (PM); iv) Business Warehouse (BW); and v) Human Resource (HR).

After appointing SAP as the ERP vendor, the development works commenced in mid-2001. The implementation team constituted of external consultants, developers and managers either provided or recommended by SAP. The team also included members of DairyCo's IT team, such as analysts and developers. The post implementation support was to be provided by the in-house IT team.

DairyCo's MD who sponsored the project, had instructed the senior management to actively participate in the ERP implementation efforts. The CFO was tasked by the MD to be the overall manager responsible for the implementation progress. Subject matter experts were recruited from all business units as part of the feedback process. DairyCo's IT staff not only provided end-user support, but were

also involved in the data migration and conversion of the legacy systems. Training was carried out by external consultants (who also acted as change managers) on the use of the new functionalities embedded in the SAP platform.

The total implementation cost that DairyCo had spent on the initial modules and subsequent module upgrades was estimated at approximately AUD12 million. An estimated breakdown of the total expenditure was shown as below:

Table 4.22: Estimated Costs for DairyCo's ERP Implementation

Project Breakdown	Estimate Costs (AUD)
Software (included annual licenses)	4 million
Manpower / labour (salaries, allowances)	5 million
Hardware (servers, workstations)	2 million
Others (training, traveling allowances, contract, licensing)	1 million
Total Costs	12 million

Change Management

DairyCo's original ERP implementation (and the later upgrade projects) all had their own change managers. The change manager was responsible for mapping "as-is" and "to-be" states with the affected end-users and business units. The mapping allowed for the identification of risk areas, design of new effective business processes and communication of business changes to all affected end-users.

DairyCo's senior management recognised that business changes and improvements impacted the organisation at all levels and that there was a need to have managers who possessed a mix of skill sets and experience to optimise or reengineer existing processes. The involvement of the end-users and gathering of their feedback were important elements for securing users' support for the SAP platform. End-users impacted by change would be provided training and support to help them adapt to the new processes.

"We have got obviously as-is-to-be and what is the path from existed-to-be. So you need to analyse that, you need to analyse basically which processes are going to change, which users are going to be impacted. You need to also, that's something we haven't done 100% is that, each department, you need to think, okay, so that's the department before and after, the before image and after image, and it's good to be bold and really thinking about how to restructure the department as a result of implementation." (SAP Project Manager)

Training & Support

The in-house IT department conducted training classes during office hours, with assistance from SAP’s consultants. The philosophy adopted for the training of end-users was “*train the trainer*”. This meant that super-users from the business units would be trained to be a SAP trainer for their respective business units. The super-users, often subject matter experts (SMEs) from the operational or middle management, were asked to attend these “train the trainer” sessions which educated them in the changes of newly created business process and increased their proficiency with SAP usage.

This practice ensured that in-house expertise with SAP usage was developed before the modules were operational. The in-house IT department provided the support for the ERP system. The role of DairyCo’s ERP system support team was not limited to resolving issues identified by end-users, but also to continuously improve the performance of the ERP system.

“In those bigger projects, it was classroom training and trained by our own people, who were trained as part of the project. Promote the trainer’s trainer approach, with proper training in analysis, like sophisticated logistics, when, who, what.” (SAP Project Manager)

Transfer of Knowledge

Subject matter experts (SMEs) or super-users in DairyCo’s ERP implementation were considered to be owners of the business processes. These SMEs, such as supervisors in the plant facilities, had direct knowledge of the business processes and were familiar with the performance measurements and inefficiencies of the existing processes. They had in-depth knowledge of the internal workings of their business units and would often understand how existing business operations could be further optimised with IT support. The involvement of these SMEs and their feedback were essential for the IT department to further optimise the SAP platform. As such, the knowledge transfer between the SMEs and IT was seen as an important enabler of the ERP system optimisation.

“Say you got person A is the subject matter expert, if that person leaves and does not hand over properly their knowledge to the successor, then you are losing that knowledge” (SAP Project Manager)

Table 4.23 summarises the benefits that DairyCo derived from the development stage of its ERP implementation.

Table 4.23: DairyCo's ERP Benefits During Project Development

Benefit	Description & Supporting Evidence/Quote (Provided by DairyCo’s SAP Project Manager)
Establishing common vision and goals among staff members	The standardisation of business processes and change management projects resulting from the ERP system initiatives enforced common objectives and goals among the users. <i>“You standardise processes and there is change management in projects that you need to make sure actually there’s not much workaround, that compliance and processes is adhered to”</i>

Business learning within the organisations	The change management projects brought about a limited degree of business learning. The business or users improved over time through the learning of better use of the ERP system and its functionalities. This enabled the users to streamline existing processes or to adopt the standardised processes in the ERP system, which led to a more effective and efficient organisation. <i>“It should make (process and workflows) be more visible.”</i>
--	--

4.8.3 DairyCo’s ERP System Going Operational

DairyCo’s ERP implementation which commenced in 2001, took nine months to go operational in 2002. A phased approach was adopted for the original implementation to allow the business operations continuity with minor disruptions. The supply chain was still required to be operating and contracts with customers needed to be fulfilled. Processing and manufacturing facilities had to be operational, regardless of the ERP system go-live deployment.

The phased approach involved sequential go-live of basic key ERP system functionalities across different sites. The FI-CO and MM modules were considered important due to the standardisation of transactions across all business units. The big-bang approach was avoided as it would cause extreme disruption to the business operations. At the same time, DairyCo could not overly commit all key personnel to the ERP deployment. Furthermore, a big-bang approach would have pressured DairyCo to purchase more modules than it required.

DairyCo took close to six months after go-live to achieve some of the expected benefits. The individual ERP system modules, as well as the integration of information between them, delivered the achieved benefits. Individual modules such as finance (FI-CO) and its procurement-related functionalities delivered many automated benefits. Transactions were recorded in real time and for the first time, DairyCo’s management was able to generate reports within days rather than weeks. The Materials Management (MM) module also reduced the errors associated with manual input as many of the business processes had been streamlined, reducing the dependency on the manual recording of data.

Besides the integration and automation benefits, there were significant improvements to the streamlining of workflows, which was not anticipated as a benefit of the ERP system implementation. New contract manufacturing or outsourcing processes and workflows were proposed by their contract manufacturers to unify transactions pertaining to receipt acknowledgement and advance shipping notice. Contract manufacturers who were approached would be invited to provide input on the new design workflows to come up with more effective ways to complete the transactions.

Table 4.24 summarises the benefits that DairyCo derived during its ERP system deployment.

Table 4.24: DairyCo's ERP Benefits from Project Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by DairyCo's SAP Project Manager)
Empowerment of employee	Increased visibility of information allowed employees to make better decisions and the increased functionality provided by the ERP system allowed the employees to do more analytical forecasting.

	<i>"Visibility. I (as an employee) can understand that this is going to be made."</i>
Better communication among business units	Automation of workflows made communication easier and faster. For example, authorisations for transactions became automated. Emails were sent out via the ERP system to the responsible parties to sign off. <i>Other examples included the forecast reports generated by the Sales department being transferred to the Production department via the ERP system modules.</i> <i>"Basic example is proof between sales and production. Their forecast is transferred into production planning and if their orders are higher than the original forecast, the discussion is basically good."</i>
Improved individual performance / efficiency	Analytical capabilities embedded in the ERP system modules allowed better access to information, resulting in better decision-making. KPIs were used to evaluate individuals' performance and the KPIs indicated that there was an increase in individuals' performance after the implementation of the ERP system. <i>"Nowadays, what we do is, we have got those reviews actually happening, so we have started recently starting into looking at KPIs, so we do actually actively chase evidence of these improvements."</i>
Business growth	One of the rationales for the implementation of the ERP system in 2001 was to ensure that the organisation was able to support business growth. The organisation would have experienced difficulties operating due to its healthy growth without the use of ERP system. <i>"The business was growing, so it was impossible to imagine that actually we could support the business growth without (SAP)"</i>
Standardised user interface	Standardised users interface helped employees to understand the ERP system's functionality and to interpret data easier. Users from different job scopes could use the same analytical reporting tools in the ERP system to generate reports for different purposes. <i>"I mentioned to you that guys walking past someone and yes, (they will be able to understand other's report easily) (sic)"</i>
Improved data quality	Evidence of improved data quality could be seen from the reduction of product lines. Management could now easily identify redundant products which might not be cost-effective to maintain and to decide to remove it from the product offering. Contract suppliers who provided the best prices based on volume could also be identified easily, allowing for better use of scale economics when outsourcing. <i>"We got less products because you find that these two products are similar, actually why do we have two or redundant products or in purchasing that you do buy what you got product for in bigger volumes"</i>
Improved shared services among the units	Not only had the IT department benefited from the implementation of the ERP system, there was consideration to create a shared service for MM, which would service all departments and business units within DairyCo. <i>"Other than IT, but what is seriously considered now is material management being as a shared service."</i>
Better reporting and auditing	Auditing had improved vastly due to the implementation of the finance (FI-CO) module. Analytical and tax reporting tools incorporated in the ERP system allowed the finance department to cut down the time and resources required to generate reports dramatically. The accounting firm, Deloitte, which was responsible for auditing the accounts, spent fewer days to close the financial year accounts. Sustainability or green-related reports could be easily generated using the tools provided by the ERP system vendor. <i>"Entering (and extracting), quality of information, less sort of bickering this or that"</i> <i>"One version of the truth."</i>
Conformity to new taxation, laws and regulations	Changes in taxes e.g. Goods and Service Tax (GST) or payroll could be easily modified in the ERP system. The ERP system vendor was responsible for providing the enhancements to the ERP system to cater to the changes in taxes or laws. <i>Example: Reporting to the State government in sustainability KPIs</i>
Easier maintenance of IT systems	The consolidation of various legacy systems into one single ERP system platform simplified IT support. It removed the need to support different technologies and required less complex expertise. <i>"Any maintenance in SAP, like we got typically many options, so which one is, so you need good expertise and another one is the integration factor on its own (to facilitate) maintenance"</i>
Improved decision making and planning	The implemented ERP system modules of finance (FI-CO) and material management (MM) provided the management with accurate information about forecasts, lead times and prevented guess-work. However, information from production planning (PP) was more difficult to extract, as it was transactional-based and decision-making was made on an annual basis as reports could only be generated on an annual level. <i>"I mentioned several times in production planning in particular, decision making can, SAP/ERP is a transactional system, so now when we are doing the annual report system thing, we are, with the decision making to be more improved based on the facts"</i>
Reduction in operation costs	There was clear indication of lower stock or inventory level. There were less raw materials and packaging stocked because the ERP system automated the restocking process. The ERP system would generate a restock order once the inventory level reached a certain point.

"You know those things, production ingredients, packaging, we don't keep existing stock just in case because you don't need to because you know the system is going order it for you"

Improved overall productivity

From a production facility's perspective, production planning had increased the accuracy and there was high attainment of meeting demand. Production plans that had been formalised from sales orders were carried out properly with minimal errors and losses.

"Production planning is better in terms of accuracy and is high attainment of meeting demand (sic)"

4.8.4 Post Implementation & Further Upgrades

The ERP system project had undergone review after going-live in 2002. From the period of 2002 to 2008, the SAP platform installed SD, PP, PM and HR. At the time of the interview, the BI module was being implemented. Also, DairyCo's senior management had plans to increase the capabilities of the SD module by incorporating asset and quality management functionalities. The management was also exploring the possibilities to utilise electronic data interchanges (EDIs) to facilitate e-commerce transactions. However, there were security concerns regarding business partners accessing DairyCo's sensitive commercial information. Other industrial applications were also being studied after the version upgrade to version 6.0 in 2008.

There were long-term financial benefits which were not expected from the ERP system implementation. The ERP system financial module had improved DairyCo's ability to obtain more advance funds (loans) from financial institutions. The use of proven processes developed by the ERP system vendor, SAP, provided the financial institutions with more assurance, that any orders processed in the ERP system would be managed with a high level of accountability. Any outstanding sales orders recorded in the ERP system would be processed and would give a clear indication of the financial status of DairyCo.

The upgrade projects that were done after the original go-live, were implemented by a team which consisted of internal IT staff and contracted developers. This was because DairyCo was still lacking the technical SAP expertise to implement the newer modules. The ERP vendor, SAP, provided on-going support for DairyCo. Monthly formal meetings with the SAP development teams were held to discuss maintenance and support issues. Feedback was provided by DairyCo back to SAP on debugging problems which they had encountered for the upgrades and enhancement packages purchased.

Protocol for ERP Improvements

There was also a formal protocol that allowed middle management, business processes owners or subject managers to propose or nominate new "ideas" on better ways to carry out business processes. These ideas would be reviewed by the IT steering committee. Accepted nominations were converted into business requirements and an IT service request would be created and get worked on by the IT department.

"there's that middle management roles, business processes owners or subject matter experts, so we push for that protocol that basically people put their programs forward, their ideas go to those

nominated subject matter experts and with them, they are going either help them in solving problems or talking with them about their ideas and then with their expertise, it's formulated, converted into business requirements, IT service request is created and then, that is the most common way, it all comes into idea to me.” (SAP Project Manager)

User's ERP System Expertise Management

From the SAP manager, there was always the need to investigate the end-users' use of the SAP functionalities. When new functionalities were introduced to the end-users, it would take time and resources for them to mature and fully understand the ERP capabilities. By ensuring that the end-users were using the applications correctly and optimally, the in-house implementation team could then further introduce more sophisticated ERP applications.

“We have got a strategy (for end-user) which is obviously based on SAP where things are considered, when we believe new functions should come in.” (SAP Project Manager)

ERP System Performance Monitoring

DairyCo's in-house IT department proactively monitored the SAP contributions to business operations improvements. Industrial best-practices were used as benchmarks to determine the performance of DairyCo's SAP platform. In DairyCo's SAP manager's perspective, the go-live of any module was not considered the end of the project, but rather the primitive stages of the project.

“And what we are in the process of right now, is that and I mention it before, you can have very good project management and change management during implementation, but the go-live is not the end. It is the start, and we do need to understand better with on-going change management.” (SAP Project Manager)

Management of ERP Improvement Projects

The progress of the ERP projects in DairyCo was monitored by an IT steering group that reported directly to the senior management. The IT steering group membership also included business unit managers. The SAP manager was responsible for the agenda of the meeting, detailing of the reports and ensuring that as much information about the SAP platform performance was made available to the top management. During the meetings, the discussion would be about the prioritisation of projects and/or what improvements were further required for the business units.

“On that note, we have got very, a very, very good setting that we have got what we call IT steering group, with regular meetings and that is the level of direct reports to our CEO. So at that level, we are talking about what needs to be done and again, it's my role to prepare as much

information as and agenda for these meetings, but the communication that production guy does not feel short-changed because we focus on export sales or we focus on this, because it is all quite transparent so we're talking about it at that level and as a group, we agree that is the direction to go, selecting the project.” (SAP Project Manager)

The other main duty of the IT steering group was to determine if the SAP modules/functionalities implemented had achieved the planned objectives and also if the users had matured and gained the necessary experience to understand the concept. The committee was also a forum to address all end-users' needs equally and this demonstrated that no special preferential treatment was given to any particular business groups. The group would plan and prepare the action plan for IT objectives set during the meetings. The group would also allocate the extra resources for IT improvement or SAP upgrade initiatives required by the business units. Sourcing arrangements would also be decided by this group, e.g. use of external consultants, to minimise the disruption on business operations when external parties were involved.

One of the major challenges that the steering group experienced was that decisions to improve and reengineer business processes were often complicated by SAP's introduction of new products and applications. Often, even before the modules that DairyCo had implemented were yet to deliver results or to become optimised, the group would be forced to consider a new compulsory upgrade which the vendor mandated.

“Yes, so that's the process we are in now. That's sort of my responsibility as portfolio management. We want to introduce this function, say asset management or quality management, but what about sales and distribution, we have lived with it for the last four or five years, does it still do for us what we expect it to do, or shall we, say we review it and bring it to a higher level because we got now experienced people who understand the concept, so we can actually ask for more complexity and it's available because SAP in the meantime develop their functionality into higher level as well.” (SAP Project Manager)

Table 4.25 summarises the benefits that DairyCo derived in its later post implementation stages.

Table 4.25: DairyCo's ERP Benefits Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by DairyCo's SAP Project Manager)
New business alliances / partnerships	Partnerships with financial institutions were established to facilitate transactions and payments. Supply chain information integration carried out by other clients e.g. Nestle, was made possible with the standardisation of processes embedded in the ERP system. Clients' confidence in dealing with DairyCo grew. <i>“I mentioned to you those banks. Another thing is that, as we have got, as I told you we are actually supplying some major businesses such as Nestle and obviously when these businesses realised that we have got recently ventured SAP system implemented, their confidence in dealing with us is higher”</i>
Business innovations	Sales order processing and workflows became streamlined. The use of e-commerce or EDI-driven channels opened up various supply chain levels with different customers e.g. Woolworths, Coles and suppliers. However, there was difficulty in unifying the processes and workflows as different customers and suppliers had their own unique business processes.

	<p><i>"The whole process of process sales orders is definitely different now than it was before. We have got more and more those electronic channels open at various levels with various, but we try to unify at some stage"</i></p>
External linkages to other organisations	<p>EDI initiatives were adopted to facilitate e-commerce between suppliers and customers e.g. Coles, Woolworths and VISY. The contract manufacturing functionality allowed suppliers to communicate with DairyCo via EDI exchanges that were enabled by the ERP system platform.</p> <p><i>"Both at the suppliers and customers and even for example, the contract manufacturing, it is actually, you would say it is probably suppliers, but it is like partnership."</i></p>
Increased customer satisfaction	<p>Clients' confidence in dealing with DairyCo grew after the implementation of the ERP system modules. The ERP system provided by SAP incorporated a high degree of accountability and rules, ensuring that there was minimal error with sales orders and processing. Sales managers were also able to provide customers with accurate stock levels and delivery time by accessing the ERP system.</p> <p><i>"If a sales manager is sitting in Singapore with our customers and you can show from this PDA or laptop, 'look, your orders is like this and that'. That's obviously something what must be seen as positive from other than say, 'I will call you or wait a second, I will call my assistant.'"</i></p>
Organisational changes	<p>There was the creation of the IT Steering Group (ITSG) during the ERP system project implementation. The ITSG played an important role in managing and governing ERP system-related initiatives. The ITSG provided the strategy on how modules/functionalties were prioritised and how business requirements were gathered and investigated.</p> <p><i>"Probably the example of that IT steering group, ITSG is very important that we have got now very good protocol about our information."</i></p>
IT flexibility for organisational change	<p>The ERP system provided greater ease of integration for acquired companies or subsidiaries. Data from acquired companies or business could be quickly assimilated into the main office's ERP system. The information of newly built production sites or facilities could also be quickly incorporated or set up in the ERP system.</p> <p><i>"In terms of new production sites or acquiring new company. These are things that you can do with, for the reason."</i></p>
Improved overall profit	<p>There was evidence to indicate that the ERP system had resulted in a reduction in inventory levels, better working capital and sales order fulfilment.</p> <p><i>"I give you that example of reducing working capital being stocked, so we definitely are acing in that regard and then BI is going further to assist with that."</i></p>
Increased understanding and control of processes	<p>Users now had better clarity of the business processes due to the change management projects. With the constant ERP system performance reviews and audits by the IT steering committee, the middle management and subject matter experts were given opportunities to improve their existing business processes through formal consultation. This led to an increased understanding and control of the business processes.</p> <p><i>"We have got people on project who do understand it that it is going to stay like that, so you need to work on it, continuously invest in projects."</i></p>
Reduction in cycle time	<p>There was no direct reduction in cycle time, but there was reduction in the time taken for suppliers to be paid for the outstanding sales orders that had been processed to DairyCo.</p> <p><i>"Basically get money in earlier, which is the days of sales outstanding (DSO) and again, it's only possible with the system and also a question of predict the stock quicker, make sure we have got generalising stock when we use them."</i></p>
Allowed the organisation to do business more effectively	<p>Overall, the business was able to be more efficient as a result of using fewer resources, having lower inventory level and having less errors, leading to lower production costs.</p> <p><i>"Basically each PLC (Product Life-cycle) can give you whatever data you need to and it's just a question of having it in database and then loading it, running it, okay, that's fully operated, now summarise and shorten this for the production line managers, for the factory manager, for the site manager, as well as the manufacturing manager, group manager, CFO, COO and that's for CEO, so that pyramid."</i></p>
Improved supply chain management	<p>The ERP system provided limited fleet and transportation capacity management. There were plans to develop a transport scaling system to allow the organisation to better utilise the fleet of tankers to collect the ingredients from the farms and to transport the manufactured products to the customers. The MM modules had provided the operational and management level with material resource planning capabilities and ensured that inventory levels were optimised to meet production plans to cater to customers' requirements accurately.</p> <p><i>"It's (fleet and transport planning) planned for (improving) supply chain management."</i></p>
Improved partner's services	<p>EDI projects with key suppliers and customer i.e. supermarkets, were implemented with the use of the ERP system data to improve the supply chain's upstream and downstream flow of materials.</p> <p><i>"Whole of suppliers and customer side improved (as a result of the visibility)"</i></p>
Achieved return on investment on the	<p>Benefits achieved from the implemented ERP system modules justified the investment. New ERP system initiatives would not be started if previous modules/functionalties were yet to deliver the expected outcomes.</p>

system

“We are now far more diligent in really, based on our newer projects, as I told you before in terms of benefits realisation, the benefits which we said that we are going to achieve, that we go after it and got that business benefit realisation program to make sure that those benefits are realised the moment that we said that we are going to do it, because we wanted that project to go ahead and it was real.”

4.8.5 DairyCo’s Summary

A strong senior management vision to revamp the existing outdated IT infrastructure at DairyCo led to a SAP-based ERP implementation. The lack of integration between the business units had impeded DairyCo’s business growth and that reinforced the decision to implement an ERP system. Although the original project had only two modules – FI-CO and MM – installed, DairyCo’s SAP platform expanded to include SD, PP, PM, HR and BI. The SAP platform became an enterprise-wide platform supporting DairyCo’s daily operations.

The exchange of organisational knowledge between the IT team and the subject matter experts proved to be an important factor in ensuring the optimisation of the ERP performance. Through a rigorous and structured approach to end-user training and ERP asset management, the IT team ensured that the developed ERP system met end-users’ expectations and business requirements adequately before going-live. The implementation of the SAP platform had also changed the IT culture in DairyCo and resulted in the formation of the IT steering group to take charge of the governance of IT resources. The group provided a mechanism whereby IT resourcing needs for the business were evaluated and prioritised. ERP system performance was constantly scrutinised to ensure that the investments were justified. End-users training were also prioritised to ensure that the system functionalities were adopted and used by end-users effectively.

4.9 ElectricCo

ElectricCo is an Australian business division of a French global corporation, that expanded its business operations globally since 2000. ElectricCo is headquartered in New South Wales, Australia and employed more than 3000 employees. ElectricCo, as a division, employed 400 employees. It generated an annual turnover of USD1 billion in 2016. The ElectricCo's division manufactured and distributed electronic devices for heavy industrial purposes such as cables, sensors, power transformers, RFID systems and signalling units. ElectricCo's products are sold in heavy industries such as electric energy, water & waste, marine, oil & gas and mining etc.

ElectricCo's general manager reported to the Managing Director (Asia Pacific), who also was responsible for two other divisions, i) Power; and ii) Installation Systems & Controls. The ANZIC classification of the company is F3494 - Telecommunications and Other Electrical Goods.

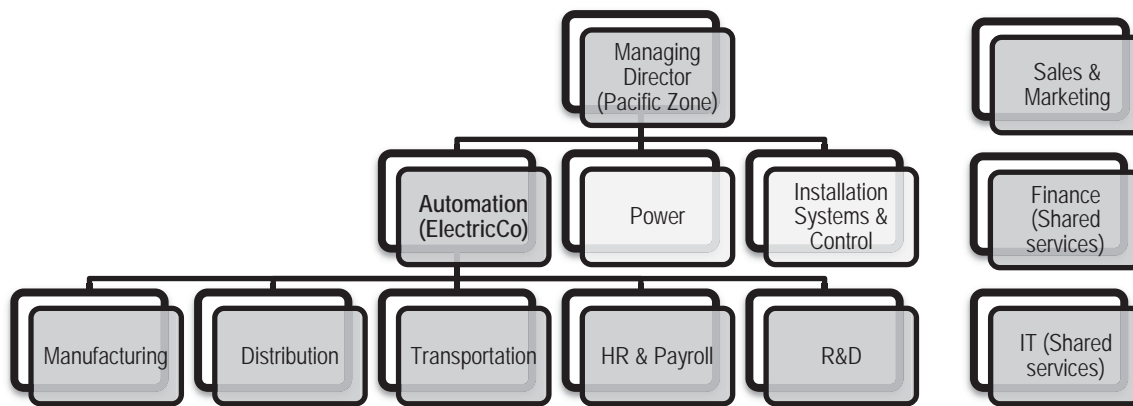


Figure 4.9: ElectricCo's Organisational Chart

ElectricCo's business units comprised of: i) *Manufacturing*; ii) *Distribution*; iii) *Transportation*; iv) *Payroll*; and v) *Research and Development*. The centralised sales and marketing business unit was responsible for marketing efforts for all three business divisions operating in the Asia Pacific region. Complex accounting and finance transactions for the business e.g. account receivables were managed by a centralised shared service based in Adelaide, Australia. ElectricCo business operations only focused on the strategic management of the industrial equipment manufacturing.

4.9.1 ElectricCo's Reasons for ERP Implementation

ElectricCo had a primitive technology ecosystem before the ERP implementation. Business units with the divisions were running their own applications or software. There was no integration between the custom-built software in every department. There was a need to update related systems individually whenever a customer placed an order. Information had to be manually transfer from paperwork into the disparate systems. The lack of technological between the business units meant there were often

significant loss of time and delays in responding to customers' demands. The complexity of information processing was further complicated given that ElectricCo operated a number of manufacturing facilities in Asia and Australia.

“Traditionally if I have separate application, one transaction need to be processed in different application, it needs time and also maybe it creates delays, so finally our customer will not be satisfied. (sic)” (IT Manager)

Senior management also realised that their executives were spending large amount of time to find information for their decision making. There was also a push by the French head office to standardise the use of an IT system to support the business operations in the Asia Pacific Region There was a strong requirement by the business to have accurate and reliable information to operate its supply chain.

The situation made consolidation of data difficult and time-consuming. Hence the business case was put forward by the IT manager (interviewed for this case) to acquire an ERP platform to: i) to allow for the integration of various applications and business process; and ii) to allow its supply chain to operate more efficiently with better quality of data; and iii) to cope with business growth. With an ERP platform, it would improve ElectricCo's competitive advantage in the market.

“You can imagine while I'm driving, I'm thinking one thing, it's like our brain, our brain cannot do as power as the other part, if we can't, if our brain cannot integrate all the signal, all the information, interpret all the information from all part from the body, similar to ERP system, that's why we decide to change the system and use ERP system” (IT Manager)

The senior management need little justification for approving the ERP implementation because they understood that a scalable technological platform was necessary for the business to cope with the increase of customer demands and achieve the goal of a world leader in automation equipment.

“One of the foundations, or the substance of the business to grow, is you must have a good platform and one for the data or for the business information, you must have good ERP system.” (IT Manager)

4.9.2 ElectricCo's ERP Project

The decision to implement a SAP-based ERP system was made by the MD and CFO jointly in 1998. The ERP implementation team was jointly managed by ElectricCo's IT manager and SAP's project manager. The members of the team consisted of SAP consultants and developers as well as ElectricCo's IT staff who assisted in end-user training and support.

The implementation team reported directly to the steering committee that was headed by the MD and included other senior executives. The implementation project commenced in 2000, and required the development of four modules: FICO (Finance & Control), MM (Materials Management), SD (Sales & Distribution), and PP (Production Planning) modules.

This initial ERP system implementation cost was approximately AUD4.5 million. Costs of the technical and functional upgrade were unclear but were estimated at AUD2 million. The bulk of the expenses were paid to the technology vendor as it had provided most of the technical expertise in the implementation of the ERP system. The estimated cost included the license for the ERP system and also the expertise required to develop the system.

A technical upgrade was scheduled in 2002 to upgrade the ERP system, SAP R/3 to the latest version. PM (Plant Maintenance), WM (Warehousing Management), and BW (Business Warehouse) were also added during the upgrade project.

Change Management

ElectricCo had to undergo high levels of organisational and business changes during the implementation. The ERP vendor, SAP strongly recommended that existing processes had to be reengineered to meet the operating requirements of the SAP platform. Retaining the old processes was not an option, if the system was to replace all the legacy systems.

“That’s an absolute requirement to have the organisation meet the requirement of this SAP, in order to achieve best result from this implementation.” (IT Manager)

SAP consultants were extremely active in the early stages of the project to map out existing workflows and processes. The consultants were required to provide recommendations on organisational restructuring and business process reengineering.

Due to the recommendations provided by the SAP consultants, a limited number of work positions were made redundant. Although some of the recommendations made were not popular with end-users, the steering committee was determined to change the way the business operated. Efforts were made to solicit feedback on the new SAP-driven business processes. Middle management was actively consulted to identify risks associated with the business changes. This also became the formal communication to inform and prepare the end-users for the anticipated changes. It could be seen that awareness of end-users were mostly driven by the supervisors or middle managers.

“The process of implementation begins by training, building new way of business, having a meeting, having a workshop for all managers and then introducing the new system, new

procedures, that will be implemented in next year, in a couple of years, so they realise that there will be a new system and they prepare.” (IT Manager)

Training & Support

Before the implementation, SAP consultants provided formal on-site classroom-based training to the end-users during office hours. Often, the supervisors or middle managers would be invited to participate in training before the operational end-users.

End-users were required to attend training sessions organised by the IT service. Examinations were conducted to ensure the key users possessed the necessary competency to perform their daily tasks. Acknowledgement in the form of participation certificates were issued to successful completion of the examinations. Consultation workshops were held with middle managers to solicit feedback on business changes and improvements. The consultations provided the middle managers a mechanism to assist the implementation team identify potential conflict areas.

After the 2000 implementation, SAP provided limited training and support. ElectricCo’s IT service took over the role of training and support after the implementation.

ElectricCo’s IT department recruited professionals with the necessary ERP system expertise to provide support in-house. Developers with the technical knowledge were headhunted to join the IT department. The ERP system support team within the IT department consists of mainly former SAP consultants or developers. The IT department only provided first level support that assisted end-users troubleshooting or queries with reporting tools. Complex issues that cannot be resolved by ElectricCo’s IT department will be escalated and sent to SAP for further action.

The support team the first level support meaning. First level support involves assisting with users with issues in the system or creation of new queries via the reporting tools. Issues that cannot be resolved will be escalated and sent to SAP’s support team for advisory support.

Table 4.26 summarises the benefits that ElectricCo derived from the development of its ERP implementation.

Table 4.26: ElectricCo's ERP Benefits During Project Development

Benefit	Description & Supporting Evidence/Quote (Provided by ElectricCo’s IT Manager)
Improved communication among employees	Common understanding of business processes, entities and jargon. The use of the standardised business process in the ERP system made communication among financial staff and other divisions easier. <i>“From the user point, they know it becomes easy to compile or process information and they can communicate the information across department”</i>

4.9.3 ElectricCo's ERP System Going Operational

The ERP system went operational in late 2000 with a phased approach. The Asia Pacific office in Sydney went live with the FICO module. The installation of the finance module allowed for the development of a single finance transactional database. This also led to the creation of the shared finance service business unit that oversee all finance transactions of ElectricCo and the other two divisions.

“The business is growing to become bigger and bigger from year to year and the activity of the transaction involved in the business is becoming so complex, so then we have to rationalise the activity by developing other business unit. Legally every business unit has different legal entity, but as a group, we are a company, so shared services will serve administrative tasks of every manufacturing units” (IT Manager)

In additional, the implementation also led to the consolidation of IT services from various divisions and units. Personnel were reorganised and new positions created. There was creation of a shared SAP support department that oversees all sites. The shared service resulted in less operational costs in managing the IT assets.

All major accounting operations were now handled by the shared finance service. The later stages of the implementation saw the installation of the remaining three modules, MM, SD & PP in the next few months. The phased approach provided more time for ElectricCo's manufacturing facilities to move towards the SAP platform. The rollouts at the other manufacturing did not adopt a big-bang approach as it had the potential to cause disruption to the business operations.

Within months of all four modules were successfully implemented, ElectricCo's management had started to observe benefits being generated by the use of the SAP platform. It could be attributed to the integration of all the four modules that were installed. Reporting became substantially easier as information was shared and functions were integrated. Information was updated and accurate and allowed managers to pursue appropriate decisions and actions.

“You can have more accurate information, reliable information and also you can have this feasible and avoiding delay in getting information, so decision making can be pursued quickly and in a real time.” (IT Manager)

End-users feedback showed that reporting was much easier and faster. There were vast improvements, particularly with procurement processes. Customers of ElectricCo were invoiced electronically. The SD module allows customer consultants (representatives) to bill the customers once the products have been delivered. Prior to SAP platform, customers were required to acknowledge the invoice manually. The acknowledgement was then sent back to the office for processing, thus leading to long cycle time. The

order-to-cash cycle was now managed by the SAP platform electronically and made many of the manual paper work redundant.

“Previously without the ERP system, if we need material, we write a purchase order, purchase order sent to supplier and supplier received the purchase order from computer for example, from email and then they print and then they deliver goods to us as indicated in the purchase order(sic)” (IT Manager)

Senior management had been relatively satisfied with the outcomes of the implementation from a business improvement perspective.

“That’s why having SAP, it’s not an expensive investment because the return on investment is higher than you buy any other small or single application. You spend 4 million, but in 6 months, you can enjoy saving because of this implementation (sic)” (IT Manager)

SAP’s SD and MM modules allowed managers working in the manufacturing facilities to easily monitor the movement of the products and labour usage. SAP reporting for the manufacturing facilities, helped the managers to analyse the optimal levels of manpower required for their assembly lines.

The dispatching process has also been streamlined. Employees responsible for dispatching, could use the SAP platform, to lookup the stock levels and locations of the products, and provide instructions to the warehouses for deliveries.

“Its material management module manages, administrates all material in the warehouse into very clear location and bin, so every bin has very specific dimension of the shelf and so forth. Then we ask our supplier to adopt the dimension of the box. (sic)” (IT Manager)

Table 4.27 summarises the benefits that ElectricCo derived during its ERP system deployment.

Table 4.27: ElectricCo's ERP Benefits from Project Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by ElectricCo's IT Manager)
Empowerment of employees	Senior management was empowered by the reporting tools. Analytical capabilities and reporting tools provided by the ERP system enabled managers to explore and analyse markets and customers in greater detail hence allowing them to make proper strategic decisions. <i>“In our organisation, from the top, they can make strategic decision making on time. In the middle management, they can provide accurate, reliable information and on time to the top management.”</i>
Establishing common vision and goals among staff members	The executive dashboard provided by the ERP system allows senior management to set and monitor KPIs for divisions, units and plants. Middle management clearly understand what their key outputs, deliverables and goals for the financial cycle or month are. <i>“They have one (common) understanding of the system, they understand what we have presented and they trust and know about the number that we presented”</i>
Better communication among business units	Before the implementation of the ERP system, employees had to understand what systems that other divisions or departments were using before liaising or communicating with them. The integration of cross division/departments business processes made communication easier. Information was easily extracted from the ERP system and there

	<p>was no need to understand different terminologies or jargon used by non-ERP system applications.</p> <p><i>"Issues can be solved easier, better with a common understanding of application"</i></p>
Personnel reorganisation	<p>Creation of shared services for finance and IT led the reorganisation of divisions/units and the introduction of new positions to coordinate and centralise finance and IT support services for the rest of the organisation.</p> <p><i>"The obvious reorganisation or requirement of a specific department is SAP itself. Once we implement, we have a SAP support incorporated into the IT department."</i></p>
Improved individual performance / efficiency	<p>Administrative tasks associated with processing financial transactions became easier with the use of ERP system. Finance staff had to previously liaise with different personnel in other divisions to reconcile accounts. The implementation led to simplified process for reconciliation especially for accounts receivable and payable.</p> <p><i>"(After the implementation), we make sure our labour efficiency not only in the factory, but also in the management or in the administrative area."</i></p>
Increased customer satisfaction	<p>The monitoring of the movement of the goods, reduction in lead-time and improved quality of products resulted in an increased in customer satisfaction. The exchange of the transaction data also allowed the customer to accurately know the delivery and payment period without the need to follow up on them. Invoicing had been automated.</p> <p><i>"So the benefit or advantage of having this ERP, we can maintain our customer satisfaction, every customer order will be processed promptly and without delay."</i></p>
Increased customer service	<p>There was substantially improved customer service during pre and post sales. Customer representatives were able to provide real accurate data on delivery time and available stock for sales enquiries or request for quotes. Post sales service was also enhanced, as customer representatives were able to manage returns and servicing more effectively.</p> <p><i>"In pre-sales, you can also convince customer that we can deliver quality product. And after sales service, I guess there is no doubt that we can maintain our customer. Returns and support became easier."</i></p>
Organisational changes	<p>The implementation of the ERP system had reorganised the job scopes and also allowed for the restructuring of organisation to take place with minimal disruptions. The outcome of the use of ERP system led to less "red-tape" and less management levels.</p> <p><i>"A lot of less bureaucracy."</i></p>
Standardised user interface	<p>The standardised interface allows users to learn to perform new tasks in the ERP system with greater ease. The buttons are all similar in all the pages e.g. logout, save file etc. Even though users may be required to learn a new process or transaction, they can easily understand how the system function as the interface is all the same.</p>
Improved data quality	<p>Senior executives such as the heads of HR and Finance are more trusting of the data and reports provided by the ERP system. Decisions are made on the basis on the analysis generated by the ERP system.</p> <p><i>"Data quality (from SAP) is very accurate"</i></p>
Improved shared services among the units	<p>The implementation of ERP system led to the creation of shared IT and Finance services to consolidate services for all divisions. SAP support was provided to all divisions and units via the shared IT services. IT support from the operational units was made redundant. The shared Finance division handled financial and administrative tasks. R&D was also consolidated as a result of the ERP system implementation. Top management found that there were overlapping processes within the R&D activities at the manufacturing sites and hence the use of the ERP system allowed the organisation to streamline and remove redundant R&D processes.</p> <p><i>"After we implement SAP, we redundant this position, production support service, we create new department called IT and SAP department. So having this new department, this department concentrate, focuses on the SAP service."</i></p>
Increased understanding and control of processes	<p>ERP system introduces and enforces standardised best business practices on ElectricCo. This forces all users to be aware of the relevant business processes and transactions to their job scopes.</p> <p><i>"The management and end users have a better picture of what's going on with the backend now with SAP"</i></p>
Better reporting and auditing	<p>The end of finance cycle auditing was also simplified as a result of ERP system use. Every transaction that has been approved and carried out can be easily monitored and evidenced. The ERP system systematically categorises manufacturing sites into cost centres and enables the operational managers to monitor and manage their budget and spending. All the operational transactions are then relayed to the regional office for consolidation. Business managers have also reflected that the use of the business warehouse module (BW) provides in-depth business intelligence and reports allowing them to make decisions quicker.</p> <p><i>"So now the top management are able to see the figures and tell for themselves this product is required for this market at this moment sort of thing."</i></p>
Provided greater ease of integration, scalability or portability of IT systems	<p>ERP system was rolled out to the individual manufacturing sites with ease. Manufacturing technical KANBAN systems were integrated with the ERP system with little or no issues.</p> <p><i>"From my experience, there is no problem, there is no constraint to link between 2 different system (KANBAN and ERP system)."</i></p>

Conformity to new taxation, laws and regulations	<p>The ERP system have the latest taxation rules and regulations embedded in its business processes and transactions. The technology vendor, SAP, also provided regular updates to the system to ensure that the transactions comply with the latest taxation law changes.</p> <p><i>"SAP is designed to comply with the regulations, with the standard practice, not only in finance or in taxation, but also in the operation side."</i></p>
Reduction in operation costs	<p>There was substantial savings in operating costs from the consolidation of IT services and the removal of legacy finance systems.</p> <p><i>"But after we implement, we can streamline the function or process and we need only 3 sections which is costing, accounts receivable and payable, and general accounting. In terms of total head counts and employee, we reduce from 15 employees into only 11 or 12 employees"</i></p> <p><i>Example: At the operational level, the ERP system had enabled a more efficient production line that led to lesser manpower used for assembling the products. This is evidenced by lesser labour hour (approximately 15-20% lesser) per unit product assembled.</i></p>
Reduction in cycle time	<p>Reports generated by the ERP system allowed operational managers to identify and solve the bottlenecks in the assembly lines. ERP system in the plants were also integrated with the KANBAN systems. These led to faster production and delivery of the goods after the customers have placed the orders.</p> <p><i>"Faster to manufacture product. That reflects low labour hour per one unit product."</i></p>
Improved overall productivity	<p>From a manufacturing perspective, there is an estimated 20% reduction of manpower on certain tasks after ERP system was implemented especially for assembly lines. Bottlenecks were easily identified in ERP system resulting better deployment of manpower. This substantially increased the individual performance.</p> <p><i>"Having high labour efficiency and also having good productivity means we have less cost of production, because now every employee can produce higher number of products with less hours."</i></p>
Allowed the organisation to do business more effectively	<p>Implementation of the ERP system had removed many of the redundancies that ElectricCo had issues with. The streamline and consolidation of administrative finance and IT support led to a leaner organisation with less bureaucracy.</p> <p><i>"In average, the product will go to our customer in maybe 2 days, but the invoice will be received in one minute."</i></p>
Improved logistics management	<p>Inventory stocks in the manufacturing sites and warehouses were optimised. There is a reduced need to keep high levels of safety stock. Operational and purchasing managers were able to identify appropriate levels of safety stocks for the manufacturing sites. Stock levels were also properly accounted and monitored with the use of ERP system.</p> <p><i>"Stock or inventory is managed in a very clear and very well designed in the bin location, so it is properly managed, the stock, so you know that at one stage of time what is the balance of your inventory."</i></p>
Improved supply chain management	<p>Before the organisation implemented the ERP system, distribution of goods had to be processed on different applications and documentation done manually. However, due to more efficient tracking of production and stocks, the cycle and lead-time for delivering customers' orders have reduced from a week to approximately 2 days. Financial transactions are electronically processed. Emails with invoicing information will be sent immediately to the customers.</p> <p><i>"Before we used SAP, we used different applications between distribution application or sales application to deliver the product and application to generate or write the invoice. So there is always a time difference between we send the goods and then we write the invoice and then send the invoice to customer."</i></p>
Reduction in lost sales from lost orders	<p>Customer orders are processed electronically and input into the ERP system. The use of the ERP system removed the dependency on manual paper documentation, reduced lost orders, and enables real time tracking of customers' orders.</p> <p><i>"I believe we will not lose order."</i></p>
Reduction in work in progress	<p>WIP has been reduced as assembly lines have been optimised to perform better and less resource demanding. There is also better management of inventory so less costs are incurred to store WIPs.</p> <p><i>"(Keep it at) a certain constant and that is the reasonable or the efficient level of work in progress."</i></p>

4.9.4 Post Implementation & Further Upgrades

After the initial implementation in 2000, a technical and function upgrade was carried out in 2002. The technical upgrade was version improvement from SAP R/3 to ECC 4.6. The upgrade project also included the implementation of new modules to assist with the optimisation of the supply chain particularly with the manufacturing sites in Australia and Asia. At the time of the interview, there was no

plan to further upgrade the ERP system because the newer version was perceived as not providing any substantial gains or benefits when compared to the existing ERP system.

“The features in the new version of SAP are more user friendly and also has more good performance of the system, but from the processes of the system, more or less still the same, but there was a discussion to upgrade to improve the version (sic)” (IT Manager)

Open Culture for ERP Improvements

ElectricCo’s IT department had an open culture and was receptive to change requests. Managers were invited to express their own opinions on the ERP system implementation and were allowed to propose functionality changes to the IT department. The proposals were studied by the ERP system support team to determine their feasibility.

“(We) adopts open management. Yes, ElectricCo accepts any idea to improve SAP.” (IT Manager)

The business environment was constantly evolving and customer demands would change. Senior management, particularly the MD and CFO, understood the need to improve the ERP system functionalities when the opportunity arises. Middle managers were instructed to be proactive in identification of bottlenecks or review existing processes for improvement. The senior management had expected that the SAP platform provides the flexibility supporting the business operations in ever-changing environment.

“It is parallel to the growth of the business, to the change of the technology or to the change of the market competition, and so forth (sic)” (IT Manager)

Proposals put forwarded by end-users will be studied by the IT department, and would be discussed by the steering committee if they were deemed valuable to the business. An example of such a proposal was the implementation of the BW module that was recently added to the SAP platform. The business managers have realised the importance of the customers’ data for business growth, and needed more robust analytical applications to assist with their decision making.

“Having R/3 is a very simple and very ordinary reporting style and it’s not so flexible as BW, so the ones I initiate is to develop a data warehouse.” (IT Manager)

ElectricCo had reaped many benefits that were not part of the original rationale for its implementation. After the installation of the newer modules, the automation of purchase order led ElectricCo to promote the use of SAP technology its major customers. The introduction of Electronic Data Interchanges facilitated the customer ordering processes electronically. Likewise, ElectricCo’s procurement team

have invited their key suppliers to consider moving all manual paperwork to an electronic platform controlled by SAP. The sharing of demand information would allow the suppliers to forecast the right levels of stock required by ElectricCo, thereby ensuring leaner inventory levels.

“We link supplier and our warehouse because our warehouse and our product already linked with SAP, so we have to link warehouse and supplier with a common system.” (IT Manager)

The use of ERP system also changed the way ElectricCo’s manufacturing units dealt with suppliers. ERP system provided by SAP provides standards for product dimensions for warehousing. Suppliers who wanted to deal with ElectricCo had to conform to the standardisation of dimensions.

Table 4.28 summarises the benefits that ElectricCo derived in its later post implementation stage.

Table 4.28: ElectricCo's ERP Benefits from Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by ElectricCo's IT Manager)
Business growth	<p>ERP system implementation has led to improved service and coordination. This allowed the organisation to focus on strategic issues such as identifying new markets, improving competitive advantage hence promoting business growth.</p> <p><i>“ElectricCo to grow organically because having this integrated system or SAP, there is no issue about how to manage delivery of product on time to customer because everything already in the motherboard, in the display, so we can monitor, we control all the delivery, all the production, all the supply.”</i></p>
Extension of market reach	<p>Business managers were able to more effectively understand customers and their needs in new markets. There was evidence of increasing customer numbers due to the identification of new market segments. ERP system allowed the organisation to react to market changes [and the ERP system provides the flexibility for the organisation to capitalise on identified opportunities and change its business or products as required.</p> <p><i>“The ability of management or the ability of company to see and accept changes in the market and then make it real in the company,”</i></p>
Business innovations	<p>The business processes within the assembly lines in the manufacturing facilities were reengineered after the implementation of the ERP system. Operational managers supervising the manufacturing facilities were able to come up with more efficient ways to save on raw materials and manpower on the production lines.</p> <p><i>“We improved our production processes the way we supply material from warehouse to production floor and the way we administrate it or we manage the way our labour working or carry on their job (sic)”</i></p>
External linkages to other organisations	<p>Implementation of information linkages via EDI allows for the exchange of finance and procurement data. Finance function was outsourced and the third party was using ElectricCo's ERP system to process the transactions for account receivables and payable.</p> <p><i>“the company outsourced accounts payable and accounts receivable function. They're known as shared services, so we broke up the organisation, we streamlined the function and within the finance department, we are not focused on processing physical or radical transaction, but those dealing with entering or compiling information, outsourced to shared services and we focus on strategic management of the manufacturing and also the business.”</i></p>
Business learning within the organisations	<p>Management became more aware of the environment and customer changes due to the information provided by the ERP system. The information provided by the ERP system also gave management more insight into areas for improvement e.g. bottlenecks of business processes. Hence there is a process of constant business improvement due to learning of the ERP system functionalities and capabilities.</p> <p><i>“There is more awareness from the management about the customer requirement, how to satisfy customer, how to deliver quality product, so that's all because all the information, all the resources is available from the system.”</i></p>
IT flexibility for organisational change	<p>ERP system provides the flexibility for ElectricCo to change its business processes to cater to new customer demands, configuration of products or product portfolio.</p> <p><i>“The portfolio of the product will be expanding, more range of product and also in terms of the costing, all the financials, we need also to respond quickly to make sure or to count the product cost of every individual</i></p>

	<i>product, so we need change in the configuration in SAP."</i>
Easier maintenance of IT systems	Less personnel working in the IT support team after the implementation of the ERP system. Part of the support services have been outsourced to the implementation partner, SAP. <i>"Less people to maintain and once you running on SAP, it will be less cost to maintain, like you don't need to outsource or to call consultant to fix or to solve a problem in SAP"</i>
Improved decision making and planning	The use of the ERP system has allowed management of all levels in ElectricCo to improved their decision making and planning. The analytical tools provided by the ERP system gave the managers drill-down and detailed reports pertaining to the operating environment, spending and identification of markets. The richness of the information provided allowed for making well-informed decisions. <i>"Management is able to respond and take opportunity. Because if you see the opportunity but you can't response, can't adopt or take that opportunity, so it is useless. So having SAP or good ERP system, it will build your ability to respond and then to take that opportunity."</i>
Improved product / service quality	The operational managers were able to monitor defect rates and identify issues with raw material quality or production processes quality. <i>Example: Overall quality control was improved via monitoring the returns and defect rates that the information that ERP system collected from the production lines. Defective rates were reduced from 25% to 5%.</i>
Improved partner's services	The implementation of EDI to integrate ElectricCo's ERP system with its suppliers has allowed suppliers to forecast more effectively and to avoid stock outs.
Achieved return on investment on the system	Management believes that the organisation has achieved a return on the investment because of the substantially savings in operational costs, the integration of benefits brought by the ERP system and the ability for the organisation to respond to market changes and changing customer demands. However, there was no proper evaluation done. <i>"Because the beauty of this integrated system [...] is the ability of the company or management to respond and see opportunity."</i>

4.9.5 ElectricCo's Summary

ElectricCo's ERP implementation, costing more than AUD4 million, was mainly undertaken to streamline many of its redundant financial processes, and to improve many aspects of its supply chain, particularly at the manufacturing sites. The management at ElectricCo well-understood the importance of data to drive business growth and had been proactive in supporting the implementation. The ERP implementation brought about a high degree of centralisation, with the formation of shared finance and IT services.

The recruitment of competent SAP consultants and ERP professionals played an important role in the ERP implementation project. The use of external expertise created opportunities for ElectricCo employees to learn new ERP knowledge, and as part of the process, to improve or innovate existing business processes to increase business efficiencies. An open culture that allowed end-users to request ERP functionalities changes also contributed to the business benefits derived from the ERP system.

Although ElectricCo's SAP platform had delivered many benefits to the logistical and manufacturing operations, its greatest value perhaps was to electronically link up its suppliers and customers using its data generated from its SAP platform. This was attributed to its strong IT innovation culture, that was driven by its senior management, to support its business goals and vision.

4.10 ClubCo

ClubCo started as an Australian motoring association in 1903 to provide a wide-range of services to its members. Since its inception, its membership has grown to more than 2 million and generated more than AUD400 million worth of revenue (in 2011). It employed more than 2,600 staff members and operated solely in Victoria, Australia. ClubCo's products and services had also grown over the years, and expanded to insurance, travel, finance and accommodation industries. The key product and service segments were as follow:

- Member services – Emergency roadside assistance, city and country club facilities, motoring guidance and telemetric services;
- Insurance services - Insurance products for motor vehicles, properties and businesses;
- Financial services – Vehicle financing, personal loans, novated leases, and additional financial services;
- Travel – Car hire, travel insurance, cruises and tours and accommodation;
- Club - Access to the recreation clubs;
- Resorts - Access to a range of holiday resorts.

ClubCo's business units (refer to Figure 4.10) are mostly in-house, with the exception of the R&D and Information Technology and Telecommunications (IT&T). Market research activities have been outsourced to an associate company that conducted customer research and provided the findings to ClubCo. ClubCo would use the findings to update its insurance products. ClubCo offered it insurance products directly to end consumers and indirectly through other insurance intermediaries.

R&D activities are outsourced to an associate company that handles the research on insurance and coverage plans that Victorian consumers need. The associate company conducts necessary market research and provides the information to ClubCo to allow it to update its insurance offerings. ClubCo also utilised a number of contracted tradesmen or car repair companies for their roadside assistance program. The IT department is heavily outsourced and ClubCo relies on its vendor, IBM for its most of its IT requirements.

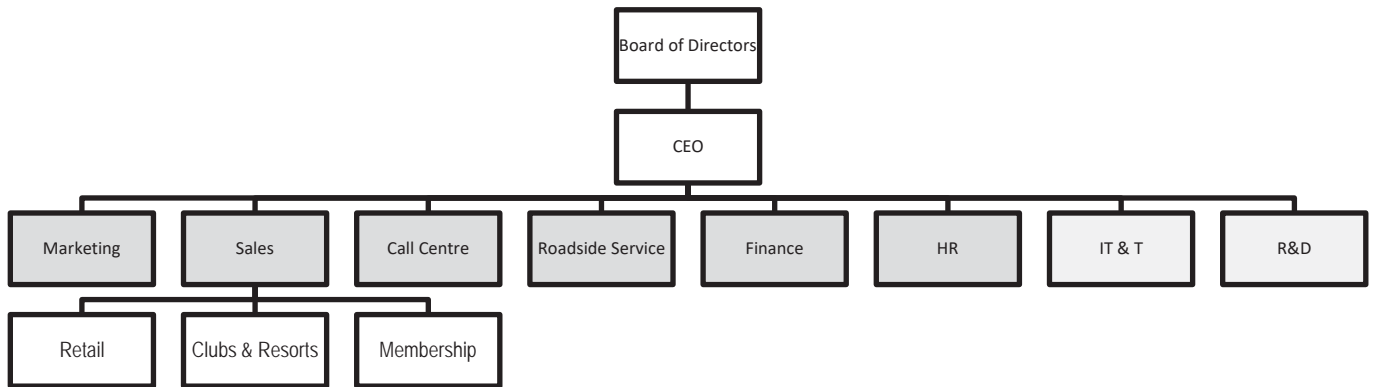


Figure 4.10: ClubCo's Organisational Chart

4.10.1 ClubCo's Reasons for ERP Implementation

Prior to ClubCo's ERP adoption, the use of integrated IT was limited. ClubCo's finance had a customised in-house system that processed the billing and invoicing of customers. Other business units purchased or developed their own bespoke IT platforms. For example, ClubCo's sales used a custom-built membership information system called, KAM that was already more than 10 years old. There was no centralised system that coordinated the transactions between the business units. The main reason was to consolidate data and transactions, and allow for easier management of financial processes especially account reconciliation.

"An organisation takes money in a lot of different areas, so we take money in each of the shops, we take money through the phone, we take money through Australia Post, through BPAY, so we're getting all this money coming all over the place and being able to understand where it was coming from and reconciling it was quite difficult. We don't have just one single channel or one single business. It's not just one wire getting money in, so it was very complex for the organisation." (Enterprise Applications Support Manager)

Also, ClubCo's product and service offerings have grown throughout the years, sales and finance reports had become difficult to generate. The IT resources that ClubCo had made it challenging for them to manage the business growth and the operations associated. ClubCo needed a more efficient IT platform to manage its IT and finance resources.

4.10.2 ClubCo's ERP Project

The ERP implementation, approved by the senior management, commenced in early 1996 and IBM was appointed to be the implementation partner. The ERP software that was selected was SAP R/3. The project was initiated by the CFO as he wanted to improve the financial capabilities, ultimately became the project sponsor and champion.

The early implementation had only involved the installation of SAP's Finance & Controlling (FICO) module. In the more recent times, ClubCo had upgraded its SAP R/3 platform with other modules, Material Management (MM) and, Sales & Distribution (SD). The total implementation cost for the project was estimated as close to AUD4 million and took slightly more than twelve months to go live. It was estimated that 60% of the costs went to labour, followed by 20% on software, 15% on hardware and the remaining 5% on training.

ClubCo's SAP platform was installed on outsourced hardware that was maintained by its implementation partner, IBM. The development of the FICO module was done by IBM's consultants and developers, with ongoing support from the software vendor, IBM. The IT&T business unit's involvement with the ERP implementation was limited to business process mappings and communication with end-users. The implementation team consisted primarily of IBM and SAP employees. SAP provided business consultants for pre-implementation support, including business requirement analyses and change management. IBM would provide the technical staff for the installation of the hardware and software required to operate SAP R/3. The implementation team also, sometimes included middle managers who represented the interests of their business units.

Change Management

Change management was strongly embedded within ClubCo's ERP implementation. ClubCo's Enterprise Applications Support Manager, who was interviewed for this case, recognised that there was an absence of a formal strategy for managing change at ClubCo. Given that almost all business units were running their own systems and had their own processes, organisational change brought about by an ERP implementation was going to be complicated.

A formal change control board called the "Change Control Committee" (CCC) was established in the middle of the ERP implementation in 1996. This committee was responsible for advisory and endorsing business changes that arose from the SAP implementation. This committee comprised of senior management and also representatives from all business units.

The CCC during the project implementation stages, created new policies and procedures, for managing change and IT resource utilisation. Other initiatives that CCC established also included the formation of formal training teams that were tasked for educating and training end-users.

Testing and Acceptance

Prior to the ERP implementation, ClubCo's IT culture traditionally was about "pushing things through quickly". Therefore, it resulted that most of the legacy application and systems that ClubCo had implemented often had glitches that need to be troubleshoot after they have going live. This was attributed to the lack of user training, testing and acceptance. The CCC understood that the it would be a

struggle to balance the project costs and deadline. The longer it took for the module to be developed and tested, it more costs it would incurred. However, user testing was seen by the CCC as necessary enabler of optimising the performance of the ERP usage prior going live. That meant that if ClubCo's end-users were went trained and understood the newly designed processes within SAP, they could identify the glitches early during testing and this would give the implementation team more time to troubleshoot the issues. Having user test was required to optimise the functionalities in the SAP platform. By fixing most of the bugs with the system before it operationalised, the SAP platform would be able to deliver value instead of creating business disruptions.

“So for the call centre and retail, it's very important to have an optimised application that works in the most efficient way because it's all about the timing and the handling of those calls. Obviously when you got someone on the telephone or someone standing in front of you, you want the application to work in the most efficient way and as quickly as possible.” (Enterprise Applications Support Manager)

Training and Support

The implementation vendor, IBM managed the training of the end-users in the early stages of the implementation, and the training efforts were also supported by staff from the IT&T business units. In the later stages of the ERP project, along with the implementation of MM and SD module, saw the creation of formal training teams under the instructions of the CCC. The training teams were managed by the IT&T business units and were responsible for all end-user training activities. Classroom-based training were the main mode of training activity for the end-users.

Given that most of the technical development of the SAP implementation was outsourced to IBM, ClubCo's IT&T business unit was restricted to a support role. IT&T's helpdesk provided the end-users with first-level support. All end-users' enquiries or issues will be sent to IT&T helpdesk for resolution. If the end-user's matter pertains to a specific module or application, it would be referred a team of specialists called BAS (Business Application Services). Complex issues, often technical in nature, that cannot be resolved by BAS would be forwarded to the IT partners for solutions.

The ERP software vendor, SAP provided basic license support as part of the early implementation. This arrangement meant that SAP was responsible for any software-related issues. However, the support arrangement has been upgraded to enterprise support, that required SAP to provide support custom application analysis and developments.

4.10.3 ClubCo’s ERP System Going Operational

The ERP system went into operation in the middle of 1997. The implementation approach taken in 1996 for the delivery of SAP R/3 was a direct installation via a big bang approach. Given that there was little impact on the existing legacy systems used by the other divisions, the decision was made to go-live with FI-CO. However, the older systems used by Finance were allowed to run concurrently with the new ERP system for contingency reasons. Other departments continued to use their bespoke systems as the initial ERP system implemented was only concerned with the finance business processes.

According to ClubCo’s EAS Manager, the SAP platform took several months to stabilised and deliver the expected benefits from the FICO module that has been installed. Although the FI-CO module replaced many of the disparate systems in the finance area, there are still many other finance-based systems in the organisations that are not linked. Furthermore, it was discovered that the capabilities of the SAP system were not sufficient to handle the bank reconciliation process. The newly implemented SAP platform was expected to solve many of the problems that ClubCo had with reconciliation of accounts. The lack of this particular functionality led to the BAS team custom building a third-party receipting module and linked it to SAP platform.

“We do receipting that accounts for stock, so we’ll then take that sale out of the retail shop. If we sell a Melway, it’ll take that out of stock overnight. It will do the postings, it will do the general ledger posting, so you do get those sorts of more traditional ERP benefits” (Enterprise Applications Support Manager)

Table 4.29 summarises the benefits that ClubCo derived during its ERP system deployment.

Table 4.29: ClubCo's ERP Benefits from Project Deployment

Benefit	Description & Supporting Evidence/Quote (Provided by ClubCo’s EAS Manager)
Empowerment of employee	Users are able to run the necessary and reports in ERP system the to enable them to do more in their tasks. They are no longer required to wait for other departments or approvals to generate reports. <i>“ERP system provides all the necessary information and the ability to drill down the reports.”</i>
Improved individual performance / efficiency	Users have improved access to customer and financial data. Accountants have quicker access to reports and consolidation of accounts. Retail shop staff are able to balance cash flows efficiently with the use of the ERP system and its applications. <i>“In the banking reconciliations area, that was my understanding of the huge improvement from the receipting implementation.”</i>
Improved data quality	Finance information is accurate and users trust the quality of data generated by the ERP system. Accountants and management are depending more on the reporting tools to assist them in their tasks. <i>“SAP is really our source of the truth of financial data”</i>
Improved shared services among the units	The ERP system implementation has resulted in the creation of a shared finance division that oversees all finance transactions for all other divisions in ClubCo. <i>“We like to move our member system from our hoteling system into a proper customer relationship system and use that/ So these bigger applications give possibilities to expand and as you say, we’re scalable and can extend quite easily too.”</i>

Increased understanding and control of processes	ERP system has led to the introduction of greater and tighter procurement processes. Release of purchase orders can only be authorised by the relevant manager. <i>"We've introduced control over the purchasing process, so we have dual built in purchase order release controls"</i>
Better reporting and auditing	Production of custom reports was made possible with the use of ERP system. External consultants were often hired to custom build reporting tools for the users of ClubCo using the programming language ABAP. <i>"We've had consultants come in and create reports, come and build them either through queries or ABAP (Advanced Business Application Programming)."</i>
Conformity to new taxation, laws and regulations	ERP system vendor provides support patches or enhancement packs for changes to laws and regulations for e.g. GST implementation in 2000. The ERP system vendor also provides the necessary encryption protocol applications to secure the electronic transactions carried out by ClubCo to ensure that organisation conforms to the industry standards. <i>"SAP was good at providing the solution for that in a short timeframe. One area I'm not sure about yet, because we handle credit card information, we have PCIDSS, Payment Card Industry Data Security Standards, I've got some questions. We've implemented encryption, so we had to put in some support packs to enable credit card encryption."</i>
Easier maintenance of IT systems	ERP system has provided ClubCo a stable and robust platform that works well with minimal issues. Errors or bugs in the ERP system tend to be fixed really quickly by the ERP system vendor, SAP. However, it was noted that ERP system is a system that is rich in functionality and hence requires a number of skilled people with the right expertise to maintain it. <i>"SAP tend to make sure that it works properly. It's not a flaky system. It's not something that they're likely to get things wrong and if they do get things wrong, they find it and fix it pretty quickly."</i>
Improved decision making and planning	Managers have made quicker and more appropriate business decisions based on the findings generated by ERP system reports. Managers are also able to identify quicker areas for improvements especially with insurance subscriptions and product offerings. <i>"It's the availability of the financial information, the ability to drill down the accounts to down to the original postings and the original documents that cause those dollars in the accounts."</i>
Improved overall productivity	The implementation of the ERP system led two major finance-related improvements: i) bank reconciliation and ii) online purchase order approvals. Less time (approximately 5%) and cost savings were the outcomes of the ERP system implementation for the finance processes. <i>"The example would have to be the banking reconciliation areas again. It's online, procurement approvals, rather than having to pass a piece of paper around."</i>
Allowed the organisation to do business more effectively	Overall, the users (including the management) found that they had more time available to analyse the information generated by the ERP system. Prior to the ERP system implementation of the ERP system, most of the time was spent on collection of data. <i>"It may be that they (employees) can concentrate on more on the analysis rather than finding the information."</i>

4.10.4 Post Implementation & Further Upgrades

ClubCo's SAP platform had three modules – FICO, MM and SD. The MM and SD modules had allowed ClubCo to better manage its customers, products and inventory. The customised receipting module that BAS developed, was used to manage financial payments by ClubCo's sales centres, call centres and retail shops. The same module was also used by ClubCo's customer representatives to manage customer accounts, finances and for reconciliation of bank accounts and funds. The receipting module allowed ClubCo's SAP platform to consolidated all finance transaction data processed across its customer facing units.

"They'll [customer representatives] go into the insurance system and check the policy and then they'll jump across to R/3 to take the credit card number and take payment for that and that creates the receipt in SAP." (Enterprise Applications Support Manager)

Besides the functional upgrades of MM and SD to the ERP system, ClubCo's IT&T department performed a technical upgrade of the SAP ERP system version R/3 to version ECC 4.6 in early 2000s. The version upgrade was to ensure the ERP system remained compatible with the latest patches from the vendor that provided the ERP system software. There was also a planned functionality upgrade of the ERP system to introduce the CRM module from SAP to replace the aging membership module.

Continuous Improvements of ERP System

There were also many instances of minor upgrading projects to improve the business after the initial implementation. One example was how ClubCo's Sales further enhance the use of the receipting module. The receipting module had been implemented at all ClubCo's retail stores for processing sales, but there was a lack of a reporting application to consolidate sales data. A serendipitous decision was made to incorporate a logistical reporting tool from the SD module that had not been utilised. The logistical application was already available in the SAP platform but was not identified as a mission critical functionality that end-users need to be proficient.

"For instance, retail was doing their sales through the receipting module and they wanted to improve their reporting, so they implemented the reporting tool in the logistics area of SAP to improve their reporting" (Enterprise Applications Support Manager)

Other business improvements that came about after the ERP system implementation included the change in membership renewals for ClubCo's Clubs and Resorts customers. Previously, membership renewal was carried out only a yearly basis on the same day each year for all customers. However, the implementation of the Receipting module coupled with the finance processing capability of the ERP system allowed membership renewals to be done on an individual basis.

"They renew on a different day depending on when they joined. So they're expanding and making it more complex because the tool has the capability of doing that." (Enterprise Applications Support Manager)

ClubCo's senior management had also approved the IT project, "Cornerstone", to enable SOA (Service Oriented Architecture) capability within its IT platforms. ClubCo's SAP platform was seen as an enterprise wide application as it did not possess all the functionalities required to support all the business units within the company. Business units such as Roadside Assistance and Payroll still utilised their custom-built systems along the SAP platform. Only the finance transactional data were extracted from these legacy systems and imported into the SAP platform for consolidation.

"I just wanted to point out, for us, SAP is not an enterprise-wide system for us. Because we have so many different areas of business, we have many applications." (ERP system Applications Support Manager)

ClubCo's IT infrastructure ecosystem was a mix of middleware, or applications that convert data from the bespoke systems into SAP compatible formats, to allow the ERP system to process the data. SOA would provide more IT flexibility and allowed the easier integration of non-SAP related systems into the SAP platform. This would also have made the procurement of new software applications less challenging.

“SOA (sic) is that it's plug and play, modularised and things.” (ERP system Applications Support Manager)

The introduction of SOA platform had also led to the implementation of an IBM's application, WebSphere. WebSphere provided ClubCo's sales staff a single customer view. Customer representatives would now have access to a consolidated customer's data including purchases and subscription. The use of WebSphere substantially reduced the amount of time required for the customer representatives to retrieve customer data from multiple systems for different business units.

Management of ERP Improvement Projects

The CCC also made major changes to the way IT was governed in ClubCo. The implementation of the SAP platform meant that many of business process across its business units were integrated and centralised. Any business or processes change, after the implementation of the ERP system, meant that it had to be well-evaluated before approval was given. A newly created position, IT solution architect, was recruited to oversee the impacts of changes to the existing IT ecosystem. The IT solution architect was a key member of the CCC and provided advice to the committee for all business and IT changes.

Previously changes in business process were done in an ad-hoc manner. Managers or users would approach the BAS team and get the necessary approval and funds from the department heads to change the functionality in the ERP system.

“It used to be that they'd come around and see us and we'd have a chat and say 'what can you do' and 'oh yeah, we can do that, let's have a go' and we'll configure it or we'll get a consultancy if we need to get consultants. If it was a bigger piece of work, they would need to then get formal approval for the budget for the money to do that, but generally it was around.” (Enterprise Applications Support Manager)

The ad-hoc manner of implementing business process changes were no longer practiced after the establishment of the CCC and the appointment of the IT solution architect. The ad-hoc approach was deemed disruptive to business and the committee introduced new procedures to formalise change requests in the ERP system. End-users wanting to ask for additional functionalities or changes in functionalities are now required to file a change request with the supporting business case. Any stand-alone application that does not have an impact on the ERP system platform is not required to undergo this formal change request.

“There is a change committee meeting every week. And there’s a two-step approval process. One is to approve the development and the second step is to approve the implementation. That formal process is really around the core integrated systems.” (Enterprise Applications Support Manager)

Any proposed changes need to go through proper feasibility study and proposed to the Change Control Committee. The key reason for the formality is to prevent any duplication of services that lead to waste of resources and also prevent any risky changes from disrupting the business.

Monitoring of Users and System Performance

Before the ERP implementation, there was little governance over IT resourcing budget resulting in high costs of maintaining the legacy system. Due to the outsourcing of software and hardware arrangements, IBM charged ClubCo on a “pay per use” basis. The senior management implemented a new budgeting model whereby the internal costs of IT utilisation were charged back to the business units. This made the business units accountable for their IT resources, and ensured that IT resources are efficiently utilised.

Sometimes, employees “hogged” IT resources due to the generation of complex finance or market reports. These resources consuming usage deprived other end-users from using their applications in other areas of the business. As a result of the new budgeting model, the business units and end-users were forced to be awareness of their utilisation as they were charged based on the time and resources whenever they accessed the system.

“They’ll say ‘if we’re going to create a new insurance policy that’s going to take us at least one minute to go through all the screens in the system’. If they can reduce that to thirty seconds, then they’re going to charge the insurance department a lot less for that transaction because we’re very strong on internal charging in the organisation.” (Enterprise Application Support Manager)

Users that excessively over-utilised the SAP resources were now required to justify their usage to the senior management. Instead of using non-resource efficient workflows to complete their tasks, the end-users were forced to learn how to use ERP applications in efficient manners. Also, the end-users were also becoming aware of the capabilities that the SAP platform could deliver, leading to more creative ways or application requests to simplify their daily tasks.

“In SAP you can monitor people’s usage of the system and we started charging out that usage, so we can see how many CPU seconds it’s taking to do something. So we started charging that out internally through the business to say ‘well, you’re using, running a report that’s running all night, so therefore we’re gonna charge you much more than someone who just does a quick report’ and what that did was it actually focused a lot of people’s attention on the performance of the system” (Enterprise Applications Support Manager)

The monitoring of the ERP system use is also crucial in enabling the BAS team to identify areas for optimisation or benefits realisation. For example, ClubCo had a problem with their retail shops having to spend a lot of time at the end of the business day to balance out cash flows. Instead of the system performing the task in seconds, it took minutes or longer to complete the task. The BAS team had to figure out what went wrong technically in the ERP system that led to the lag experienced by the users.

Table 4.30 summarises the benefits that ClubCo derived in its later post implementation stage.

Table 4.30: ClubCo's ERP Benefits from Post Implementation

Benefit	Description & Supporting Evidence/Quote (Provided by ClubCo's EAS Manager)
Better communication among business units	<p>The implementation of IBM's WebSphere application that is linked to the ERP system gives all business units a single customer view. There is no need to access and update multiple systems for any change in customers' information. This facilitates the communication between departments in responding to customers. The Finance division have experienced improvements in their communication with other business units particularly in management accounting.</p> <p><i>"We have a central finance and accounting team, but then we have business analysts and business units, so it would be one set of figures that they can see and access themselves"</i></p>
Business growth	<p>ClubCo was able to cope with increased market growth and membership numbers with the use of ERP system and the Receipting module. It was easier for ClubCo to acquire more assets, resorts and incorporate newer business processes easily.</p> <p><i>"We've put more resorts on, more company codes, more processes, it's a system that we can use the base functionality and build new functions like the receipting area, so it enables us to cope with all sorts of growth"</i></p>
External linkages to other organisations	<p>As ClubCo offer insurance products, the ERP system was linked to the system of IAG, the underwriting company of ClubCo's insurance products. Insurance policies were created on IAG's system and payment information relayed to ClubCo's ERP system to create payment details and invoices that are to be billed to the customers. ClubCo's customers are able to pay for their invoices using the money transfer services of Australia Post, BPAY or other financial institutions. The payment and money collected by these agencies will be linked to ClubCo's ERP system.</p> <p><i>"We linked from R/3 to IAG, to the insurance system. So they go into the insurance system, create the policy, then there's a link back to SAP to take payment and that insurance system passes the details to R/3 and then we take payment for that policy."</i></p>
Increased customer satisfaction	<p>IBM's WebSphere and receipting module has allowed ClubCo's customers to receive timely and accurate invoices and statements that consolidate their memberships, subscriptions and purchases.</p> <p><i>"There are some things that we do out of SAP, such as creating invoices and customer statements, so it's possible (that customer satisfaction has increased) (sic)"</i></p>
Improved customer service	<p>The use of IBM's WebSphere application coupled with the ERP system allowed ClubCo to consolidate individual customer's purchases and subscriptions into a single database. This has led to more efficient processing of customer enquiries and requests.</p> <p><i>"With the single customer view and WebSphere, we are building what is more of standardised user interface for those frontline consultants."</i></p>
IT flexibility for organisational change	<p>Flexibility for newer IT applications has been increased due to the introduction of SOA capability brought about by the implementation of the ERP system. SOA allows ClubCo to seamlessly integrate legacy and new applications without the need to customise. It also enabled ClubCo to add new subsidiaries or acquisitions easily and does not require the companies to undergo standardisation of platforms or systems</p> <p><i>"We've added many companies over the years and (the platform is flexibility to add acquisitions) "</i></p>
Standardised user interface	<p>WebSphere offers the customer representatives a standardised interface to amend and update customers' details, purchases and subscriptions</p> <p><i>"With the single customer view and WebSphere, we are building what is more of standardised user interface for those frontline consultants."</i></p>
Provided greater ease of integration, scalability or portability of IT systems	<p>Project Cornerstone which was to enable SOA capability in ClubCo brought about greater ease of integration and linkages between the various systems used by ClubCo including the ERP system. The implementation of the ERP system also provided ClubCo a development framework that determines how future applications can be developed and integrated with the existing infrastructure.</p>

“Definitely from integration, there’s no problem with integrating it. With Project Cornerstone, because we’re on an older version, we had to put ITS in front, Internet Transaction Server, to web-enable the screen, but that wasn’t too much of an issue. Scalability definitely, it’s very scalable, it has a great capacity.”

The implementation of SAP’s CRM to replace the aging membership also shows the scalability and portability of the ERP system platform.

“We built a receipting system. It was a function that really wasn’t there in SAP to what we needed, so it provides a development framework as well really, that you can build anything.”

Reduction in operation costs	From an IT usage perspective, the introduction of the internal charging system led to a decrease in excessive resource use. Divisions and their departments are more aware of the resource implications of ERP system use.
------------------------------	--

“We get charged by how many systems, how many environments, how many servers we run. The more business processes you can run in the one environment, the more cost effective it is for us.”

Reduction in cycle time	The use of ERP system allows ClubCo employees to carry out bank reconciliations in a more effectively and quicker manner.
-------------------------	---

“What happened was they couldn’t reconcile their bank accounts. They couldn’t reconcile their GL accounts in those areas and then what was taken. So they’ve gone from a position from not being able to reconcile”

Achieved return on investment on the system	Despite the lack of empirical evidence to suggest that the ERP system had achieved a return on investment, the ERP system manager was confident that the ERP system had a reasonable return on investment. The manager pointed out that the implementation of the ERP system had provided ClubCo the necessary technical platform framework to implement further technologies and also paved way for the introduction of SOA capabilities. All these were necessary to ensure the compatibility of other non-ERP system applications in ClubCo.
---	---

“Yes, it would have returned that. We’ve had it for a number of years. I think we would have retrieved a reasonable return on investment.”

4.10.5 ClubCo’s Summary

ClubCo’s ERP system project was implemented in 1997 but was not used as an enterprise wide application. The main rationale for the ERP system implementation was to improve and consolidate the disparate finance processes among its divisions and units. The CFO sponsored and championed the initial implementation, costing ClubCo approximately AUD4 million. The ERP system project implementation was primarily outsourced to the IT vendor, IBM, who was responsible for the development of the system and post-implementation support. Unlike many of the ERP system implementations, ClubCo’s ERP system served primarily as a backend financial system during the early operational period. The ERP system had helped streamline many of the financial processes in the areas of bank reconciliation, billing and invoicing. The inclusion of the MM and SD modules from the same ERP system vendor brought about more functionalities to deal with market and membership growth.

The key focal point of ClubCo’s change management was the emphasis on thorough end-user testing and full acceptance of the new ERP system prior to going-live. This allowed end-users to feedback on any issues or bugs they experienced during the testing. The ERP implementation also created a new support team, Business Application Services, which provided further support to deal with complex ERP technical issues. The ERP system implementation learning process provided the IT&T division a governance framework, or map for future application implementation that emphasised on continuous improvements of ERP functionalities, close management of future ERP upgrade projects and regular measurement of end-users and system performances.

Chapter 5 Cross Case Findings & Discussion

This chapter presents the findings of the cross analysis, starting with an overview of the key lessons learnt from the within case analysis in the next section. It will then present and discuss the 10 primary ERP benefit drivers identified based on the ERP implementation processes the nine case companies went through, noting that the 10 benefit-drivers are conceptually defining three ERP implementation constructs: organisational learning, organisational innovation and ERP system governance. This is then followed by the presentation of a process model developed from the cross-case findings. The process model offers a conceptual overview of the contributory roles of the 10 benefit drivers to the ERP implementation process, yielding a total of seven main working propositions for theory building in ERP implementation. The chapter then goes on to link the ERP implementation process to the benefits of ERP implementation. Setting those benefits with the CVF framework (Quinn and Rohrbaugh, 1981, Denison and Spreitzer, 1991, Borell and Hedman, 2000), this chapter highlights the relationships between the three ERP implementation constructs and two sets of ERP benefits, i.e., the inherent ERP benefits and the unintended ERP benefits.

5.1 Overview and Key Lessons from the ERP Implementation Cases

No One Size Fits All Approach

In all the nine case companies, ERP implementation was motivated by a desire to enjoy the many benefits inherent in the use of the SAP system as well as by the dissatisfaction with the significant drawbacks of the legacy system. These common motivations, however, did not result in the adoption of a common set of modules among the nine case companies. Neither did the common motivations affect how the case companies elected to organise their project team or deploy the new system (“go-live”), as Table 5.1 shows.

The within case analysis reveals that the modules selected for the ERP implementations were dependent on the business case rationales. With the exception of EnviCo, whose ERP implementation was primarily to support future business growth and had only implemented PM, SD and HR, the other eight had SAP’s FICO included. While seven of the nine cases added other modules to support their business operations, PipeCo and EnviCo did not (see Table 5.1). EnviCo was a waste management company that focused on waste collection and recycling, whereas PipeCo’s main line of business was manufacturing of industrial equipment, such as valves and pipes.

The within case analysis also indicates that the in-house technical ERP expertise available within the adopting organisations determined the level of outsourcing for ERP implementations. The lack of in-house ERP development expertise had led to three organisations (EntertainCo, PackCo and ClubCo) to outsource the implementation project. On the other hand, GovDep and PipeCo had their implementation

managed by an in-house team. The remaining four organisations (DairyCo, ConfecCo, EnviCo and ElectricCo) used a mixed project team comprising external consultants, developers and in-house IT employees.

The differences in deployment (go-live) of the ERP system among the nine cases were primarily attributed to the scale of ERP implementation, i.e. the number of modules implemented, and the complexities of the business environment. EntertainCo, PackCo, PipeCo and ClubCo opted for a “big-bang” approach because of their need to integrate their business processes and to have a unified reporting system. The remaining six organisations preferred a phased approach due to their unique operating environment, organisational structure or politics. EnviCo had to experience multiple rollouts in different sites. ConfecCo, DairyCo and ElectricCo decided to roll out their modules gradually to avoid business disruptions. In the case of GovDep, it was the need to consolidate a number of agencies, statutory boards and governmental departments that led to a phased approach.

Table 5.1: Summary of ERP Projects for all Cases

Case	PipeCo	EnviCo	GovDep	EntertainCo	PackCo	ConfecCo	DairyCo	ElectricCo	ClubCo
Industry	Manufacturing	Waste & Recycling Management	Governmental	Entertainment & Media	Manufacturing & Recycling	Manufacturing & Consumer Goods	Manufacturing & Consumer Goods	Manufacturing	Consumer Services & Retailing
Owner	USA	FRA	AUS	AUS	AUS	USA	AUS	GER	AUS
Staff	2400+	3,800+	700+	5000+	9600+	2500+	3000+	3250+	2600+
Annual Revenue / Budget (AUD) millions	\$400	\$1,000	\$7	\$250	\$2,500	\$1,800	\$2,500	\$1,000	\$400
Sponsor	Managing Director	Managing Director	Director General	CFO	CFO	CFO	Managing Director	Managing Director	CFO
Software	SAP	SAP	SAP	SAP	SAP	SAP	SAP	SAP	SAP
Costs (millions)	10	27	NA	5.5	5	10+	12	4.5	4
No. of years since going-live (at the time of interview)	5	7	12	9	13	16	9	11	14
Project Team	In-housed	Mixed	In-housed	Outsourced	Outsourced	Mixed	Mixed	Mixed	Outsourced
Approach	Big-bang	Phased	Phased	Big-bang	Big-bang	Phased	Phased	Phased	Big-bang
Initial Modules	FICO, MM, S&D, WM, PM, PS, SM, BW	PM, SD, HR	FICO	FICO	FICO, MM	FICO, MM, SD, PP	FICO, MM	FICO, SD, MM, PP	FICO
Extra Modules	NIL	NIL	MM, PS, BW, PM	MM, SD, BW, HR, CRM, Customised IPM	SD, WM, PM, CRM, PS, BW	CRM, HR, APO, BW	SD, PP, BW, PM, HR	PM, WM, BW	MM, SD

Senior Management Commitment and Support

Despite these differences, all nine cases had their ERP implementation championed by a very senior company executive (Director General, Managing Director or CFO) (see Table 5.1). Senior management commitment and support were instrumental in driving changes, no matter what, and how difficult, the implementation obstacles had been. The willingness to deploy a mix of training, education, support and feedback mechanisms to ready the end-users for the operationalization of the ERP platform, as seen in PipeCo and ConfecCo, underscores the importance of senior management commitment in driving changes, especially to overcome end-user resistance. While the end-users in all nine organisations exhibited different degrees of resistance (as described in the cases found in Chapter 5) to the implementation process, the involvement of senior management became a vital catalyst in changing the negative end-user perceptions of ERP implementation.

Learning to Change and Progress

Some of the organisations (e.g. EnviCo, EntertainCo, PackCo and ClubCo) capitalised on the ERP implementations to cultivate a willingness to learn and change for innovation. The senior management of PipeCo, EntertainCo and ClubCo, through the assimilation of new ERP knowledge and expertise, also supported the opportunities provided by the ERP platforms to further improve their business performance, e.g. designing creative business solutions not originally planned for during the implementation.

Leveraging Capabilities to Enhance ERP Business Benefits

The senior management team of seven cases (except PipeCo and EnviCo) also demonstrated a robust understanding for continuous improvements or upgrades to their ERP systems to ensure long-term viability and interoperability with other technologies. These seven companies leveraged their newfound ERP expertise and knowledge to innovate their post-implementation efforts. The within case analysis indicates that these seven organisations invested in modules upgrades, version upgrades, or third-party application development to expand their system capabilities or functionalities. They implemented different forms of innovations that included unanticipated use of ERP information or tools to support business operations; developed new applications (e.g. analytics tools, EDI) to exploit the ERP information, and further reengineered post-implementation business processes to drive work efficiencies.

Governance Structure

A by-product of the experience gained and knowledge assimilated from ERP implementations was the formalisation of governance structures or models for managing ERP systems. Eight of the case companies, i.e. except GovDep, did not possess any ERP system management expertise prior to their

implementations. GovDep was unique. As a governmental organisation, GovDep inherited an ERP-enabled agency that led to the full-scale rollout of ERP systems throughout its organisational units.

Before the ERP implementation, the IT ecosystems within the eight cases were fragmented, consisting mostly of legacy systems that were disparate and cumbersome. There was little structure on how the legacy systems were managed, and most of times those legacy systems were developed and managed in an ad-hoc manner. The implementation of the ERP platforms in the eight cases resulted in the establishment of a governance system in different forms. Seven organisations (excluding GovDep and ElectricCo) implemented monitoring tools to measure ERP system contribution to business operational performance. Other forms of formalised governance structures established as a result of ERP implementations included user performance management and ERP asset management.

5.2 ERP Benefit Drivers

All nine case companies underwent a relatively distinctive process of ERP implementation within the context of their business models, business case rationales, availability of ERP expertise and level of senior management commitment and support. These parameters created the project boundaries that influenced the processes used during the ERP implementations. Despite the operations differences in their implementation processes, the nine case companies were all determined to get their ERP systems off the ground so that they could reap the benefits promised by the use of the ERP system. During the process of change, many were quick to see the prowess of the system embedded in the platform and extended its functionalities by incorporating new modules and/or applying the acquired modules beyond the original intended usage. From the change processes put in place by the nine case companies to implement their ERP systems, 10 benefit-drivers were identified (see Tables 5.2A, 5.2B and 5.2C):

1. Change management
2. Testing and acceptance
3. Education, training and support
4. Knowledge codification and sharing
5. Process routinisation
6. Continuous receptivity
7. Strategic ERP extensions
8. User management
9. Performance monitoring
10. Assets management

Conceptually, these 10 benefit-drivers are subsumed under three constructs: organisational learning, organisational innovations and governance mechanisms. The conceptual relationships between the three constructs and their benefit-drivers are discussed in the sections that follow.

Table 5.2.A: Implementation Change Process for all Cases

Cases	Primary Change Process	Benefits Drivers
PipeCo	<ul style="list-style-type: none"> Change management program incorporated a rigorous training and education that improve end-users' knowledge of ERP system and new business processes. Change management program initially introduced the use of external consultants and was changed to internal consultants to overcome user resistance. Change management also heavily relied on site champions to enhance training at the operational level 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> Regularly consultations between the implementation team and end-users created a feedback communication mechanism to improve the capabilities of the ERP system. The feedback mechanism collected end-user requirements more accurately led to enhanced reporting tools catering to executive needs as well as better supply chain management. 	<ul style="list-style-type: none"> Knowledge codification and sharing Strategic ERP extensions
	<ul style="list-style-type: none"> The accumulation and assimilation of experience from the first roll-out resulted in a global implementation template and increased expertise for future ERP implementations. The implementation team constantly strived to improve their newer implementations by identifying bottlenecks 	<ul style="list-style-type: none"> Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> PipeCo's management became more receptive to ERP capabilities extensions after learning the improved ERP expertise within the organisation. The management initiated a IT project to build on its existing infrastructure to gain more productivity by using the ERP system to interact with other offices and subsidiaries via Electronic Data Interchange (EDI) capability to improve supply chain management. 	<ul style="list-style-type: none"> Knowledge codification and sharing Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> The ERP manager and his team carried out constant reviews of the ERP system performance to identify sub-optimised areas. This forms a feedback mechanism to carry out continuous improvements. 	<ul style="list-style-type: none"> Performance monitoring
EnviCo	<ul style="list-style-type: none"> A structured change management strategy was formulated to support the ERP implementation that included training, education and obtaining managerial support. Training and education sessions were organised for the operational workforce (e.g. drivers and plant workers) and officer users in the period leading up the go-live. Training program also incorporated regularly practice sessions to ensure that the users were truly familiar with the ERP system. The realism of the training was improved by using real actual customer data for their training simulation. 	<ul style="list-style-type: none"> Change management Education, training & support Process routinisation
	<ul style="list-style-type: none"> There was an accumulation of experience of multiple ERP projects in different states, leading to increased technical expertise within the implementation team. This led to more efficient use of resources for the later projects across Australia. EnviCo's implementation team was able to share their knowledge with the end-users of the later projects, prevent the pitfalls of earlier projects. As a result, the integration between the legacy systems and the new ERP platform in the later projects were faster. 	<ul style="list-style-type: none"> Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> EnviCo ERP implementation team, enabled by the increased knowledge and expertise, was proactively seeking new ways to improve the existing capabilities provided by the ERP systems. The implementation team has also pipelined a number of new initiatives that further enhance EnviCo's customer relationship management systems. Examples of the extensions made to the ERP platform included truck fleet management, customer relationship management and a new customer tracking system that works with over web or telephone. In additional, there was also work done to incorporate external third application, a geographical information system, that will interact with the ERP system to manage trucks. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> EnviCo's steering committee had tasked the ERP manager to report on the ERP performance to ensure that the system was running as intended. The review process involved the identification of the efficiencies or improvements that had been brought by the use of the ERP implementation. Cost benefit analysis was used to identify areas that were also lacking and required improvement. 	<ul style="list-style-type: none"> Performance monitoring
GovDep	<ul style="list-style-type: none"> GovDep's ERP team manage all end-user training to improve the operational readiness of the end-users. The end-users continuous training and exposure to ERP capabilities increased the end-users' technical awareness. This resulted in more frequent end-user's demands for sophisticated ERP tools. 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> GovDep's ERP team had undertaken a number of integration ERP projects due to the ever-changing portfolio of the Governmental Department. The experiences gained by the ERP team had built up internal ERP expertise. The internal ERP expertise and better end-user awareness promoted better utilisation and adoption of the ERP platform within the organisation. 	<ul style="list-style-type: none"> Education, training & support Knowledge codification and sharing
	<ul style="list-style-type: none"> The establishment of formal channel for changes allowed end-users to put in their request to be evaluated and implemented by the GovDep's ERP team. The GovDep ERP team worked together with the steering committee to ensure that all the request and upgrades to their IT assets were well-justified. Examples of the ERP capabilities upgrades include third party applications to manage real estate assets. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions Assets management
	<ul style="list-style-type: none"> The use of a standardised ERP platform provided the opportunities for functions within GovDep to be consolidated into shared services and support. This resulted in less operational overheads and reducing costs. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> GovDep had formulated policies to control ERP system related expenditure as well as changes to the ERP use and improvements. This allowed the ERP implementation to prioritised improvement projects that can support the organisational growth and operations. 	<ul style="list-style-type: none"> Assets management

Table 5.2.B: Implementation Change Process for all Cases

Cases	Primary Change Process	Benefits Drivers
EntertainCo	<ul style="list-style-type: none"> EntertainCo's change management process involved two key elements, end-user acceptance and fit of system to meet business requirements. The analysis of business requirements and proposed solutions needed to be embraced by the end-users before implementation. The change management strategy also deployed end-users to be trained by the implementation team on the beta (pre-live) system to help identify technical glitches within the system. The use of a live training system helped end-users to increase familiar fast. End-users, during regularly testing, were able to provide feedback to implementation team on whether if the ERP system conforms to business requirements and end-users' expectations. 	<ul style="list-style-type: none"> Change management Education, training & support Testing and acceptance Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> The implementation team had also established a user feedback channel for soliciting improvement requests. This help the implementation team to continuously improve the system quality prior to going live. 	<ul style="list-style-type: none"> Change receptivity Knowledge codification and sharing
	<ul style="list-style-type: none"> EntertainCo's senior management extended the ERP platform support, through shared services, to all its divisions e.g. theme park management, media leasing division and cinemas management. The change management strategy for EntertainCo's ERP implementation requires all divisions to standardised their finance and IT services. This was attributed to the increased ERP expertise within the organisation. 	<ul style="list-style-type: none"> Change management Knowledge codification and sharing Strategic ERP extensions
	<ul style="list-style-type: none"> The senior management, was open to innovation that exploited the ERP system capabilities. And this led to further the implementation of EDI to communicate with partners for procurement, distribution and licensing of assets / products. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
PackCo	<ul style="list-style-type: none"> PackCo implementation decided on a soft and proactive change management strategy by involving the operational end-users early in the implementation project. The soft approach also required the involvement of supervisors or managers, who are trained to be super-user, to champion the ERP cause within their departments or teams. The super-users were tasked to run regularly workshops to ready the end-users for the ERP go-live. 	<ul style="list-style-type: none"> Change management Education, training & support Process routinisation
	<ul style="list-style-type: none"> The establishment of a feedback channel, via the project team, allowed users to request for additional functionalities. This had brought unexpected development of more efficient workflows and business processes that the implementation team did not originally anticipated. As result, further enhancements were made to the data quality and reporting tools. 	<ul style="list-style-type: none"> Education, training & awareness Strategic ERP extensions Knowledge codification and sharing
	<ul style="list-style-type: none"> PackCo implementation team was actively seeking ways to improve the ERP system through upgrading programs or the inclusion of newer technologies to further enhance the platform's capabilities. These initiatives included version upgrades to ECC6.0 for more functionalities and the implementation of SOA compatible applications to augment the ERP capabilities. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> The IT steering committee had a rigours process established to get the implementation and business teams to review the processes embedded in the ERP platform and ensure that they were optimised for business operations. The IT steering committee also established a robust governance framework to ensure that the performance of the end-users and ERP system performance were accountable. 	<ul style="list-style-type: none"> Performance monitoring Usage management
ConfecCo	<ul style="list-style-type: none"> Change management incorporated training program that help personnel specialised in the capabilities of the ERP platform, and in doing so, created 'silos of [expert] knowledge'. The experts, with their increased understanding and use of ERP capabilities, utilised the ERP more proficiently. 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing
	<ul style="list-style-type: none"> The end-users gained access new information after the ERP integration, and learnt to utilise the information in more meaningful way to support business operations. The quality of information also helped drive the adoption of analytical tools being used in their daily work. The synergy of information provided the end-users a better understanding of the status in other business units. 	<ul style="list-style-type: none"> Knowledge codification and sharing Strategic ERP extensions
	<ul style="list-style-type: none"> ConfecCo management, as an outcome of the ERP implementation, created the L&D group to provide training and facilitate end-user feedback to improve the ERP platform. Based on the feedback obtained from the end-users, the implementation team would plan the upgrades projects to improve the ERP system. These included to EDI capabilities and version upgrades for more functionalities and support. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> The implementation team, developed key performance indicators, to benchmark ConfecCo's operational performance with industrial best practices. The measurement of the performance allowed the implementation to identify under-performing end-users, as well as business operations that would require further training or optimisation. 	<ul style="list-style-type: none"> Knowledge codification and sharing Performance monitoring Usage management

Table 5.2.C: Implementation Change Process for all Cases

Cases	Primary Change Process	Benefits Drivers
DairyCo	<ul style="list-style-type: none"> DairyCo's ERP project (including the original implementation) utilised an agile approach for change management. A change manager was appointed for the projects (including minor upgrades) that would oversee the organisational changes and mitigate the risks of ERP disruption. It was also the change manager that would communicate with and organise training for the end-users that affect the ERP changes. The change management at DairyCo, adopted "train-the-trainer" approach to facilitate knowledge transfer and to obtain user buy-in. A number of personnel were recruited from business units to be trained into experts, who could later go back to their units to impart their knowledge to other end-users. 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> Senior management, was committed to adoption of the ERP platform, and had invested resources to ensure that the capabilities were constantly upgraded to meet the industrial and partners' requirements. DairyCo's ERP system had undergone version upgrades to ensure compatibility with other players within its supply chain. Also, it had implement an SOA architecture for its IT platform to facilitate financial transactions with financial institutions. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
	<ul style="list-style-type: none"> DairyCo's middle management exposure to the information from the ERP system, led to more creative business solutions. There was an active push by the middle management to constantly request for better functionalities and reporting tools e.g. dashboards. 	<ul style="list-style-type: none"> Knowledge codification and sharing Strategic ERP extensions Change receptivity
	<ul style="list-style-type: none"> The organisational expertise with ERP system resulted in the establishment of a governance model to help solicit feedback to improve the ERP capabilities. The governance model would also introduce KPIs to evaluate individual end-user performance to help optimise existing business workflows within the ERP system. The initial steering group that oversaw the ERP implementation had extended its membership to include business unit managers. This group would govern the resourcing requirements for its ERP system (including upgrades) and ensure the investments spent were justified. 	<ul style="list-style-type: none"> Usage management Performance monitoring Asset management
ElectricCo	<ul style="list-style-type: none"> Many aspects of ElectricCo's change management was outsourced to its implementation vendor, SAP. SAP managed the organisational changes and provided the necessary training to the end-users. Vendor trained IT-savvy business managers so that they can be used to facilitate on-site training in their own business units. The super-users would continue the training with their colleagues, and tasked to ensure the proficiency level of the end-users prior to the go-live. 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> ElectricCo's training program required end-users to attend annual refresher courses that had mandatory testing to determine their level of ERP proficiency. The refresher workshops also provided opportunities for key-users to exchange ideas and a channel to propose new business process or improvements to the functionalities of the system. 	<ul style="list-style-type: none"> Education, training & support Knowledge codification and sharing Change receptivity Process routinisation
	<ul style="list-style-type: none"> ElectricCo's management utilised the ERP platform to further change and streamline the business operations in other locations. The multisite IT services were made redundant, and a shared SAP support service was created to manage the ERP platform in all sites. The management also wanted to change the way information was exchanged between suppliers and its facilities. This led to the creation of a third-party EDI that allowed timely information to be communicated for its supply chain management. 	<ul style="list-style-type: none"> Change receptivity Strategic ERP extensions
ClubCo	<ul style="list-style-type: none"> ERP trained managers, through better access to information provided by ERP, had more visibility that help improved labour efficiency in their facilities. Labour costs were reduced and manpower utilisation was optimised. Less time taken to manufacture goods. 	<ul style="list-style-type: none"> Change management Education, training & support Knowledge codification and sharing
	<ul style="list-style-type: none"> ClubCo's change management strategy included the establishment of the "Change Control Committee" that was responsible for organisational change and risks. The committee would determine the resourcing and training requirements for all ERP related initiatives. During the project implementation, the committee created policies and procedure to govern ERP changes. Due to the outsourcing arrangement of ClubCo's IT assets, the CCC would also monitor end-users and system performance to ensure IT costs were appropriate for supporting business operations. 	<ul style="list-style-type: none"> Change management Usage management Performance monitoring Asset management
	<ul style="list-style-type: none"> Although, the vendor managed training at the start of the project, formal training teams were later created by CCC to take over the task of training end-users. The training team provided on-site classroom training for the business units, and was responsible for the readiness of the end-user prior to deployment. Testing and acceptance was a critical element within ClubCo's change management strategy. The tests of the prototype system were essential to ensure that the ERP system was developed in accordance to the business and end-user requirements. The tests allowed end-users to be exposed and gained knowledge early implementations. It also formed a feedback mechanism that provided opportunities for the end-user to identify IT glitches in the system. 	<ul style="list-style-type: none"> Change management Education, training & support Testing and acceptance Knowledge codification and sharing Process routinisation
	<ul style="list-style-type: none"> ClubCo had a strong continuous improvement culture and was open to changes that could improve the ERP system. A greater awareness of ERP capabilities, during post-implementation, led to the better utilisation of analytical applications that were not originally introduced to the end-users. The senior management, was open to end-users' feedback, and allowed for the investment of resources to further enhance the ERP capabilities. This was evident from the creation of third party application that allows for easy web access to consolidated customer's records without the need to use different databases. The senior management, through a better understanding of ERP process and information visibility, was proactive in ensuring that the information from the ERP platform is compatible with its partners. This led to the adoption of the SOA framework allowing for other third-party applications to be developed and linked to the ERP system platform seamlessly 	<ul style="list-style-type: none"> Change receptivity Knowledge codification and sharing Strategic ERP extensions

5.2.1 Benefit Drivers of Organisational Learning

Past research (Stewart, 2000, Kwahk and Lee, 2008) strongly suggests that ERP adopting organisations need to be change-ready to undergo substantial operational adjustments. ERP implementation forces adopters to fundamentally change their organisational processes that impact a variety of stakeholders (Kwahk and Lee, 2008, Boonstra and Govers, 2009, Alsulami et al., 2016). The management of change (Motwani et al., 2002, Ash and Burn, 2003a) plays a critical role in establishing an appropriate fit between the newly created technological platform and on-going organisational requirements (Soh et al., 2000, Hong and Kim, 2002) to deliver the expected business benefits and performance improvements after it goes live (Glowalla and Sunyaev, 2014, Nwankpa, 2015, Slabbert et al., 2016). Putting in place such a fit requires active organisational learning (Attewell, 1992, Markus et al., 2000a, Holland and Light, 2001, Boudreau, 2003).

In all nine cases, there was evidence that the organisations underwent a degree of preparation to ensure that their structures, business operations and end-users were ready for the ERP implementation. The preparations carried out included management strategies to communicate and educate changes to the operational users, streamlining of business processes, the redundancy of legacy systems, testing of beta systems, upgrading of end-users' skills and also providing opportunities to exchange ideas or knowledge between the project stakeholders. Companies that had utilised external ERP expertise also establish mechanism to absorb ERP knowledge actively to build their internal expertise. More significantly, the learning processes were not confined to formal programs of training and support. Many forms of informal learning happened at the grass-root level with employees helping out one another as the implementation proceeded. The willingness and ability to adopt changes on the part of both management and employees characterise *organisational learning*, which was manifested in four key areas (benefit-drivers): i) change management, ii) education, training and support; iii) testing and acceptance and iv) knowledge codification and sharing.

Change Management

All nine case organisations implemented some forms of change management strategy to communicate changes that would be introduced to all users expected to be impacted by the ERP system implementations. The change management strategies at EnviCo, DairyCo and ElectricCo focused on achieving users "buy-in" (support) to overcome change resistance in adopting the ERP system. It was seen as a way of promoting the unlearning, and re-learning, of new business processes resulting from ERP implementations.

The managers interviewed (EntertainCo, PackCo, DairyCo and ClubCo) stressed the importance of informal feedback to supplement a formal change strategy to manage the fallouts associated with ERP implementations. A formal approach to managing change was seen as a means to ensure that business

changes and requirements were well understood and the development of the ERP system could adequately address all requirements. In the case of PackCo, the senior management even made it mandatory for middle managers to attend consultative sessions with the implementation team to provide feedback on proposed changes. The middle managers were required to educate their own staff about the changes and to increase awareness.

On the other hand, PipeCo and ConfecCo indicated how the lack of a formal strategy made their ERP implementation difficult. PipeCo originally intended to use external consultants to conduct change management, but the lack of end-user support led to a switch to in-house consultants (managed by PipeCo's own manager).

"We've definitely experienced that in a few areas where ex-consultant has been in their own mindset or with their own experience and not listening to what the business requirements are."
(PipeCo's SAP Business Manager)

PipeCo's end-users benefitted considerably from the feedback of the in-house consultants who spent socialising with end-users to guide them with the use of the ERP and learn from them how the new business processes that came with the system would affect their work. There was significant mutual learning happening.

Likewise, ConfecCo faced strong resistance from their finance group as employees felt that the ERP implementation would have huge implications on their job scope and responsibilities with potential for job cuts. The lack of an articulated change management strategy resulted in unnecessary delays with the project and this led to ConfecCo's CFO personally championing the project.

"So there was a very large mind-set change that I think we underestimated. We also didn't know at that point what the effect would be on people's role, yeah, what new role would be required, what would disappear." (PipeCo's SAP Business Manager)

The collective experiences of the nine case companies suggest that change management is a process for establishing a structured mechanism to formalize a program of actions to facilitate the communication of changes, prepare end-users for changes and provide both formal and informal channels for feedback.

Testing and Acceptance

Only EntertainCo and ClubCo had tested ERP prototypes extensively by the end-users before the system went live. Testing of the trial systems were seen as an essential step to ensure that all the requirements and specifications of the ERP system were developed and delivered to end users according to plan. Testing also ensured that the newly designed processes were aligned with the

business operations and accepted by the end-users who had input in them. The outcomes of the tests were also used to evaluate whether expected benefits from the ERP were ultimately delivered.

“Change management is involved in terms of blueprinting a solution, getting their confirmation around a proposed solution and getting them involved in user acceptance testing.” (EntertainCo’s SAP Manager)

Only EntertainCo and ClubCo highlighted the importance of testing, for ensuring the successful implementation of the ERP system. Other seven cases had downplayed the importance of testing within the change management strategy but had repeatedly reiterated the importance of gaining user-acceptance, not necessarily formally but informally by emphasising user readiness via the change management programs.

EntertainCo and ClubCo cases demonstrated that testing and user acceptance were equally important elements of the change process, and allowed for fit between technology, process and end-user expectations. The process of testing promoted user acceptance as users were given opportunities to design and propose ERP system changes that best fit their working requirements. As such, testing and acceptance is described as a mechanism of obtaining endorsement from end-users, through system testing, identification and rectification of issues, before the system goes live.

Education, Training & Support

Education and training of end-users was an essential process of ERP implementations across all cases. All nine cases used super-users, implementation team and/or external consultants provided by the ERP vendor. Super-users (or site champions) were generally employees appointed from the managerial or supervisory levels. The main reasons given by PipeCo, ConfecCo, DairyCo and ElectricCo for employing super-users for training were as follows:

- *Super-users* were required to “own” (take ownership of) the newly designed business processes as part of the ERP implementations.
- *Super-users* were experienced leaders (within their own business units) who were able to persuade other end-users more readily, due to the close relationships that already existed between them. *Super-users* were more suitable for reducing user resistance and ensuring buy-in to the new system.
- *Super users* serve as the first point of contact to communicate with end-users. *Super users* had been trained in the system use and act as a filter for more complex end user enquiries.

The role of training was strongly emphasised in all cases, in particular EnviCo. EnviCo’s ERP implementation saw the replacement of all legacy systems post implementation, making it crucial that end-users be given intensive training to ensure their competence in using the newly implemented SAP

platform. Training was also recognised by most managers as an essential step to facilitate the exchange of knowledge feedback between end-users, super-users and implementation teams. The informal communication (e.g. conversations over coffee break) that arose from training sessions assisted in the identification of issues and provided opportunities for rectification prior to system deployment.

“So you know (during training), every data conversion load, the data improves, you find errors and you fix them.” (EnviCo's Business Improvement Manager)

Closely related to training end-users is the support given to them. End-user ERP support was not limited to ensuring that queries about system use were addressed, but also further promoted learning between end-users and support personnel. In cases whereby end-users encountered problems, established, support teams (either in-house or external) were able to readily provide solutions to troubleshoot the problem encountered by end-users. The presence of an end-user support mechanism or team further improved the end-users' confidence and capabilities in using the system. The troubleshooting process and learning of solutions also allowed end-users to learn to be more independent if they ever encounter similar issues.

In most cases (EnviCo, GovDep, EntertainCo, PackCo, DairyCo and ElectricCo), the issues given to the support team also formed the basis for continuous improvement projects to further enhance the ERP platform capabilities. The support team in these organisations went beyond the provision of routine support but gave end-users opportunities to propose and drive changes to the ERP functionalities, if the functionalities did not meet their business requirements. For example, EntertainCo's end-users found that the functionalities offered by ERP were not sufficient and had to get the ERP support team to develop an in-house application to manage intellectual property of their media products.

All nine cases incorporate education and training programs for their ERP implementations to ensure that end-users were capable of using the system the way it should be. In sum, while education, training and support are inherent in all implementations and involved having a formalised approach to increase end-users' awareness of the system functionalities, the emphasis given to socially engage the end-users plays a catalytic role in deepening their knowledge in using and applying the modules to perform their job tasks accordingly. This was evident in all cases, whereby education and training became intricate components of the social process of change management and the relationships developed through social interactions between the key stakeholders, e.g. end-users, IT personnel and consultants, are fundamental to cultivating learning and knowledge absorption.

Knowledge Codification and Sharing

The mutual exchange of information or knowledge via informal or/and formal channels (e.g. workshops) promotes interaction between the end-users, trainers, support and implementation personnel (See Figure 5.1). End-users, through education and training, increased their competencies of using ERP

applications effectively for their jobs. This created a greater awareness of the capabilities of ERP use, and also its limitations. The knowledge obtained from interactions, both formal and informal, increased the ERP competencies and expertise of the players within the project. Competent end-users, in certain post-implementation cases (GovDep, EntertainCo, ConfecCo, DairyCo and ClubCo), also increased their demands for more complex applications or functionalities.

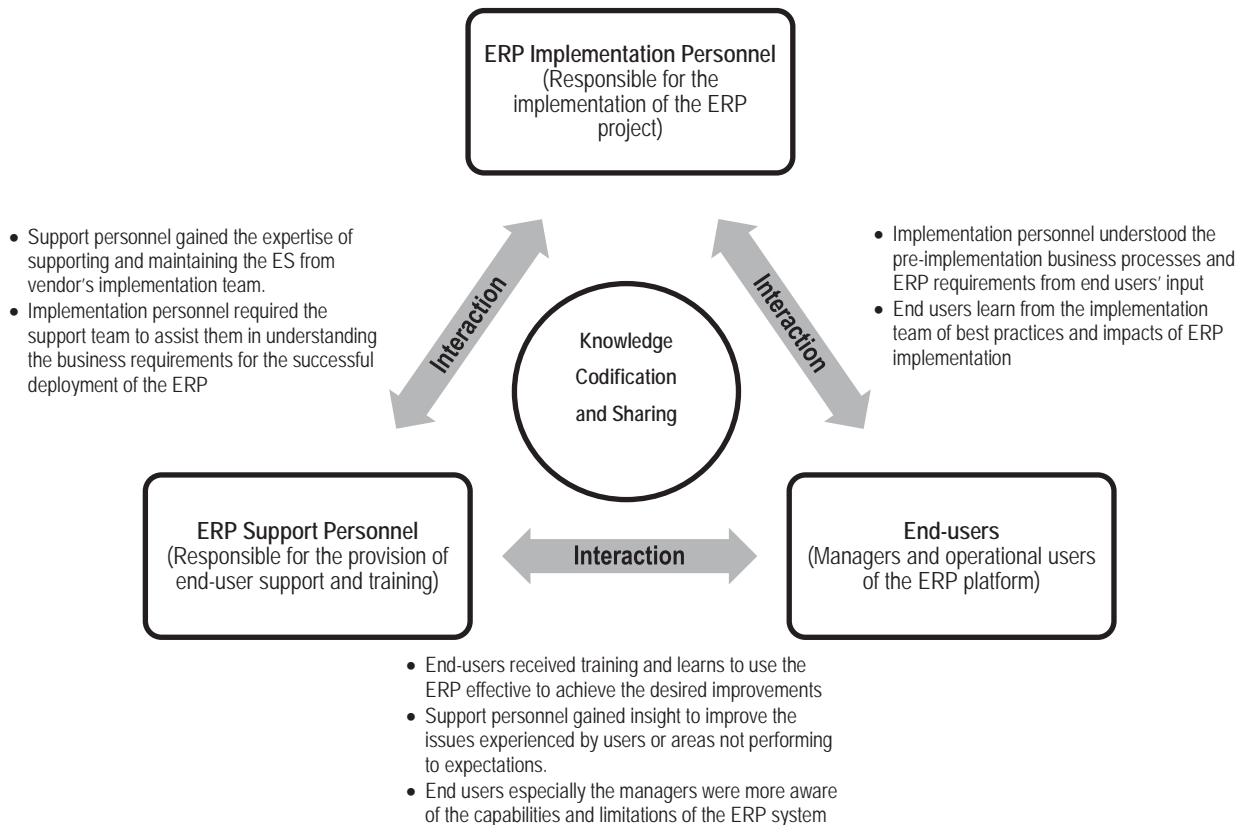


Figure 5.1: Interactions with Stakeholders Involved in Implementation Projects

The involvement of subject matter experts enabled the implementation personnel to develop an effective ERP that met the business requirements and also helped support personnel identify areas needing further improvements. The support or implementation personnel (that may consist of internal or external consultants) would gain insights on user and system performance through their interactions. Interactions would promote learning within and between the end-users, trainers, support and implementation personnel. In the case of EnviCo, the implementation team consisting of technical personnel mainly provided by the SAP lacked the knowledge of existing business processes and IT systems platform. EnviCo's implementation team was highly dependent on the in-house support team and the end users to get the initial implementation requirements correct. Again, much of these requirements were acquired not by formal meetings and organised workshops, but from informal work-station discussions between these three groups of stakeholders, i.e. technical personnel, ERP support team and end-users. Inputs, both formal and informal, from the support team and users from earlier rollouts had also provided the company with a project template that resulted in quicker later installations.

The interactions between the personnel involved in the ERP implementations had facilitated a transfer of knowledge, and contributed to expertise building within the adopting organisations. The end-users, had assimilated the knowledge transferred from the trainers, improved their ERP usage competencies through routine training programs. Similarly, in-house IT personnel deployed to support end-users had to absorb knowledge from implementation vendors. These interactions led to knowledge codification and sharing among the end-users, support and implementation personnel during the change process.

5.2.2 Benefit Drivers of Organisational Innovation

ERP researchers (Willis and Willis-Brown, 2002, Lee et al., 2003, Aburub et al., 2015) have argued that ERP implementations bring about organisational agility through superior integration capabilities with external trading partners. Other forms of agility may also include system agility that allows for customised business applications or further improvements to business processes (Davis, 2005). As such, ERP implementations provide adopters the potential to enhance their business processes even after deployment (Srivardhana and Pawlowski, 2007, Nicolaou and Bhattacharya, 2008).

An ERP implementation is considered both an IT innovation (Bradford and Florin, 2003) and BPR mechanism (Rajagopal, 2002), allowing for the process of change and continuous learning (Kraemmerand et al., 2003, Ke and Wei, 2008) that provide opportunities for end-users and management to further improve their business operations beyond what has been planned for in adopting the ERP system (Bernroider et al., 2014). The higher level of end-user expertise, e.g. task familiarity (Ruivo et al., 2014), tend to positively impact the business operations. The more familiar end-users are with the ERP system, the greater their involvement in its usage and optimisation (Davenport et al., 2004, Amoako-Gyampah, 2007). Marabelli and Newell (2009) also suggest that the organisational learning and ERP knowledge absorptive capacity further enhance the ability to innovate ERP implementations.

The within case findings indicate that eight of the nine cases achieved organisational innovation through the increased technical and business ERP expertise developed from learning during ERP implementation. Routine end-user training, exchange of ERP knowledge between external and internal stakeholders, and openness to innovation promote the absorption of ERP knowledge. System acceptance leads to increased ERP knowledge or “ERP-savviness”, which, in turn, resulted in a culture of continuous improvement in the organisations, leading to extensions of ERP capabilities or new business solutions not originally planned for. The unplanned extensions or business solutions further contributed to the list of benefits made possible by the ERP systems. In short, the experiences of the case companies suggest that *organisational innovation* evolves from an organisation’s ability to incorporate experience and knowledge gained through the change process of ERP implementation and could be developed in three different ways: i) process routinisation; ii) continuous receptivity; and iii) strategic ERP extensions.

Process Routinisation

Related to knowledge codification and sharing is to the opportunities for the adopting organisations to practice what they have experienced from their ERP implementations. PipeCo and EnviCo's ERP projects were not limited to a single rollout, but rather a series of deployment across a number of physical facilities. The experience gained from the implementation provided both PipeCo and EnviCo's implementation teams a clearer understanding of the business and organisational changes involved, including pitfalls to avoid, for their future implementations.

“We are in the process for the next 18 months to migrate all these guys [other business groups] to SAP according to specific regions. The U.S. are still learning an old system which they plan to migrate in the next two years. Europe are running SAP, but at a very smaller user base (sic)”
(PipeCo's SAP Business Manager).

Further, end-users who had given opportunities to practice their learning were able to increase their user competencies prior to the system development and, used task familiarity to achieve improved productivity when the system turned operational. This meant that end-users would be capable of using the ERP functionalities competently and would also create opportunities to utilise the increased competencies to find ways to improve the ERP system as well as to innovate.

Although change management, education, training, support, knowledge codification and sharing were promoting organisational learning, competencies can only be further solidified through task repetition. The opportunities that the implementation and support personnel had in the form of multiple rollouts (e.g. PipeCo and EnviCo) helped them practice what had been learnt from earlier implementations, and avoided mistakes to enhance future implementation efforts. Equally, end-users need to be given opportunities to improve their familiarity with the ERP tools to improve their productivity, and allow them to seek refinements to their job tasks. Process routinisation, seen in the case studies, can be explained as increasing ERP technical or business expertise via repetition of implementation tasks

Continuous Receptivity

Senior management that demonstrated an understanding of strategic use applications of ERP tend to have a positive attitude and were receptive to business changes post implementation. Seven organisations, except PipeCo and EnviCo, underwent further organisational changes, by upgrading their ERP platform capabilities or purchasing more modules to improve their ERP platform functionalities (refer to Table 5.1).

All cases, except PipeCo, highlighted that the implemented ERP platforms might not fully support their business requirements. In almost cases, the willingness to pay attention to user feedback had led to further enhancement of the ERP platforms. The eight organisations utilized a feedback mechanism to

allow for continuous improvements to the ERP platform. For example, EnviCo proactively worked with its implementation partner to constantly seek ways to further streamline the business process even after the implementation. GovDep's and EntertainCo's implementation team also adopted a proactive approach to continuously remove redundant processes and systems post-implementation in consultation with end-users.

Improving the ERP platform could be achieved by installing more modules to support business operations. In certain cases, improvement was achieved by designing solutions on top of the ERP platform based on operational needs or end-user requirements. Listening to business units or end-users became the basis for ERP functionality change request that often required the implementation team to reconfigure existing functionalities, e.g. reporting tools with the ERP platform. The creation of an open and conducive environment (e.g. DairyCo, ClubCo) also encouraged end-users to seek alternative solutions for ERP usage. Often the solutions included additional capabilities not originally implemented by the implementation team. Two of the case companies further introduced formal mechanisms to develop new solutions:

- **DairyCo:** Created a formal mechanism to allow end-users to propose new improvement "ideas" for the IT steering committee to consider.
- **ClubCo:** Established a "Change Control Committee" that provided a mechanism for continuous improvements.

Allowing feedback for continuous improvement of the ERP system to ensure continuous organisational receptiveness of system change had allowed seven of the eight cases (except PipeCo) to extend their ERP platform capabilities, through user-driven, or business-driven, upgrade projects.

Strategic ERP Extensions

All cases have revealed that their organisations had innovated the use of their ERP capabilities. The innovations could be in the form of: i) unintended use of the ERP information or functionality, e.g. analytical tools; ii) increased end-users' demand for more complex ERP capabilities; iii) creation of third-party applications to support business operations that lacked ERP capabilities; iv) reengineering of business process to complement the ERP platform; and v) installation of more ERP modules to improve existing capabilities, such as the case with EntertainCo, which separately implemented an IP Management module that the company found was lacking in the SAP platform to support their business operations.

The experience of the nine case companies suggests that ERP innovations typically sprung from the increased competency of end-users, their awareness (knowledge) of ERP capabilities, willingness for organisational change, and the technical capability of the ERP support personnel. Examples included:

- **EnviCo:** Engaged their implementation partner to come up with a third-party application to allow for the GPS tracking of their transportation fleet after end-users and the support team identified that their ERP systems were not able to deliver this capability.
- **PackCo:** End-users requested that, useful reporting applications within the SD module, be implemented even though it was not compatible with existing business processes. This resulted in further reengineering of business processes to have it utilised.

All nine cases covered in this study had extended their ERP capabilities in differing ways. Some cases had formal mechanism, e.g. ClubCo change control committee, to facilitate them; others adopted informal means to respond to end-user requests for improved functionalities, e.g. GovDep. It is obvious that the knowledge assimilated, and the experience gained, from earlier implementations had influenced later extensions of the ERP platforms. Hence, strategic ERP extension is the creation of new business ERP-based solutions due to increased technical or business ERP expertise.

5.2.3 Benefit Drivers of ERP System Governance

The life-cycle of an ERP system is unlike typical IT platforms. Its embedded informative processing capabilities (Davenport, 2000a, Davenport, 2000b) allow for future extensions of the capabilities via version upgrades (Dempsey and Liam Sheehan, 2013) or the use of third party software (James and Wolf, 2000) or analytical tools (Sahay and Ranjan, 2008). Moreover, the ERP implementation ecosystem within an organisation is often complicated (Gable and Timbrell, 2001, Schlichter and Kraemmergaard, 2010), due to complex organisational changes arising from the technical and business requirements (Yang and Su, 2009, Žabjek et al., 2009, Chiang, 2013).

Many adopting organisations tend to underestimate the maintenance and support resources needed for their new ERP ecosystem (Law et al., 2010). ERP researchers (Beatty and Williams, 2006, Wang and Chen, 2006) have argued the need for governance mechanisms to allow organisations to manage their platforms sustainably, given that ERP vendors are continuously rolling out new functionalities or version upgrades to their ERP platforms. Bernroider (2008) suggests that ERP investments are more effective when there is an active governance mechanism guiding the ERP projects; the lack thereof would result in ERP projects failing to meeting corporate goals.

All cases (except EntertainCo) in this research have shown that the implementations of the ERP systems have created organisational changes in the form of new governance structure or mechanisms. The new structure provided senior management in these organisations formalised tools or frameworks that assisted them in managing end-users and ERP performance, e.g. measurable KPIs that determine ERP system contribution to organisational efficiencies. Four cases had further developed structures, e.g. policies and protocols, that made changes within the ERP ecosystem accountable and resources invested justified. *ERP system governance*, which covers the structures and formalised mechanisms to

manage ERP ecosystem, thus ensures that any future changes proposed for the ERP systems are sustainable, optimised and risk-managed. From the within-case findings, *ERP system governance* extends to the management of people, systems and performance.

User Management

Though all nine case companies had included education and training programs within their ERP implementations, little efforts were made to ensure, or measure, end-users' competencies. Only PackCo, DairyCo, ElectricCo and ClubCo indicated that end-users' competencies should be well-managed and evaluated during the ERP implementations. The competencies of the end-users affected the manner in which they used the ERP functionalities and tools. This ultimately impacted on the end-user and system performances. The management of end-users at four cases were noticeably different:

- **PackCo:** The General Manager (Enterprise Solution) had repeatedly emphasised the need for end-users to be sufficient mature in the applications of ERP so that the potential of the ERP system could be fully optimised. User training should allow for learning and innovation to happen, so that end-users could fully understand how to use ERP functionalities to support their work effectively.
- **DairyCo:** The company would not introduce new functionalities to end-users unless they were already familiar with the existing ones.
- **ElectricCo:** End-users were required to undergo compulsory "refresh" training workshops and be examined to assess their levels of competencies.
- **ClubCo:** The company established formal teams that specialised in training end-users.

In the context of the four cases highlighted, the aim of user management was to ensure that end-users could utilize the ERP applications productively.

System Performance Monitoring

With the exception of GovDep, EntertainCo, and ElectricCo, all the other cases took an active approach in evaluating their ERP system performance post implementations. Monitoring of system performances provided these companies opportunities to identify areas that need attention and improvements. Underperforming areas were analysed to understand the causes to enable solutions be designed for end users to more fully exploit the potential of the ERP capabilities. Solutions might include further user training even after the systems had been implemented.

The ERP managers of EnviCo and EntertainCo were tasked by their steering committee to undertake constant performance reviews of their ERP systems after going-live. The reviews were primarily driven by the need to determine if there was a return on the ERP investments, and whether ERP systems had delivered the expected benefits. Likewise, ERP support teams of PackCo, ConfecCo and ClubCo were

also given similar responsibilities to ensure that the ERP systems were effectively utilised by end-users to improve business performance.

In ConfecCo's instance, review undertaken by the support team indicated that end-users were using the ERP platform competently but yet did not drive any business performance improvements. This was due to the lack of efficient business process and streamlined workflows. In another example, ClubCo's ERP platform was outsourced and ran on a platform-as-a-service (PAAS) pricing model. ClubCo's ERP costs were dependent on time utilisation of the ERP resources and hence it was important for the support team to track and monitor the resource usage to avoid unnecessary operational overheads.

It was evident that across the seven cases (except GovDep and ElectricCo) post-implementation effort tends to focus on the monitoring system performance to determine the operational performance improvement that resulted from ERP use.

ERP Asset Management

The cases for GovDep, PackCo, DairyCo and ClubCo indicate that governance of ERP resources is necessary to ensure that ERP capabilities are optimised and ERP changes well-managed. In these three cases, the organisations had undertaken a formal and methodological approach to managing the ERP capabilities and associated changes to optimise resources invested in the ERP platform. Examples included:

- **PackCo:** Reviews of performance, best practice modelling, training and maturity and innovation were critical elements of prudent ERP system governance.
- **DairyCo:** Strong steering committee oversaw the performance of the ERP system, ensuring that ERP system improvements were made

Findings from the within case analysis also reveal that ERP resource management included the design of effective ERP governance policies/framework (e.g. PackCo's ITIL) that determine what improvement projects to prioritise and what modules to be purchased. The use of policies or frameworks provided guidance and prevented unnecessary wastage of resources from enhancement initiatives. End-users requests for new functionalities or business improvements need to be stringently scrutinised to determine their priority levels and their fit with the current ERP capabilities and business processes. For instance, proposed changes or improvements to ClubCo's ERP system had to undergo feasibility studies and presented to the Change Control Committee. The Change Control Committee considered the proposals based on the guidelines within the stipulated policies. This prevented any duplication of functionalities that might have already been developed leading to less likelihood of resource wastage.

Based on GovDep, PackCo, DairyCo and ClubCo cases, ERP asset management became part of their governance strategy to ensure ERP capabilities and changes were fully optimised and risk managed.

Table 5.3 shows which of the benefit-drivers are linked to which of the three constructs. It also provides the definitions of both the benefit-drivers as well as the constructs and displays which of the case companies had invoked which of the benefit-drivers in their implementation.

Table 5.3: Constructs that Affect ERP Implementation Outcomes

Constructs	Benefits Driver	Definition	PipeCo	EnvCo	GovDep	EntertainCo	PackCo	ConfecoCo	DairyCo	ElectricCo	ClubCo
Organisational learning (a willingness and ability to adopt changes to meet requirements of ERP implementations)	Change management	Establishing a structured mechanism/program that will communicate changes, prepare end-users for changes and provide a channel for feedback	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Testing and acceptance	Getting end-users to test and identify issues that needs to rectify before the system goes operational				✓					✓
	Education, training and support	Having a formalised approach to increase end-users' awareness and expertise through education and training programs and adequate support	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Knowledge codification and sharing	Creating opportunities for employees to apply and share their newly acquired ERP skillsets	✓	✓	✓	✓	✓	✓	✓	✓	✓
Organisational innovation (ability to leverage on experience and knowledge gained through process change resulting from ERP implementation.)	Process routinisation	Increasing ERP technical or business expertise via repetition of implementation/execution tasks	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Continuous receptivity	Allowing feedback for continuous improvement of the ERP system to ensure continuous organisational receptiveness of system change		✓	✓	✓	✓	✓	✓	✓	✓
	Strategic ERP extensions	Creating new business solutions due to increased technical or business ERP expertise	✓	✓	✓	✓	✓	✓	✓	✓	✓
ERP System Governance (structures and formalised mechanisms to manage ERP ecosystem)	User management	Ensuring end-users are using the ERP applications productively					✓		✓	✓	✓
	Performance monitoring	Monitoring the operational performance improvement resulted from ERP use	✓	✓			✓	✓	✓		✓
	Assets management	Ensuring that the ERP capabilities and changes were fully optimised and risk managed			✓		✓		✓		✓

5.3 A Process Model of ERP Implementation

Findings from the within case analysis clearly show that ERP implementation brings about multi-faceted changes to the adopting organisation in the areas of business, technology and end-users. The imposed changes experienced by the implementing organisations forced them to unlearn their existing practices

and relearn new practices aligned to the ERP platforms (Liang et al., 2007, Chiang, 2013). The process model presented in Figure 5.2 captures the change process management for the cases, and also included the key drivers that moderate the processes.

The process model describes the factors that moderate benefit outcomes of ERP implementations. In the early stages of ERP implementation, end-users' expertise and attitudes are primarily impacted by the effectiveness of change management strategy, which would incorporate the education, training and support programs. The change management strategy, not only prepares the end-users to use the new ERP system, but also serves to overcome end-user resistance. End-user resistance can be further reduced with the inclusion of early testing, to determine if the ERP functionalities developed meet the end-users' requirements and expectations.

Process routinisation, continuous receptivity and strategic extensions are important post implementation changes. The extent of ERP technical and business expertise is associated with tasks familiarity arising from use routinisation. Similarly, a high degree of exposure to ERP usage or implementation leads to the building of internal ERP competencies, such as awareness of ERP functionalities, ability to accept ERP-business changes and technical capabilities to implement the end-user driven improvements. Strong internal ERP expertise, coupled with continuous improvement receptivity, provides potential to further extend the ERP capabilities to develop strategic benefits. Examples of these benefits include unintended use of the ERP system functionalities, enhancement of embedded functionalities, development of third-party applications, further business process reengineering for optimisation, and installation of more ERP modules to support other business operations.

It is also necessary to govern the ERP system ecosystem after the go-live. The monitoring of end-user performance determines if the end-users are using the ERP functionalities as intended. Likewise, the measurement of ERP system performance determines if the ERP system is providing operational improvements as intended. The management of the ERP assets and resources, as well as the monitoring of end-user performance and ERP system performance are necessary to ensure that the previous and future investments made into the ERP implementations are accountable and sustainable.

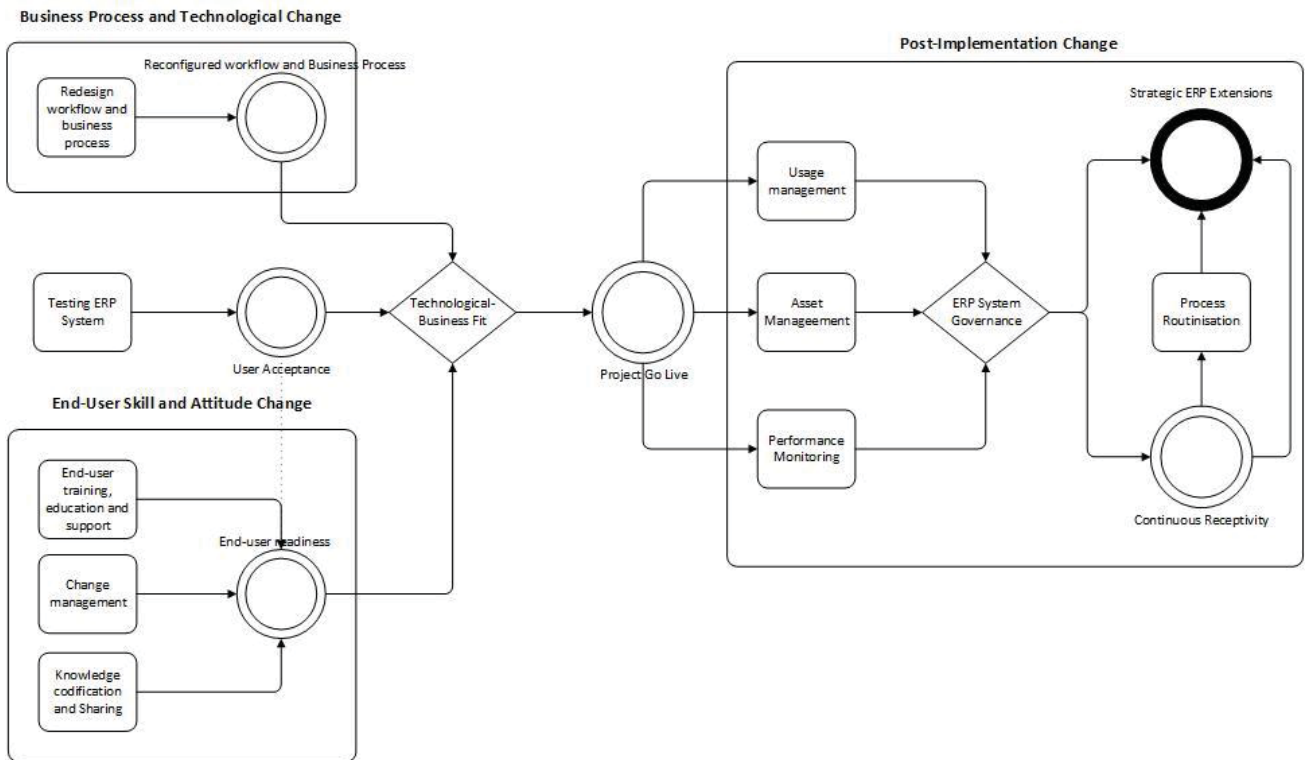


Figure 5.2: Process Model for Deriving Benefits from ERP Implementations

Although all the cases differed in their ERP implementation approaches, all nine cases underwent substantial organisational change as a result of their ERP implementations. Organisational changes in the cases often involved the modification of existing works or business processes to suit the business needs, such as streamlining or removing redundancies or duplications in existing tasks. Despite the changes imposed by the ERP implementations, not all cases proactively managed the changes, which led to high level of user resistance (e.g. PipeCo). On the other hand, there were also examples of successful change management. For instance, EnviCo instilled end-user confidence early in the project by overcoming social barriers with the support of senior management.

Organisational change brought about a high degree of disruption to end-users. The disruptive effects were often underestimated, due to the absence of a pre-determined change management strategy. In some extreme cases, senior managements had to be involved in providing hands-on leadership to direct the change and reduce user resistance. Extant research (e.g. Markus et al., 2000a, Robey et al., 2002, Wang et al., 2007) has traditionally claimed that organisational learning needs to occur at the adopting organisation for the ERP implementation to be successful. Kraemmerand et al. (2003) advocated effective change management requires increased communication, training and education, performance management and management practices.

Based on the illustration given in Table 5.3, it was evident all nine organisations had undergone organisational learning, through their own distinct change processes, to ensure user readiness. All nine cases had change management incorporating training programs that shared ERP knowledge, with the

use of external or internal trainers, e.g. super-users, to increase end-user ERP expertise. The training and education programs also acted as mechanisms to solicit end-users feedback, and helped in overcoming end-user resistance. The active sharing of information between the technical and business staff encouraged further end-user acceptance and “buy-in”, leading to a high degree of readiness prior to ERP system deployment.

Proposition 1: *Change management, education, training and support, knowledge codification and sharing are the basic building blocks for upgrading end-users’ skills and overcoming user resistance to engender user readiness.*

All cases, except PipeCo, had utilised their own internal IT personnel to manage end-users change during the development stages. Only PipeCo first attempted to use external consultants, but replaced them eventually with internal ones due to high user-resistance. The within case findings clearly show that internal consultants, owing to their familiarity with the business processes, did well in serving as site champions in inducing end-users, both through training and social engagement, to accept the new systems and associated process change. Their ability to demonstrate beneficial changes in task performance had been instrumental in helping to overcome strong user resistance.

Proposition 1A: *Change management is more effective with the use of internal consultants due to their familiarity with organisational process and their social ties with the end-users, which leads to a higher chance of end-user acceptance.*

All cases had their formal ways of training and supporting end-users but the outcomes of the training program varied. One key observation from the cases was that all cases, with the exception of GovDep, did not have any ERP expertise or experience prior to the implementation. This meant that training had to rely on the implementation partners. Training tends to be structured around the use of internal super-users or site champions, who acted as on-site trainers specific to the business units. During the training sessions, end-users were able to provide feedback and comment on issues that would impact on the way they run the business operations. The feedback mechanisms create a sense of end-user ownership. In all cases, the use of education, training and support mechanisms were necessary to increase end-user awareness and ensure that end-users were ready before the system went live.

Proposition 1B: *Training and education is best facilitated by super-users, due to their ownership of the processes and ability to serve as feedback link between the end-users and implementation personnel.*

Almost all cases (except GovDep) involved the use of external technical implementation partners, i.e. SAP, to develop the ERP software platform, and gave support and post-implementation responsibilities to the in-house IT personnel. Interactions between end-users, technical implementation personnel and support personnel increased the competency of ERP implementation. This is evident in cases when

multiple deployments were involved, where resources utilised in later implementations became more efficient with fewer issues arising. All cases also employed a systematic process to share and assimilate knowledge. It became evident that all the nine case organisations were learning to manage the change as the project progressed. The stakeholders involved in the implementation were actively encouraged (or forced in some instances), either via formal or informal mechanism, to acquire new knowledge or expertise (refer to Figure 5.1) from the external implementation partner SAP. Wang et al. (2007) has also suggested that knowledge transfer between external consultants and internal employees was necessary to improve ERP implementations. In this light, proposition 1C is offered as follows:

Proposition 1C: *Three way interactions (among end-users, support personnel and implementation personnel) are needed to bring about an effective knowledge codification and sharing process in ERP implementation.*

EntertainCo and ClubCo, both service-oriented organisations, emphasised on the importance of testing and user acceptance as a means to ensure that the ERP system being developed conforms to their business needs and end-user expectations. Coincidentally, both cases had only implemented FICO module for their initial implementation. The within case findings indicate that this was due to their ageing financial systems, the need to have visibility over finance transactions and accurate reporting, e.g. GST (EntertainCo) and account reconciliation (e.g. ClubCo). Both also adopted a big-bang approach for their FICO implementation that required all their business units to adopt the ERP after deployments. As such, this evidence leads to Proposition 2.

Proposition 2: *Testing and acceptance, through social-technical alignment, ensures a fit between technology, business and end-users*

Proposition 2A: *Testing and acceptance should form part of a formal mechanism to endorse the technical specifications developed for companies requiring transaction visibility and accurate reporting.*

Proposition 2B: *Adopters that use testing and acceptance to ensure that the system implemented conforms to business needs and user expectations tend to be comfortable with a big-bang approach to system deployment.*

Research (Robey et al., 2002, Bajwa et al., 2004, Liang et al., 2007, Saraf et al., 2013) has strongly argued that assimilation of knowledge during ERP project helps improve innovations and utilisation of ERP resources. It was discovered that end-users' familiarity with ERP related tasks and processes increased with routinisation e.g. training and active usage. Likewise, technical expertise of the project teams also increases with multiple implementations within the organisations. This was evident in PipeCo and EnviCo whereby the implementation teams were required to deliver multisite ERP systems. Also, all organisations (except PipeCo) have created information channels that collected feedback to identify

areas requiring improvements, for ensuring long-term organisational receptiveness to ERP utilisation. The within case analysis also reveals that the assimilation of experience and knowledge and increased process routinisation resulting from ERP implementation had led to different forms of organisational innovations, e.g. effective utilisation of resources (e.g. ClubCo), enhanced ERP expertise (e.g. GovDep). The argument provided by the findings leads to Proposition 3.

Proposition 3: *Process routinisation, continuous receptivity and strategic ERP extensions are critical for organisational innovation.*

The capability to innovate stemmed from the level of internal ERP technical and business expertise. Business end-users' ability to understand and use ERP applications result in different forms of demands and requirements, and were constrained by the ability of the technical staff to implement requirements. This was credited to the opportunities that the employees had to constantly practice what they had learnt and experienced. Cases that involved multiple roll-outs (PipeCo and EnviCo), i.e. deployments, indicate that the technical implementation and support teams had gained experience from the first original implementation and used that experience to improve further implementations at other sites. Likewise, end-users who were given opportunities to practice their newly assimilated knowledge during training or usage, such as those in EntertainCo, would exploit their increased competencies to continuously improve or innovate the ERP capabilities.

Proposition 3A: *Process routinisation, through implementation and training repetition, increases learning opportunities for building up organisational ERP competencies to innovate*

Process routinisation is an important enabler of organisational innovation, but equally important is the organisational receptivity to continuous improvements. It is well documented that, due to organisation need to further increase their ERP capabilities after deployment, small scale upgrade projects to refine the ERP platform or installation of new modules are sometimes necessary (Staehr et al., 2012, Leyh and Muschick, 2013). Most cases (except PipeCo & EnviCo) in this study have demonstrated that it was necessary to install more modules after their ERP platforms had been implemented. Also, in some cases, end-users, due to increased competencies and user knowledge, were driving business improvements by utilising ERP functionalities in unintended ways, or requesting IT team to install more sophisticated ERP capabilities for their work. Researchers (Alles et al., 2006, McGinnis and Huang, 2007) have also suggested that the ability of organisation to receive feedback and act on the feedback to improve is critical to drive ERP success.

Proposition 3B: *Receptivity to constant business and system changes and proactive utilization of feedback to drive innovations from ERP implementations could help improve business operations.*

Across all nine cases, there had been various forms of (often unintended) strategic extensions, and they can be broadly categorised into the following: i) optimisation of ERP functionalities; ii) functionality enhancement; iii) development of third-party applications to complement existing functionalities; iv) further business reengineering; and v) installation of additional ERP modules.

Proposition 3C: *Strategic extensions of ERP applications, a component of organisational innovation, provide unintended benefits that may include optimisation of ERP functionalities, functionality enhancement, third-party applications, further business reengineering and installation of more ERP modules.*

A by-product of organisational learning and organisational innovation was cultivation of organisational awareness of the ERP ecosystem. All cases (except GovDep) had no prior experience with ERP systems and implementations. The ERP implementations studied for this research indicate that the eight cases have implemented ERP system for the first time. Due to the lack of ERP experience and expertise, issues such as high user resistance, delays, and unsatisfactory became important learning experiences for these first-time adopters. A key outcome of the organisational learning process was to how better govern ERP resource or ERP related initiatives or projects after the original deployment. Through multiple iterations of ERP improvements/upgrades, these organisations serendipitously gained an increased understanding of governing and optimising their ERP ecosystem through three key main areas: i) end-user management (e.g. EntertainCo, DairyCo, ElectricCo and ClubCo); ii) system performance (e.g. PipeCo, EnviCo, EntertainCo, PackCo, ConfecCo, DairyCo and ClubCo); and iii) ERP asset management (e.g. GovDep, EntertainCo, DairyCo and ClubCo).

Proposition 4: *ERP system governance involves the proper management and monitoring of end-users, system and IT assets.*

Four of the nine cases (PackCo, DairyCo, ElectricCo and ClubCo) had formalised mechanism to ensure that end-users are well equipped with the right knowledge to fully exploit the functionalities in the ERP platform. The management at PackCo were of the view that user training and comprehensive documentation could help expand end-user skills. PackCo and DairyCo had programs to assess end-users' skill level before introducing new functionalities. ElectricCo required its end-users to undertake annual examinations to determine their competency. Similarly, ClubCo's support team monitored the way its end-users utilise the system to avoid unnecessary IT wastage.

Proposition 4A: *Measurement of end-users' competencies could ensure the productive utilisation of ERP platform.*

With the exception of GovDep and ElectricCo, undertakings of ERP system performance evaluation exercises were fairly common across the other seven cases. Post implementation reviews had helped identify issues, such as inefficiencies with the newly designed ERP-based processes in PipeCo and

EnviCo, or areas that require enhancements (e.g. EntertainCo, PackCo), removal of redundancies (e.g. ConfecCo), benchmarking (e.g. DairyCo) and wastages (e.g. ClubCo).

Proposition 4B: *Monitoring the operational performance of ERP system provides essential feedback for improving ERP capabilities*

Formalised IT (ERP) governance procedures (e.g. PackCo), frameworks (e.g. GovDep) and establishment of committees (e.g. DairyCo and ClubCo) were some of the examples of governance structures created to assist the organisations manage their finance commitments to new ERP initiatives and/or for the maintenance and support of ERP technological assets. The management of ERP assets were important to both GovDep and ClubCo. GovDep had a limited annual IT budget that was allocated by the state government, whereas ClubCo outsourced its hardware resourcing, and was billed based on usage.

Proposition 4C: *The management of the ERP assets could ensure that ERP capabilities and associated changes are optimised and risk free*

Among the nine cases, EntertainCo was an outlier that did not highlight any form of governance. This is because the organisation considered its ERP implementation as an on-going project that would continue to evolve its capabilities through future upgrades and installation of more modules.

Proposition 4D: *Governance would have a lesser role in ERP implementations that are considered on going, or are experiencing constant changes associated with enhancements or upgrades.*

5.4 Deriving Benefits from the ERP Implementations

Research have shown that benefits achieved by adopting organisations can be inherent to the ERP implementation (Bendoly and Schoenherr, 2005), e.g. automation and improved data quality (Gattiker and Goodhue, 2005), and can also be benefits arising from post-implementation usage (Hayes et al., 2001, Chou and Chang, 2008), or extended benefits. In this research, the within case analysis has shown that all the case organisations had obtained short-term benefits inherent to the ERP system, and they all also gained long-term benefits not originally anticipated. The benefits identified from all nine cases, both inherent and extended, were analysed using CVF as a theoretical lens and presented in Table 5.4, which categorises them into the CVF's HR, IP, OS and RG quadrants.

Table 5.4: Summary of ERP Benefits Analysed from Cases

Benefits		PipeCo	Env/Co	GovDep	EntertainCo	PackCo	ConfecCo	DairyCo	ElectricCo	ClubCo
Internal Process (IP) Related	Conformity to new taxation, laws and regulations	★	✓	✓	✓	✓	✓	✓	✓	✓
	Improved shared services among the units	★	★	★	★	★	★	★	★	★
	Increased understanding and control of processes	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Better reporting and auditing	★	★	★	★	★	★	✓	★	★
	Better communication among business units	★	✓	✓	★	★	★	★	★	★
	Improved data quality	★	★		★	★	★	★	✓	★
	Standardised user interface		✓	★	✓	✓	★	★	✓	✓
	Easier maintenance of IT systems			★	★		★	★	★	✓
Human Resource (HR) Related	Improved individual performance / efficiency	★	✓	✓	★	★	✓	✓	✓	★
	Empowerment of employees	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Establishing common vision & goals among staff members	✓	✓	✓	✓	✓	✓	✓	✓	
	Personnel reorganisation	✓	✓	✓	✓	✓	✓		✓	
	Business Learning within the organisation		✓	✓	✓	✓	✓	✓	✓	
	Improved quality of work life		✓	✓						
	Better communications amongst employees		✓						✓	
Rationale Goals (RG) Related	Reduction in cycle time	✓	★	✓	★	✓	✓	✓	★	✓
	Improved decision making and planning	★	✓	✓	✓	✓	✓	✓	★	✓
	Improved overall productivity	★	✓	✓	✓	★		✓	✓	★
	Allows organisation to do business more effectively	★		★		✓	★	✓	★	★
	Improved logistic & supply chain management	★	✓		✓	✓	✓	✓	★	
	Reduction in operation costs		✓	✓			★	✓	★	✓
	Improved product/service quality		✓	✓	✓	✓	✓		★	
	Improves partner's (e.g. suppliers, customers) services				★	✓		✓	✓	
	Achieves return on investment on the ERP System			✓				✓	✓	✓
	Improved overall profit	✓				✓		✓		
	Reduction in lost sales from lost orders			✓			✓		★	
	Reduction in work in progress						✓		★	
	Provides Cost Leadership					✓				
Open System (OS) Related	IT flexibility for organisational changes	★	★	★	✓	✓	★	★	★	✓
	Provides greater ease of integration, scalability or portability of systems	★	★	★	★	★	★		★	★
	Builds external linkages to other organisations (via system integration)		✓	✓	✓	✓	✓	✓	✓	✓
	Enables innovations	✓	✓	✓	✓	✓		✓	✓	
	Support business growth	★			✓		✓	★	★	✓
	Supports organisational changes		✓	✓	★	★		✓	✓	
	Increased customer satisfaction		✓		✓	✓	✓	✓	✓	✓
	Improved customer service	✓	✓	X			✓		✓	✓
	Builds new business alliances / partnerships		✓		✓	✓		✓		
	Allows product / service differentiation		✓			✓				
	Extension of Market Reach	✓			✓				★	

Legend: ★ Benefit Required from ERP Implementation ✓ Benefit not Related to ERP Implementation Business Case

Project Development Stage (Inherent) Project Deployment Stage (Inherent) Post Implementation Stage (Extended)

The legend is explained as follow:

Alignment to the business case (rationale) for ERP implementation
 ★ indicates that it is an achieved benefit that is an expected outcome relating to the business rationale for ERP implementation;
 ✓ indicates that it is an achieved benefit that is unintended outcome that was not planned and unrelated to the business rationales for ERP implementation.

Phase of project when the benefit occurred:
 green indicates the inherent benefit occurs during the development stage;
 blue indicates that inherent benefits occurred at deployment stage;
 purple indicates that extended benefits occurred after post implementation.

Alignment of ERP Business Cases and Achieved Outcomes

The promise of ERP benefits tends to be the main motivators for ERP implementation. Past studies (Davenport et al., 2004, Chand et al., 2005) have shown that the inherent ERP benefits that adopting organisations are able to reap from their ERP implementation are essentially integration, optimisation and information related.


Similarly, the findings of this research suggest that most ERP implementations were primarily motivated by organisational business requirements to improve IP efficiencies, especially in the following areas: i) creation of shared services; ii) reporting and audit; iii) communication among business units; and iv) data quality that enhances integration and optimisation of business process. The IP related outcomes are summarised as follows:

- **Creation of Shared Services** - All organisations underwent organisational structuring through the creation of shared services unit for finance, HR or IT. Shared services improved the interactions between business units, and via centralisation, provided a “one-stop” service to support the other business units. There were clearer workflows for addressing support issues with shared services.
- **Better Reporting and Audit** – All organisations have improved their reporting and analytical capabilities. In most cases, reporting prior to ERP implementations, was a time-consuming that resulted in huge wastage of manpower resources. This was attributed to the use of fragment legacy systems that were supporting different business units within the organisations. Consolidated or customised reports generated by the ERP system have improved the process of reporting and increased the ease of auditing for all organisations. Reports generated by the ERP systems could be easily ported, customised and manipulated by other end-users.
- **Better Communication Between Business Units** - Due to integrated business functions, all data are now online real time, accessible by all organisational or departmental units for shared views on demand forecasts, staffing, production targets, budget, long term planning and customer and partner management issues. The standardisations of data, transactions and process including cost centre management, and finance transactions have improved the communication among the business units. As an outcome, better communication among departments/units with all working from the same database had eliminated a lot of misunderstandings and erroneous data that used to accrue from using multiple systems prior to ERP implementations.
- **Improved Data Quality** - ERP systems are capable to capturing useful relevant real-time data. Information captured by the ERP system can be presented quickly to users at extremely detailed level using applications incorporated. There was clear evidence that the end-users have more accurate and mission critical data pertaining to business operations, transactions and trading partners, that assisted with their decision-making process. Other example of improved data

quality also included decreasing rate of errors associated with the use of manual paperwork for processing payment.




In the context of RG, the main motivations are: i) IT flexibility for organisational changes; and ii) greater ease of integration, scalability or portability of systems. The RG related outcomes are described as follows:

- **IT flexibility for Organisational Changes** - Although organisational changes can range from structure, operations, products, and responsibilities, the cases have demonstrated that their ERP platforms provided the organisations the capability to respond and adapt to the changes quickly. The changes discussed in these cases ranged from organisational restructuring, personnel reorganisation, IT functionalities reconfiguration, ability to meet changing customer demands, and conforming to new taxations or laws.
- **Greater Ease of System Integration, Scalability and Portability** – The ERP implementations had increased their organisations the capability to better integrate and scale their operations and growth. The processes for integrating subsidiaries that are using the same ERP platforms, managing new acquisitions or customer markets are simplified with the use of the ERP software. The ERP system applications also allowed them to create new customer records and transactions for new market segments easily.

Findings of this research show that inherent ERP benefits (marked as  in Table 5.6) tend to be associated with the IP-related and RG-related dimensions in the CVF framework. On this account, the following proposition is offered:

Proposition 5: *Organisations motivated to implement ERP to improve internal process efficiencies would stand to gain IP and RG benefits.*

5.4.1 Major Unintended ERP Benefits

In addition, findings from this study show that the case organisations also obtained 10 unanticipated benefits associated with their ERP implementation (see boxes , ,  in Table 5.4). These unanticipated benefits, i.e. benefits not forming part of the reasons for ERP implementation, occurred in all three main stages of the ERP implementation process: development, deployment and post implementation. These benefits were mainly associated with HR, RG and OS dimensions in the CVF framework.

Unintended Pre-Implementation Benefits

The concentration of in the HR-related dimension reveals that pre-implementation benefits of an ERP implementation tend to focus on human capital development, all cases have achieved outcomes relating to i) personnel reorganisation; and ii) business learning. A limited number of cases (e.g. PipeCo, DairyCo and ElectricCo) had also experienced an increased understanding and control of processes. The main two pre-implementation benefit outcomes are explained as follow:

- **Personnel Reorganisation** – In five of the nine cases, new roles were created within the organisation prior to the ERP deployment. Although some consolidation of positions and redundancies eventuated with the implementation of ERP, these organisations successfully retrained and reorganised positions to ensure that all employees remained in these organisations. The changed positions typically resulted from skills acquired as a result of ERP implementation to support and maintain the ERP platform, rather than merely skills of working on new business systems or computer applications. Instead of inputting data into different systems, employees gained access to a common data set on ERP which enabled them to make contributions to decisions and to highlight problems, if any, with forecast, demand, supplies, quality, distribution, warehousing, among others. Therefore, findings from the case studies suggest that ERP implementation has resulted in people having acquired enhanced skills with a heightened understanding of business process, which helped many to embrace new roles.
- **Business Learning** - Change management strategies and processes embedded in the ERP implementations had made end-users more aware of existing business processes, bottlenecks, workflows and responsibilities of other business functions in the organisation. A greater access to data, improved communication between departments and ERP-related training and education sessions were major contributors to this learning in organisations.

Unintended Deployment Benefits

It can be inferred, from the in Table 5.6, that the deployment (go-live) of an ERP system does engender unanticipated HR benefits. Majority of the cases have realised unintended benefits that are summarised as follow:

- **Improved Individual Performance / Efficiency** – Although all cases have improved their individual performance as a result of ERP implementation, only five of the nine reported that it was unintended. The nine cases suggest that ERP implementations also led to business process automation in the case companies, and provided access to increased information and data at all levels in the organisation. As a result, more employees had access to information, and were generating reports quicker from a greater volume of data. Also, many workflows, especially finance transactions, were simplified, thus reducing the amount of time required for

completing previously paper-based tasks, such as authorisation for staff travel (GovDep), procurement of office equipment (EntertainCo), raw material supplies for manufacturing organisations (PipeCo). The electronically processing of these tasks not only made the process quicker, but also enabled all documents to be digitally recorded, thus improving accountability. Automation of documentation process freed up staff time for more productive activities. The performance for each employee became transparent and could easily be assessed by their supervisors. As a result, end-users were accomplishing more than before.

- **Employee Empowerment** – All cases reported that the empowerment of end-users was an unintended benefit. The availability of information and the analytical ERP applications allowed managers and supervisors to make informed decisions and to liaise with their subordinates, allowing the latter to provide inputs into organisational level decisions. The detailed reports created from ERP applications modules also enabled end-users to analyse or understand the impacts of potential decisions on their job functions. The ERP platform also allowed managers to delegate tasks to their subordinates, as evident from the ERP financial module. This led to the employees feeling important and motivated, contributing to part of organisational decisions.
- **Establishing Common Vision and Goals** – ERP dashboards (also known as executive support systems) allowed managers to monitor and disseminate organisational and business strategies as well as KPIs, financial targets and budgeting to the operational users. Business targets, aligned with the strategic business goals, can be easily monitored and achieved. All cases (except ClubCo) reported that use of the ERP system has unexpectedly allowed employees to work towards common organisational with ease

Other unintended benefits achieved when ERP systems go operational also include IP benefits. From the case findings, the two main unintended IP benefits were: i) conformity to new national taxation, laws and regulations (all cases except PipeCo); and ii) greater understanding and control of business (all cases). The main two benefit outcomes are explained below:

- **Conformity to New National Taxation, Laws and Regulations** - The ERP platforms provided by SAP had provided all the nine case organisations the ability to quickly adapt to new governmental taxation and regulations. Whenever there were any changes to the taxes or regulations, the software vendor, SAP would roll out new software patches for the organisations to update their platform.
- **Increased Understanding and Control of Business Process** - All cases except PipeCo, DairyCo and ElectricCo suggest that their ERP implementations brought about unintended better understanding and control of business process due to the effective change management strategies. ERP implementations had provided the employees a better understanding and control of the business processes. The change management, training and consultation exercise carried out as part of the ERP implementations had brought about a greater awareness of the inner workings of the organisations. In addition, the clarifications and streamlining of the workflows

(through feedback mechanisms) have resulted in end-users having more control and ownership of their own job functions. Increased control of the business processes was also evident by the strict authorisation controls embedded in the ERP platforms for example, PipeCo's use of ERP for auditing. Management and users had better transparency (e.g. GovDep, and accountability (e.g. EntertainCo, PackCo, and DairyCo) as a result of the authorisation controls used.

The in the RG dimension appears to be dispersed and varied across the cases. However, **improvement of decision making and planning** stood out as an unintended benefit for most cases. All cases have suggested that the end-users have benefited from the analytical applications embedded within their ERP platform. The transparency of accurate data, coupled with powerful analytical applications, provided critical insights to end-users for their decision-making and planning. An example is the case of ConfecCo. There was also evidence that planning was more efficient, and also a number of organisations (e.g. PipeCo, GovDep, PackCo, ElectricCo) were creating more accurate forecasts for their production, expenditure and sales.

Unintended Post Implementation Benefits

The high concentration of in the OS dimension indicate that many of the OS-related benefits are not derived straight after deployment. In particular, they came from **all** cases that have used their ERP platforms to: i) build external links with other organisations (all except PipeCo, EnviCo and GovDep), and ii) enable business innovations (all except EnviCo, ConfecCo and ClubCo). The key unintended post-implementation benefits are elaborated as follow:

- **Build External Linkages with Other Organisations** – The use of EDI to exchange information with trading partners was most common across most cases. This is only possible, after the ERP implementation, as data structure, formats and templates for business transactions were standardised. The standardisation of the database transaction meant that partners can easily interpret the information shared by the organisations
- **Enable Innovations** – Seven cases (except that reported that innovation was an unintended post-implementation benefit. The seven cases experienced some forms of innovation, either technological or business. These organisations implemented further modules not catered for during the original ERP implementations to reform or re-design their business processes. The reforms or re-design of business processes were a result of increased understanding of the ERP system capabilities and limitations, such as the case of ConfecCo. At the same time, some of the organisations (e.g. EntertainCo) had also innovated by increasing their ERP capabilities through the implementation of new third-party modules or applications after the system went operational.

5.4.2 Evolution of ERP Benefits: A CVF Perspective

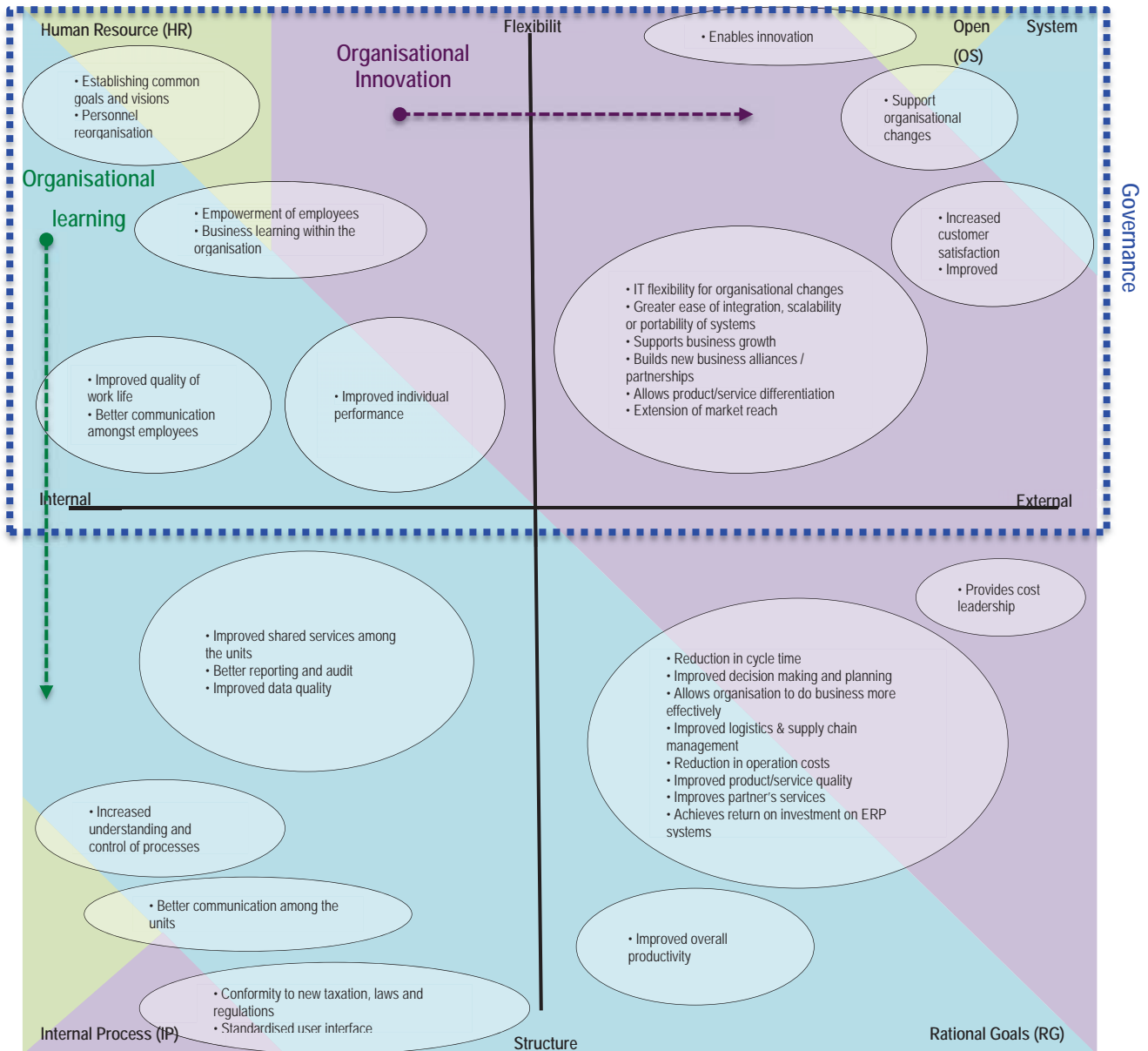


Figure 5.3: Visualisation of the ERP Benefits in CVF

To help explain the changing nature of ERP benefits derived from ERP implementations, the ERP benefits were visualised within the four quadrants of the CVF (see Figure 5.3). Observation of the benefits presented in the CVF framework (see Figure 5.3) suggests that benefits from ERP implementation do not only occur from using the ERP system as an artefact. In fact, the process of organisational change from ERP implementations delivers a variety of internal oriented benefits (Aladwani, 2001, Davenport et al., 2004) that can found in the quadrants of HR, IP and OS (indicated by the green segments within the quadrants).

Unlike most traditional ERP evaluation research that emphasised on the post implementation outcomes (Gefen and Ragowsky, 2005, Häkkinen and Hilmola, 2008, Uwizeyemungu and Raymond, 2010), this study has demonstrated that during the development stages of ERP implementation, organisational learning occurs, leading to internal positive outcomes that are mainly concentrated with in the HR dimension, achieving benefits relating to: i) employee empowerment; ii) personnel reorganisation; and iii) business learning within the organisation. Other instances of benefits (not related to HR dimension) included: i) increased understanding and control of processes; ii) innovation and; iii) support organisational change. This implies that early ERP implementation process, prior to system deployment, could result in the development of human capital resources.

However, the enhancement of human capital does not end at the development stage. The moment the ERP system goes live, it would also generate further HR-related benefits, by delivering increased individual performance, empowering end-users and creating common business vision or goals. In some cases (EnviCo and GovDep), end-user adopting ERP applications in their daily work had also demonstrated improved quality of work life and communication with fellow employees. Nwankpa (2015) argued that organisational learning in ERP implementations is about unlearning, relearning and capitalising on the knowledge gained from the process. In this context, these flow-on ERP benefits could be considered as the dominant outcomes of organisational learning.

Most of the immediate benefits resulting from system deployment and usage are essentially internally oriented, focusing on improving organisational efficiencies through vertical coordination of processes and communication among business units. The benefits derived from the ERP system at this stage can be attributed to the continuation of organisational learning that occurred during the development stage. The cases of PipeCo and ConfecCo have shown that it took time for end-users to be familiar with the newly reengineered business process and workflows. The experience of these cases also indicated further knowledge codification and sharing happening as end-users, ERP implementation and support personnel and management interacted during the development and deployment stages. This finding gives rise to Proposition 6.

Proposition 6: *Organisational learning contributes to unanticipated HR-related ERP benefits that further drive inherent IP-related ERP benefits.*

The key benefits identified in the IP dimension were consistent with existing research findings (Davenport, 2000a, Bendoly and Schoenherr, 2005, Chou and Chang, 2008, Koh et al., 2008): major benefits of ERP implementations were due to automation of the business processes leading to increased information visibility and increased collaboration. The main benefits, found in this study, that were driving IP efficiencies from the system use, were: i) improved shared services among organisational units; ii) improved data quality; iii) better reporting; iv) better communication among business units; v) increased understanding of business processes; and vi) standardisation of user interface.

The benefits of ERP deployments were not limited to HR and IP related ones. It is clear that across the cases, there were contributions from other CVF dimensions. Evidence shows that ERP deployment and use had helped management in areas of rational goals and planning (RG) through: i) reduced cycle time; ii) improved decision making; iii) increased overall productivity; iv) improved business effectiveness; v) enhanced logistics and supply chain operations; vi) reduced operational costs; vii) higher service/product quality; viii) improved partner's service; ix) increased ROI on ERP system; x) reduced lost orders; and xi) less work-in-progress.

The research findings indicate that the operationalisation of the ERP system does not seem to have a high impact on OS-related benefits in some cases have achieved the following benefits: i) building of external linkages with other organisations; ii) organisational change support; iii) increased customer satisfaction; and iv) improved customer service. On the other hand, the purple colour areas in Figure 5.3 shows that bulk of the OS-related benefits were only achieved at the later stage post implementation. The organisational learning, persisted from development to deployment stages of the ERP implementation, enabled end-users and organisations alike to be more experienced and competent with their ERP utilisation and implementations. Researchers (Markus et al., 2000a, Markus et al., 2000b) have suggested that the experience gained would enable adopting organisations to help identify and rectify problems that may exist in future ERP efforts. Accumulated experience or task routinisation, from multiple rollouts or ERP upgrade projects have taught some of the case organisations (e.g. ConfecCo, DairyCo and ClubCo) to be more resourceful when implementing other ERP projects since their first experience.

The organisational ability to innovate its ERP platforms stems from organisational receptivity for continuous improving the ERP platforms to further innovate their capabilities, by implementing more modules or incorporating more technical functionalities for the end-users. The senior management's receptivity is cultivated to further improvements from understanding the outcomes reaped from the initial deployments, i.e. the more benefits from the original go-live, the more likelihood to purchase more modules or seek further enhancements to the ERP platform. Similarly, end-users were equipped with better knowledge of ERP platforms, have showed evidence of becoming more demanding in their use of ERP functionalities and extension of the ERP capabilities to drive further business improvements. Such "second wave" of benefits (Shanks et al., 2003) have been discussed in extant research, and researchers (Willis and Willis-Brown, 2002, Shanks et al., 2003, Hawking et al., 2004, Huang and Handfield, 2015) have long argued that implementing organisations need to adopt a strategic and long-term view for evaluating the returns on ERP investments.

The post implementation long term benefits analysed from cases tend to concentrate in the mainly in OS dimension and RG dimension, and with limited occurrences in other two CVF dimensions. The vast majority of the OS-related benefits achieved post implementation tend to be external and customer centric. The main benefits related to OS, achieved by the cases are as follow: IT flexibility for

organisational changes; ii) provides greater ease of integration, scalability or portability of systems; iii) builds external linkages to other organisations (via system integration); iv) enables innovations; v) support business growth; vi) supports organisational changes; vii) increased customer satisfaction; viii) improved customer service; ix) builds new business alliances / partnerships; x) allows product / service differentiation; and xi) extension of market reach. On the other hand, long term RG-related benefits that were internal, tend to be focus on operational planning and performance, included (not limited to): i) reduction in cycle time; ii) improved decision making and planning; iii) do business more effectively; iv) improved logistic & supply chain management; v) Improved product/service quality etc.

Organisation innovation (e.g. unintended use of ERP functionalities, further enhancement of applications) is not the only product that originated from organisational learning, occurring within the ERP implementations studied in this research. ERP System Governance is the other component that is embedded within the implementation process, arising from organisational learning. With the exception of GovDep, all cases described in this study had little knowledge nor expertise with ERP systems when implementing the platform. These companies did not fully appreciate the organisational complexities and impacts involved in ERP implementation. However, due to their mandate to make the ERP implementation successful, the case companies underwent a journey of learning to govern their ERP system assets by managing their users and constant monitoring the system performance. Formalised structure of system governance, for example change committee and frameworks and methodologies for continuous improvement, ultimately eventuated from the organisational learning. These observations lead to the next proposition.

Proposition 7: *Organisational innovation, coupled with effective governance, drives unanticipated OS-related benefits*

A literature review on the role of IT governance on ERP implementation, in particular benefits, yields few results. The few seminal research (e.g. Legare, 2002, Bernroider and Hampel, 2005, Bernroider, 2008, Law et al., 2010, Tsai et al., 2013, Badewi and Shehab, 2016) has mutually established that governance is an important enabler of ERP success. Fitz-Gerald and Carroll (2003) argue that ERP implementations are organisation-wide transformation projects. However, adopting organisations tend to underestimate the level of organisational change brought about by ERP implementation (Wang and Chen, 2006), resulting in little attention being given by management to ensure governance of the changes. The cases covered in this research exhibited similar characteristics that support extant research findings (Legare, 2002, Wang and Chen, 2006). All cases did not have a formalised change strategy before the implementation, but accidentally created various governance mechanisms as an outcome of the ERP implementation.

Chapter 6 Conclusion

6.1 Summary of Study

This research set out to understand how contingent organisational factors impact on the realisation of ERP benefits, and if so, what types of benefit are derived. The axial questions that this research attempts to address are:

- How do ERP adopting organisations respond to the contingent factors to secure ERP system benefits? What proactive actions do they take?
- What has been the range of benefits achieved by ERP adopting organisations? How and why do these benefits change over time?

In order to adequately address the two research questions, a theoretical framework incorporating contingency theory (Fiedler, 1964, Kast and Rosenzweig, 1973, Edstrom, 1977) and CVF (Quinn and Rohrbaugh, 1981, Denison and Spreitzer, 1991, Borell and Hedman, 2000) was proposed for this study. The framework addresses the research questions in two-ways. First, the contingency approach, which contends that the most appropriate style of management is context dependent, offers a guiding frame to enable the analysis to take cognizance that ERP implementation management is unique to the adopting organisations, depending on the implementation reasons, change management format and degree of stakeholder involvement, among other organisational characteristics. The CVF, on the other hand, provides an inclusive theoretical lens to identify the types of business benefits that the adopting organisations generated as a result of their ERP implementations.

Through a multiple case study of nine organisations, this research study has discovered several distinctively different ERP implementation approaches. Although the journeys taken by the adopting organisation were dissimilar in many ways, all cases had successfully achieved the primary goals of adopting ERP systems to help streamline and support their business operations. All nine cases realised similar short-term business benefits inherent in ERP implementations, e.g. automation of transactions, improved data quality and reporting efficiency.

All nine cases have exploited the integration, automation and information capabilities provided by their ERP systems in their own unique ways to innovate their existing business processes. These innovative extension of ERP capabilities have resulted in some distinctive medium and long-term business benefits post-implementation, including B2B integration. More significantly, the findings reveal that those long-term benefits are related to the ways adopters innovated the ERP capabilities, which were dependent on a number of factors (e.g. change management approach) that influence the process of organisational socio-learning. These findings underscore the importance of examining the social aspects embedded within the ERP implementation process.

In this connection, this study identifies 10 ERP benefit drivers: i) *change management*; ii) *testing and acceptance*; iii) *education, training and support*; iv) *knowledge codification and sharing*; v) *process routinisation*; vi) *continuous receptivity*; vii) *strategic ERP extensions*; viii) *user management*; ix) *performance monitoring*; and x) *assets management*. The 10 benefit-drivers were seen to undergird three main constructs central to the ERP implementation process: organisational learning, organisational innovation, and ERP system governance. *Organisational learning* describes the willingness and ability of the ERP implementing firms to adopt changes and adapt their business processes to leverage the prowess of the ERP systems functionalities. *Organisational innovation* captures the organisation's ability to incorporate experience and knowledge gained through the change process during ERP implementation to extend and explore new applications in line with their business strategies. *ERP system governance* defines the structures and formalised mechanisms to manage the ERP ecosystem. The manner in which these three constructs, and their benefit drivers, interact in the ERP implementation process was captured in a process model that explains, in a conceptual sense, how ERP adopting organisations secure ERP system benefits.

In sum, this study has contributed to unearthing the process of ERP implementation and how that process could generate positive impacts on organisations in different ways. The early stages of ERP implementations would require the adopting firms to undergo an *organisational learning* process to secure the inherent ERP systems benefits in the form of human capital development, e.g. business learning and personnel reorganisation, as well as internal operational-based benefits, e.g. process standardisation, quality reporting and audit. As the process of *organisational learning* takes hold, adopters able to flexibly adapt the system functionalities to their unique business needs could engender a heightened process of organisational innovation, where new or extended uses are routinely added to the various systems platforms. Organisational learning could also manifest in systems monitoring and control, leading to the development of a robust ERP system governance mechanism to stimulate continuous improvements. The study reveals that cultivation of organisational innovation and introduction of ERP system governance could further induce strategic long-term ERP benefits that tend to create competitive advantages for the adopting organisations. These observations were reduced to a set of working propositions, which have implications for both theory development and business practices.

6.2 Significance of Findings

6.2.1 Implications for Theory

This study contributes to theory development in beneficial ERP implementation in three ways. The first contribution relates to the use of a research framework that combines contingency theory with CVF to examine how ERP adopting organisations respond to contingent organisational factors and their interactions to manage their implementation, which would ultimately lead to ERP benefits. Past research (Borell and Hedman, 2000, Hedman, 2000, Hedman and Borell, 2002) has suggested the suitability of CVF as an evaluation tool to measure ERP contribution to organisational effectiveness. Yet little work has been done to validate the claims. This research has demonstrated that CVF does offer an appropriate tool for exploring ERP benefit capture. CVF provides an effective tool to understand the evolving nature of ERP benefits at different stages of the implementation process, including post-implementation.

This research also reveals that early ERP benefits tend to be associated with the formalisation of internal organisational structures that instil managerial controls over business processes. The increased control comes from greater visibility of business operations and mission-critical information for executive decision-making. The long-term benefits identified tend to be oriented towards organisational goals, or post-implementation organisational changes, or even external innovations that encourage collaborative relationships with partner, e.g. implementation of middleware. This supports the notion that ERP benefits that adopting organisations tend to be inherent to automation and process related benefits (Bendoly and Schoenherr, 2005), and imposes more control over the employees through greater visibility and transparency (Sia et al., 2002). However, it also indicates that greater control of business processes provides the adopters the ability to change and collaborate with their partners.

Secondly, the study develops a process model that captures the complex interactions between the benefit drivers embedded within the contingent organisational factors, e.g. how change management impacts education, training and support, and acceptance and testing practices. Although numerous researchers (Soh et al., 2000, Hong and Kim, 2002, Staehr et al., 2012) have attempted to explain how the drivers or organisational factors impact on ERP benefits, they did not explore the interrelationships to explain how they influence one another to achieve ERP benefits. Through the development of a process model, this study has demonstrated how the interactions between the benefit drivers affect the ERP implementation outcomes. The research findings suggest that the fit between the technical and social aspects of ERP implementations can be achieved by managing end-users' expectations and competency levels to nurture organisational learning, drawing synergy from change management, education and training and knowledge codification and sharing. The process model also shows that the

management of the relationships between the ERP benefit drivers creates opportunities for organisational learning and innovation, and promotes a fit between ERP technology, business requirements and end-users. Understanding how the benefit drivers interact at different stages of the ERP implementation process to produce the targeted outcomes is a distinct contribution of this study.

Organisational innovation, as explained in the model, is not a result of an idiosyncratic attribute, but rather the outcome of a symbiotic relationship between process routinisation, continuous receptivity and strategic ERP extensions. The extent of innovation occurring post-implementation is directly influenced by the degree of organisational learning during implementation. The development of a high level of internal technical and/or business expertise within the adopting organisations often lead to unintended ERP benefits. The model also explains the role of governance arising from user management, performance monitoring and asset management in moderating the degree of innovations on ERP platforms after implementations.

Another theoretical contribution is the seven main working propositions that unpack the change processes and associated contingent organisational factors embedded within the ERP implementation process. This study has identified three main constructs - organisational learning, organisational innovation, and ERP system governance - affect the type of business benefits that can be derived from ERP implementation. ERP adopting organisations often undergo radical changes in the form of business process reengineering and system deployment either during or after ERP implementation. This study has noted that the manner in which change is managed affects organisational learning and its outputs, organisational innovation and ERP governance. A high degree of organisational learning would mean effective assimilation of ERP knowledge, and increased competencies and expertise. The degree of organisational learning would also influence the extent of organisational innovation, and ERP system governance of continuous improvements. This study thus extends existing research on ERP implementation (Kraemmerand et al., 2003, Srivardhana and Pawlowski, 2007, Kemp and Low, 2008), which has suggested that organisational learning is essential for organisational innovation in ERP implementations, but does not explain how governing the ERP ecosystem could optimise innovation related ERP benefits.

6.2.2 Implications for Practice

From a practice perspective, this study offers ERP adopting organisations and their practitioners a knowledge base on how to manage change effectively to optimise the ERP implementation benefits from a social perspective. There is ample evidence (Liang et al., 2007, Teoh and Shan, 2008, Kim and Kankanhalli, 2009, Shaheen, 2016) supporting ERP implementation successes are more reliant on the management of social aspects than the technical functionalities. Successful deployment of an ERP platform does not imply that business benefits would be automatically generated. Rather, it is the acceptance and effective utilisation of the functionalities in the ERP system that deliver the business

benefits. This study has uncovered the need to achieve a close techno-socio-business fit before the ERP system goes live. The process model developed based on the experience of the nine case organisations clarifies the interrelationships of the benefit drivers that straddle an ERP implementation process, providing useful hints at what is needed and what is not.

Findings of this study also enable practitioners to gain an understanding on how organisational change, learning and innovation influence the derivation of different types of ERP benefit. Therefore, by ensuring that the benefit drivers are contextually managed, organisations can optimise the success of the ERP implementation benefits to derive maximum value from their ERP system investments. The process model also serves as a tool for practitioners to consider areas that require resource allocation during ERP implementation, to mitigate the impacts of change, and assist in the creation of a positive learning and innovative culture for their ERP ecosystems. By appreciating the role of governance within ERP implementations, organisations can effectively manage and allocate their limited resources to optimise their ERP system capabilities and avoid costly unproductive expenditure.

6.3 Limitations and Suggestions for Further Study

As with all case studies that depend heavily on primary interview data to develop rich stories, this research has several limitations:

1. **Reporting bias** – The primary data collected for this study depended on the use of recall (memory) data (McFarland et al., 1992), which is prone to bias that may influence the reliability (Dex, 1995). The interview data used in this research were also sourced solely from the case company employees (i.e. the nominated company informants), and did not cover external respondents. As such, there may be inherent social-desirability bias (Paulhus, 1984, Fisher, 1993) that influences respondents to provide socially desirable information, rather than giving an objective description or explanation of what had actually happened (Adams et al., 1999).
2. **Knowledge limitation of respondents** – The respondents (company nominated informants) in this study were all ERP managers who had managed ERP implementations for their Australia organisations, and possessed knowledge of the project since the project inception till post-implementation. However, given that ERP implementations involve a variety of internal and external stakeholders, and create organisational-wide changes, the ERP managers may not necessarily possess in-depth knowledge of all benefits generated, e.g. some operations-specific benefits that have been derived from the implementations.
3. **Temporal Changes** – Although the cases were drawn on historical and information current during the research collection process, further unintended ERP benefits may have evolved post interviews.
4. **Quantification of Benefits** – The research framework only provides a qualitative methodological approach to study the internal and external, intended and unintended, and tangible as well as

intangible benefits realised from ERP implementations. It does not allow for the quantification of benefits e.g. improved productivity in terms of actual cost savings.

5. **Generalisability** – Though all nine cases studied describe SAP-based ERP platforms, these nine cases operated in different industries, with different business models, project requirements and characteristics. While these nine cases exhibited implementation commonalities, both in terms of processes and benefits gained, they cannot be considered as representative of all ERP adopting firms. As such, how well the findings could be generalised remains to be determined.

In recognition of the above limitations, the following further studies are suggested:

- Although the ERP implementation process model developed in this thesis has provided insights into the complex nature of ERP implementation changes and associated factors, more work is required to fully understand the effects of the contingent organisational factors on ERP benefit outcomes to capture the symbiotic relationship and interactions among organisational learning, innovation and governance. Testing the process model and working propositions with survey data would give greater credence to the findings.
- The process model and propositions were developed using primary data collected from a specific group of stakeholders within ERP implementation, i.e. ERP managers. The reporting bias of the data can be overcome if future studies can validate the model and propositions with all the stakeholders involved in ERP implementations, e.g. end-users, consultants and senior management. The inclusion of other ERP implementation stakeholders should also take into consideration the intricate relationships and interactions that exist among them. This may provide in-depth insights to the existence of micro-level issues, e.g. stakeholder management (Boonstra, 2006, Ifinedo and Nahar, 2007) that may influence macro-level factors, e.g. change management.
- CVF, despite being a relevant tool to help evaluate ERP contributions to organisational effectiveness, lacks the ability to quantify ERP benefits in a deterministic way. The application of the CVF helps researchers to draw insights on how the benefits contributes to organisational effectiveness from a HR, IP, RG, OS perspective but does not inform how much improvement has been made by the organisation. As such future studies could incorporate an operational performance model that informs how much performance improvement (e.g. lead time, order to cycle time) has been achieved by the adopting organisations.
- Research has shown that ERP systems have already been implemented extensively in most industries, with most Fortune 500 companies already running an ERP platform (Ali and Miller, 2017). Over time, the capabilities of implemented ERP platforms would change as adopters continue to seek ways to optimise or invest in upgrades (Worley et al., 2005). The case studies found that business changes that adopting organisations experienced due to ERP projects were seldom constant. With new technological innovations, such as rising popularity of big data applications (Wang et al., 2016), cloud computing (Elragal and Haddara, 2012, Al-Ghofaili and Al-Mashari, 2014), robotics, automation (Zhong et al., 2013), and Internet of Things (IOT) (Meyer

et al., 2013), the business value proposition of ERP system integrations are constantly evolving. It is clear that the findings, process model, and factors identified in this thesis would likely to change, due to the rapidly changing IT and ERP landscape. Future studies, as such, should consider extending to organisations that have exploited the latest technological innovations, such as big data or automation using their ERP platforms. New insights may be gained on how the inclusions of newer ERP-enabled technologies may lead to new drivers or interactions between the existing drivers, and hence unearthing other unintended technological or business innovations along the way.

The suggestions outlined above are natural extensions of this research, and serve to overcome the limitations highlighted. The adoption of the suggestions would provide further contributions to the body of knowledge, as well as insights to management and practitioners to exploit the full potential of their ERP systems and optimise the return on their investments

References

- Aanestad, M. & Jensen, T. B. 2016. Collective mindfulness in post-implementation IS adaptation processes. *Information and Organization*, 26, 13-27.
- Abdinnour-Helm, S., Lengnick-Hall, M. L. & Lengnick-Hall, C. A. 2003. Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning system. *European Journal of Operational Research*, 146, 258-273.
- Abdinnour, S. & Saeed, K. 2015. User perceptions towards an ERP system: Comparing the post-implementation phase to the pre-implementation phase. *Journal of Enterprise Information Management*, 28, 243-259.
- Aburub, F., Whitley, E. A. & Doherty, N. 2015. Impact of ERP Systems Usage on Organizational Agility: An Empirical Investigation in the Banking Sector. *Information Technology & People*, 28.
- Adams, A. S., Soumerai, S. B., Lomas, J. & Ross-Degnan, D. 1999. Evidence of self-report bias in assessing adherence to guidelines. *International Journal for Quality in Health Care*, 11, 187-192.
- Ahituv, N. 1980. A Systematic Approach toward Assessing the Value of an Information System. *MIS Quarterly*, 4, 61-75.
- Akhgar, B., Siddiqi, J. & Al-Khayatt, S. 2002. Strategic exploitation of ERP for e-business. *Proceedings of the International Conference on Information Technology: Coding and Computing*.
- Akkermans, H. & Van Helden, K. 2002. Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors. *European Journal of Information Systems*, 11, 35-46.
- Al-Ghofaili, A. A. & Al-Mashari, M. A. ERP system adoption traditional ERP systems vs. cloud-based ERP systems. *Innovative Computing Technology (INTECH)*, 2014 Fourth International Conference on, 2014. IEEE, 135-139.
- Al-Mashari, M. 2003. A Process Change-Oriented Model for ERP Application. *International Journal of Human-Computer Interaction*, 16, 39 - 55.
- Al-Mashari, M. & Al-Mudimigh, A. 2003. ERP implementation: lessons from a case study. *Information Technology & People*, 16, 21-33.
- Al-Mudimigh, A., Zairi, M. & Al-Mashari, M. 2001. ERP software implementation: an integrative framework. *European Journal of Information Systems*, 10, 216-226.
- Al-Rashid, W., Alshawi, M. & Al-Mashari, M. Exploring enterprise resource planning (ERP) implementation from stakeholder perspective-a case study. *Communications, Computers and Applications (MIC-CCA)*, 2012 Mosharaka International Conference on, 2012. IEEE, 125-130.
- Aladwani, A. M. 2001. Change management strategies for successful ERP implementation. *Business Process management journal*, 7, 266-275.
- Ali, M. & Miller, L. 2017. ERP System Implementation in Large Enterprises-A Systematic Literature Review. *Journal of Enterprise Information Management*, 30.
- Alles, M., Brennan, G., Kogan, A. & Vasarhelyi, M. A. 2006. Continuous monitoring of business process controls: A pilot implementation of a continuous auditing system at Siemens. *International Journal of Accounting Information Systems*, 7, 137-161.
- Aloini, D., Dulmin, R. & Mininno, V. 2007. Risk management in ERP project introduction: Review of the literature. *Information & Management*, 44, 547-567.
- Aloini, D., Dulmin, R. & Mininno, V. 2012. Risk assessment in ERP projects. *Information Systems*, 37, 183-199.
- Aloini, D., Dulmin, R., Mininno, V. & Spagnesi, A. 2016. Benefits and Barriers of Social/Collaborative ERP Systems: A State of the Art and Research Agenda. *Strengthening Information and Control Systems*. Springer.
- Alshawi, S., Irani, Z. & Baldwin, L. 2003. Benchmarking information technology investment and benefits extraction. *Benchmarking: An International Journal*, 10, 414-423.
- Alsulami, M., Scheepers, H. & Rahim, M. M. A Comparison between Organizational Stakeholders' and External Consultants' Perceptions on CSFs Affecting ERP Life Cycle Phases. *System Sciences (HICSS)*, 2016 49th Hawaii International Conference on, 2016. IEEE, 4676-4685.
- Amoako-Gyampah, K. 2007. Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation. *Computers in Human Behavior*, 23, 1232-1248.
- Amr 2009. The Global Enterprise Application Market Sizing Report, 2008–2013 AMR Research.
- Anandarajan, A. & Wen, H. J. 1999. Evaluation of information technology investment. *Management Decision*, 37, 329-339.
- Anaya, L., Dulaimi, M. & Abdallah, S. 2015. An investigation into the role of enterprise information systems in enabling business innovation. *Business Process Management Journal*, 21, 771-790.

- Annamalai, C. & Ramayah, T. 2011. Enterprise resource planning (ERP) benefits survey of Indian manufacturing firms: An empirical analysis of SAP versus Oracle package. *Business Process Management Journal*, 17, 495-509.
- Aronson, J. 1995. A pragmatic view of thematic analysis. *The qualitative report*, 2, 1-3.
- Ash, C. G. & Burn, J. M. 2003a. Assessing the benefits from e-business transformation through effective enterprise management. *European Journal of Information Systems*, 12, 297-308.
- Ash, C. G. & Burn, J. M. 2003b. A strategic framework for the management of ERP enabled e-business change. *European journal of operational research*, 146, 374-387.
- Attewell, P. 1992. Technology Diffusion and Organizational Learning: The Case of Business Computing. *Organization Science*, 3, 1-19.
- Babu, M. P. & Sastry, S. H. Big data and predictive analytics in ERP systems for automating decision making process. Software Engineering and Service Science (ICSESS), 2014 5th IEEE International Conference on, 2014. IEEE, 259-262.
- Badewi, A., Mohamad, M., Shehab, E. & Wood-Harper, T. 2015. Business innovation in ERP orchestration theory: multicases from the West and East. *The Journal of Strategic Information Systems*.
- Badewi, A. & Shehab, E. 2016. The impact of organizational project benefits management governance on ERP project success: Neo-institutional theory perspective. *International Journal of Project Management*, 34, 412-428.
- Bajwa, D. S., Mooney, T. & Garcia, J. E. 2004. An Integrative Framework for the Assimilation of Enterprise Resource Planning Systems: Phases, Antecedents, and Outcomes. *Journal of Computer Information Systems*, 44, 81-90.
- Ballantine, J., Levy, M., Martin, A., Munro, I. & Powell, P. 2000. An ethical perspective on information systems evaluation. *International Journal of Agile Management Systems*, 2, 233-241.
- Ballantine, J. A. & Stray, S. 1999. Information systems and other capital investments: evaluation practices compared. *Logistics Information Management*, 12, 78-93.
- Bannister, F. 2005. When Paradigms Shift: IT Evaluation in a Brave New World. *Electronic Journal of Information Systems Evaluation*, 8, 21-30.
- Baxter, J. & Eyles, J. 1997. Evaluating qualitative research in social geography: establishing 'rigour' in interview analysis. *Transactions of the Institute of British Geographers*, 22, 505-525.
- Beard, J. W. & Sumner, M. 2004. Seeking strategic advantage in the post-net era: viewing ERP systems from the resource-based perspective. *Journal of Strategic Information Systems*, 13, 129-150.
- Beatty, R. C. & Williams, C. D. 2006. ERP II: best practices for successfully implementing an ERP upgrade. *Communications of the ACM*, 49, 105-109.
- Becerra-Fernandez, I. & Sabherwal, R. 2001. Organizational knowledge management: A contingency perspective. *Journal of management information systems*, 18, 23-56.
- Benbasat, I., Goldstein, D. K. & Mead, M. 1987. The Case Research Strategy in Studies of Information Systems. *MIS Quarterly*, 11, 369-386.
- Benders, J., Batenburg, R. & Van Der Blonk, H. 2006. Sticking to standards; technical and other isomorphic pressures in deploying ERP-systems. *Information & Management*, 43, 194-203.
- Bendoly, E. & Kaefer, F. 2004. Business technology complementarities: impacts of the presence and strategic timing of ERP on B2B e-commerce technology efficiencies. *Omega*, 32, 395-405.
- Bendoly, E. & Schoenherr, T. 2005. ERP system and implementation-process benefits: Implications for B2B e-procurement. *International Journal of Operations & Production Management*, 25, 304-319.
- Benlian, A. Exploring the impact of fit between context factors and pricing model choice on the success of IT outsourcing mega-deals. 18th European Conference on Information Systems, 2010 Pretoria, South Africa.
- Berghout, E. & Remenyi, D. 2005. The Eleven Years of the European Conference on IT Evaluation: Retrospectives and Perspectives for Possible Future Research. *Electronic Journal of Information Systems Evaluation*, 8, 81-98.
- Bernroider, E. & Hampel, A. 2005. Enterprise resource planning and it governance in perspective: strategic planning and alignment, value delivery and controlling. *Book Enterprise Resource Planning and IT Governance in Perspective: Strategic Planning and Alignment, Value Delivery and Controlling*.
- Bernroider, E. & Koch, S. 2001. ERP selection process in midsize and large organizations. *Business Process Management Journal*, 7, 251-257.
- Bernroider, E. W., Wong, C. W. & Lai, K.-H. 2014. From dynamic capabilities to ERP enabled business improvements: The mediating effect of the implementation project. *International Journal of Project Management*, 32, 350-362.
- Bernroider, E. W. N. 2008. IT governance for enterprise resource planning supported by the DeLone-McLean model of information systems success. *Information & Management*, 45, 257-269.

- Bernroider, E. W. N. 2013. Effective ERP adoption processes: the role of project activators and resource investments. *European Journal of Information Systems*, 22, 235-250.
- Bhati, P. S. & Trivedi, M. C. Applicability and Impact of ERP: A Survey. *Computational Intelligence & Communication Technology (CICT)*, 2016 Second International Conference on, 2016. IEEE, 28-31.
- Bhimani, A. 2003. A study of the emergence of management accounting system ethos and its influence on perceived system success. *Accounting, Organizations and Society*, 28, 523-548.
- Bingi, P., Sharma, M. K. & Godla, J. K. 1999. Critical Issues Affecting an ERP Implementation. *Information Systems Management*, 16, 7-14.
- Boonstra, A. 2006. Interpreting an ERP-implementation project from a stakeholder perspective. *International Journal of Project Management*, 24, 38-52.
- Boonstra, A. & Govers, M. J. G. 2009. Understanding ERP system implementation in a hospital by analysing stakeholders. *New Technology, Work and Employment*, 24, 177-193.
- Borell, A. & Hedman, J. 2000. CVA Based Framework for ERP Requirements Specification. *Proceedings of IRIS 23*.
- Botta-Genoulaz, V. & Millet, P.-A. 2005. A classification for better use of ERP systems. *Computers in Industry*, 56, 573-587.
- Botta-Genoulaz, V. & Millet, P.-A. 2006. An investigation into the use of ERP systems in the service sector. *International Journal of Production Economics*, 99, 202-221.
- Boudreau, M.-C. Learning to use ERP technology: A causal model. *System Sciences*, 2003. Proceedings of the 36th Annual Hawaii International Conference on, 2003. IEEE, 10 pp.
- Boyatzis, R. 1998. *Transforming qualitative information: Thematic analysis and code development.*, Thousand Oaks, CA, Sage.
- Bradford, M. & Florin, J. 2003. Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. *International Journal of Accounting Information Systems*, 4, 205-225.
- Brown, C., V. & Vessey, I. 2003. Managing the Next Wave of Enterprise Systems: Leveraging Lessons from ERP *MIS Quarterly Executive* 2, 13.
- Brown, C. & Vessey, I. 1999. ERP implementation approaches: toward a contingency framework. *Proceedings of the 20th International Conference on Information Systems*. Charlotte, North Carolina, United States: Association for Information Systems.
- Brynjolfsson, E. 1993. The productivity paradox of information technology. *Communications of the ACM*, 36, 67-77.
- Brynjolfsson, E. & Hitt, L. 1996. Paradox Lost? Firm-Level Evidence on the Returns to Information Systems Spending. *Management Science*, 42, 541-558.
- Brynjolfsson, E. & Hitt, L. M. 1998. Beyond the Productivity Paradox. *Communications of the ACM*, 41, 49-55.
- Brynjolfsson, E. & Hitt, L. M. 2000. Beyond Computation: Information Technology, Organizational Transformation and Business Performance. *Journal of Economic Perspectives*, 14, 23-48.
- Brynjolfsson, E. & Hitt, L. M. 2003. Computing Productivity: Firm-Level Evidence. *The Review of Economics and Statistics*, 85, 793-808.
- Brynjolfsson, E., Hitt, L. M. & Yang, S. 2002. Intangible Assets: Computers and Organizational Capital. *Brookings Papers on Economic Activity*, 2002, 137-181.
- Brynjolfsson, E. & Yang, S. 1997. The intangible benefits and costs of investments: evidence from financial markets. *Proceedings of the Eighteenth International Conference on Information Systems*. Atlanta, Georgia, United States: Association for Information Systems.
- Buenger, V., Daft, R. L., Conlon, E. J. & Austin, J. 1996. Competing Values in Organizations: Contextual Influences and Structural Consequences. *Organization Science*, 7, 557-576.
- Búrca, S. D., Fynes, B. & Marshall, D. 2005. Strategic technology adoption: extending ERP across the supply chain. *Journal of Enterprise Information Management*, 18, 427-440.
- Burgess-Limerick, T. & Burgess-Limerick, R. 1998. Conversational Interviews and Multiple-Case Research in Psychology. *Australian Journal of Psychology*, 50, 63-70.
- Cameron, K. S., Quinn, R. E., Degraff, J. & Thakor, A. V. 2006. *Competing Values Leadership Creating Value In Organizations* Edward Elgar Publishing, Incor.
- Carlsson, S. A. & Widmeyer, G. R. 1994. Conceptualization of Executive Support Systems: A Competing Values Approach. *Journal of Decision Systems*, 3, 339-358.
- Chakravorty, S. S., Dulaney, R. E. & Franza, R. M. 2016. ERP implementation failures: a case study and analysis. *International Journal of Business Information Systems*, 21, 462-476.
- Chan, Y. E. 2000. IT value: the great divide between qualitative and quantitative and individual and organizational measures. *J. Manage. Inf. Syst.*, 16, 225-261.
- Chand, D., Hachey, G., Hunton, J., Owhoso, V. & Vasudevan, S. 2005. A balanced scorecard based framework for assessing the strategic impacts of ERP systems. *Computers in Industry*, 56, 558-572.

- Chang, H.-H. & Chou, H.-W. 2009. Drivers and effects of enterprise resource planning post-implementation learning. *Behaviour & Information Technology*, 1-9.
- Chang, M.-K., Cheung, W., Cheng, C.-H. & Yeung, J. H. Y. 2008. Understanding ERP system adoption from the user's perspective. *International Journal of Production Economics*, 113, 928-942.
- Chang, S.-I., Chang, I.-C. & Wang, T. 2014. Information systems integration after merger and acquisition. *Industrial Management & Data Systems*, 114, 37-52.
- Chang, S.-I., Yen, D., Ng, C.-P., Chang, I. C. & Yu, S.-Y. 2011. An ERP system performance assessment model development based on the balanced scorecard approach. *Information Systems Frontiers*, 13, 429-450.
- Chapman, C. S. & Kihn, L.-A. 2009. Information system integration, enabling control and performance. *Accounting, Organizations and Society*, 34, 151-169.
- Charette, R. N. 2013. IBM Sued Over Queensland Health Payroll System Debacle. *IEEE Spectrum* [Online]. Available: <http://spectrum.ieee.org/riskfactor/computing/it/ibm-sued-over-queensland-health-payroll-system-debacle>.
- Chen, G. & Wang, J. Analysis on performance evaluation system of ERP implementation. Information Science and Management Engineering (ISME), 2010 International Conference of, 2010. IEEE, 185-188.
- Chen, I. J. 2001. Planning for ERP systems: analysis and future trend. *Business Process Management Journal*, 7, 374-386.
- Cheng, H. An Integration Framework of ERM, SCM, CRM. Management and Service Science, 2009. MASS '09. International Conference on, 20-22 Sept. 2009. 1-4.
- Chiang, M.-H. 2013. Organizational Change in ERP Implementation: A dialectical perspective. *Journal of Global Business Management*, 9, 175.
- Chou, H.-W., Chang, H.-H., Lin, Y.-H. & Chou, S.-B. 2014a. Drivers and effects of post-implementation learning on ERP usage. *Computers in Human Behavior*, 35, 267-277.
- Chou, H.-W., Lin, Y.-H., Lu, H.-S., Chang, H.-H. & Chou, S.-B. 2014b. Knowledge sharing and ERP system usage in post-implementation stage. *Computers in Human Behavior*, 33, 16-22.
- Chou, S.-W. & Chang, Y.-C. 2008. The implementation factors that influence the ERP (enterprise resource planning) benefits. *Decision Support Systems*, 46, 149-157.
- Christopher, M. 2016. *Logistics & supply chain management*, Pearson UK.
- Chung, S. H. & Snyder, C. A. 2000. ERP adoption: a technological evolution approach. *International Journal of Agile Management Systems*, 2, 24-32.
- Conteh, N. Y. & Akhtar, M. J. 2015. Implementation Challenges of an Enterprise System and Its Advantages over Legacy Systems. *International Journal on Computer Science and Engineering*, 7, 120.
- Corbitt, G., Da Cunha, P. R. & Themistocleous, M. Introduction to ERP/EAI System Issues and Answers: A Research Journey Minitrack. 2012 45th Hawaii International Conference on System Sciences, 2012. IEEE, 4641.
- Cotteleer, M. J. 2006. An Empirical Study of Operational Performance Parity Following Enterprise System Deployment. *Production and Operations Management*, 15, 74-87.
- Cotteleer, M. J. & Bendoly, E. 2006. Order Lead-Time Improvement following Enterprise Information Technology Implementation: An Empirical Study. *MIS Quarterly*, 30, 643-660.
- Creswell, J. 2009. *Research design: Qualitative, quantitative, and mixed methods approaches*, Thousand Oaks, CA, Sage Publications, Inc.
- Creswell, J. W. & Clark, V. L. P. 2007. *Designing and conducting mixed methods research*, Thousand Oaks, CA, Sage.
- Croteau, A.-M. & Raymond, L. 2004. Performance outcomes of strategic and IT competencies alignment†. *Journal of Information Technology*, 19, 178-190.
- Cullen, J., Tsamenyi, M., Bernon, M. & Gorst, J. 2013. Reverse logistics in the UK retail sector: A case study of the role of management accounting in driving organisational change. *Management Accounting Research*, 24, 212-227.
- Cullinan, C., Sutton, S. G. & Arnold, V. 2010. Technology monoculture: ERP systems, "techno-process diversity" and the threat to the information technology ecosystem. *Advances in Accounting Behavioral Research* Emerald Group Publishing Limited.
- Darke, P., Shanks, G. & Broadbent, M. 1998. Successfully completing case study research: combining rigour, relevance and pragmatism. *Information Systems Journal*, 8, 273-289.
- Davenport, T. H. 1998. Putting the enterprise into the enterprise system. *Harvard Business Review*, 76, 121-131.
- Davenport, T. H. 2000a. The Future of Enterprise System-Enabled Organizations. *Information Systems Frontiers*, 2, 163-180.

- Davenport, T. H. 2000b. *Mission Critical: Realizing the Promise of Enterprise Systems*, Harvard Business Press Books
- Davenport, T. H. & Brooks, J. D. 2004. Enterprise systems and the supply chain. *Journal of Enterprise Information Management*, 17, 8-19.
- Davenport, T. H., Harris, J. G. & Cantrell, S. 2004. Enterprise systems and ongoing process change. *Business Process Management Journal*, 10, 16-26.
- Davis, A. 2005. ERP Customization Impacts on Strategic Alignment and Systems Alignment. *SAIS Proceedings of the Southern Association of IS (SAIS)*, 45.
- Davis, F. D. 1993. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts.
- Deloitte 1999. ERP's second wave: maximizing the value of ERP-enabled processes.
- Delone, W. H. & Mclean, E. R. 1992. Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, 3, 60-95.
- Delone, W. H. & Mclean, E. R. 2003. The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *J. Manage. Inf. Syst.*, 19, 9-30.
- Dempsey, R. V. & Liam Sheehan, S. 2013. Justification of an upgrade of an enterprise resource planning (ERP) system—the accountant's role. *Global Journal of Human-Social Science Research*, 13.
- Denison, D. R. & Spreitzer, G. M. 1991. Organizational culture and organizational development: A competing values approach. *Research in organizational change and development*, 5, 1-21.
- Devaraj, S. & Kohli, R. 2000. Information technology payoff in the health-care industry: a longitudinal study. *Journal of Management Information Systems*, 16, 41-67.
- Dex, S. 1995. The reliability of recall data: A literature review. *Bulletin de Methodologie Sociologique*, 49, 58-89.
- Doherty, N. F. & Doig, G. 2003. An analysis of the anticipated cultural impacts of the implementation of data warehouses. *Engineering Management, IEEE Transactions on*, 50, 78-88.
- Donaldson, L. 2001. *The contingency theory of organizations / Lex Donaldson*, Thousand Oaks, Calif. :, Sage Publications.
- Du, T. C., Lai, V. S., Cheung, W. & Cui, X. 2011. Willingness to share information in a supply chain: A partnership-data-process perspective. *Information & Management*.
- Dutta, D. & Bose, I. 2015. Managing a big data project: the case of ramco cements limited. *International Journal of Production Economics*, 165, 293-306.
- Eden, C. & Ackermann, F. 1996. "Horses for Courses": A Stakeholder Approach to the Evaluation of GDSSs. *Group Decision and Negotiation*, 5, 501-519.
- Edstrom, A. 1977. User influence and the success of MIS projects: a contingency approach. *Human Relations*, 30, 589-607.
- Edwards, J. B. 2001. ERP, Balanced Scorecard, and IT: How Do They Fit Together? *Journal of Corporate Accounting & Finance*, 12, 3-12.
- Eisenhardt, K. M. 1989. Building Theories from Case Study Research. *The Academy of Management Review*, 14, 532-550.
- Eisenhardt, K. M. 1991. Better stories and better constructs: The case for rigor and comparative logic. *Academy of Management review*, 16, 620-627.
- Eisenhardt, K. M. & Graebner, M. E. 2007. Theory building from cases: Opportunities and challenges. *Academy of management journal*, 50, 25-32.
- Elragal, A. & Haddara, M. 2012. The Future of ERP Systems: look backward before moving forward. *Procedia Technology*, 5, 21-30.
- Ensign, P. C. 2001. THE CONCEPT OF FIT IN ORGANIZATIONAL RESEARCH. *International Journal Organization Theory and Behavior*, 4, 287-306.
- Esteves, J. 2009. A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises. *Journal of Enterprise Information Management*, 22, 25-35.
- Esteves, J. M. 2014. An empirical identification and categorisation of training best practices for ERP implementation projects. *Enterprise Information Systems*, 8, 665-683.
- Etzioni, A. C. 1969. *Readings on modern organizations*, Englewood Cliffs, N.J., Prentice-Hall.
- Fichman, R. G. & Kemerer, C. F. 1997. The Assimilation of Software Process Innovations: An Organizational Learning Perspective. *Management Science*, 43, 1345-1363.
- Fiedler, F. E. 1964. A Contingency Model of Leadership Effectiveness. In: Leonard, B. (ed.) *Advances in Experimental Social Psychology*. Academic Press.
- Fiedler, K. D., Grover, V. & Teng, J. T. C. 1996. An Empirically Derived Taxonomy of Information Technology Structure and Its Relationship to Organizational Structure. *Journal of Management Information Systems*, 13, 9-34.

- Finney, S. & Corbett, M. 2007. ERP implementation: a compilation and analysis of critical success factors. *Business Process Management Journal*, 13, 329-347.
- Fisher, R. J. 1993. Social desirability bias and the validity of indirect questioning. *Journal of consumer research*, 20, 303-315.
- Fitz-Gerald, L. & Carroll, J. The role of governance in ERP system implementation. Proceedings of the 14th Australasian conference on information systems, 2003.
- Flick, U. 2009. *An Introduction to Qualitative Research*, Thousand Oaks, CA, Sage.
- Forrester 2011. The State Of ERP In 2011: Customers Have More Options In Spite Of Market Consolidation *In: Hamerman, P. D., Martens, C., Moore, C. & Magarie, A. (eds.). Forrester Research.*
- Françoise, O., Bourgault, M. & Pellerin, R. 2009. ERP implementation through critical success factors' management. *Business Process Management Journal*, 15, 371-394.
- Gable, G. G., Sedera, D. & Chan, T. 2003. Enterprise systems success: a measurement model. *Twenty-Fourth International Conference on Information Systems*. Queensland University of Technology.
- Gable, G. G. & Timbrell, G. T. 2001. The SAP ecosystem: A knowledge perspective.
- Gallagher, K. P., Worrell, J. L. & Mason, R. M. 2012. The negotiation and selection of horizontal mechanisms to support post-implementation ERP organizations. *Information Technology & People*, 25, 4-30.
- Galliers, R. D. & Leidner, D. E. 2014. *Strategic information management: challenges and strategies in managing information systems*, Routledge.
- Galy, E. & Saucedo, M. J. 2014. Post-implementation practices of ERP systems and their relationship to financial performance. *Information & Management*, 51, 310-319.
- Gambardella, A. & Mcgahan, A. M. 2010. Business-Model Innovation: General Purpose Technologies and their Implications for Industry Structure. *Long Range Planning*, 43, 262-271.
- Gargeya, V. B. & Brady, C. 2005. Success and failure factors of adopting SAP in ERP system implementation. *Business Process Management Journal*, 11, 501-516.
- Gartner 2007. ERP Software Market Review, Asia/Pacific, 2006. Gartner.
- Gartner 2016. IT Market Clock for Postmodern ERP Platform Technology, 2016.
- Gattiker, T. F. 2007. Enterprise resource planning (ERP) systems and the manufacturing-marketing interface: an information-processing theory view. *International Journal of Production Research*, 45, 2895-2917.
- Gattiker, T. F. & Goodhue, D. L. Understanding the plant level costs and benefits of ERP: will the ugly duckling always turn into a swan? *System Sciences*, 2000. Proceedings of the 33rd Annual Hawaii International Conference on, 2000. IEEE, 10 pp. vol. 1.
- Gattiker, T. F. & Goodhue, D. L. 2004. Understanding the local-level costs and benefits of ERP through organizational information processing theory. *Information & Management*, 41, 431-443.
- Gattiker, T. F. & Goodhue, D. L. 2005. What Happens after ERP Implementation: Understanding the Impact of Interdependence and Differentiation on Plant-Level Outcomes. *MIS Quarterly*, 29, 559-585.
- Gefen, D. 2004. What Makes an ERP Implementation Relationship Worthwhile: Linking Trust Mechanisms and ERP Usefulness. *Journal of Management Information Systems*, 21, 263-288.
- Gefen, D. & Ragowsky, A. 2005. A Multi-Level Approach to Measuring the Benefits of an Erp System in Manufacturing Firms. *Information Systems Management*, 22, 18-25.
- Gerring, J. 2006. *Case study research: Principles and practices*, Cambridge University Press.
- Ghosh, R. 2012. A Comprehensive Study on ERP Failures Stressing on Reluctance to Change as a Cause of Failure. *Journal of Marketing and Management*, 3, 123-134.
- Ginsberg, A. & Venkatraman, N. 1985. Contingency perspectives of organizational strategy: a critical review of the empirical research. *Academy of Management Review*, 10, 421-434.
- Ginzberg, M. J. 1980. An organizational contingencies view of accounting and information systems implementation. *Accounting, Organizations and Society*, 5, 369-382.
- Glowalla, P. & Sunyaev, A. 2014. ERP system fit—an explorative task and data quality perspective. *Journal of Enterprise Information Management*, 27, 668-686.
- Goodhue, D. L., Quillard, J. A. & Rockart, J. F. 1988. Managing The Data Resource: A Contingency Perspective. *MIS quarterly*, 12.
- Goodman, E. A., Zammuto, R. F. & Gifford, B. D. 2001. The competing values framework: Understanding the impact of organizational culture on the quality of work life. *Organization Development Journal*, 19, 58.
- Grover, V., Jeong, S. R., Kettinger, W. J. & Teng, J. T. 1995. The implementation of business process reengineering. *Journal of Management Information Systems*, 12, 109-144.
- Grover, V. & Kohli, R. 2012. Cocreating IT Value: New Capabilities and Metrics for Multifirm Environments. *MIS Quarterly*, 36, 225-232.
- Guba, E. G. & Lincoln, Y. S. 2005. The Sage handbook of qualitative research. *In: Denzin, N. K. & Lincoln, Y. S. (eds.) 3rd ed.* Thousand Oaks, CA: Sage.
- Gunasekaran, A. & Ngai, E. W. T. 2011. Editorial: Strategic enterprise information systems for global supply chain competitiveness. *J. Strateg. Inf. Syst.*, 20, 215-216.

- Ha, Y. M. & Ahn, H. J. 2014. Factors affecting the performance of Enterprise Resource Planning (ERP) systems in the post-implementation stage. *Behaviour & Information Technology*, 33, 1065-1081.
- Häkkinen, L. & Hilmola, O.-P. 2008. ERP evaluation during the shakedown phase: lessons from an after-sales division. *Information Systems Journal*, 18, 73-100.
- Hamilton, S. & Chervany, N. L. 1981. Evaluating Information System Effectiveness - Part I: Comparing Evaluation Approaches. *MIS Quarterly*, 5, 55-69.
- Hammer, M. & Champy, J. 1993. *Reengineering the corporation: A manifesto for business revolution.* , Harper Collins Publishers
- Hart, S. L. & Quinn, R. E. 1993. Roles Executives Play: CEOs, Behavioral Complexity, and Firm Performance. *Human Relations*, 46, 543-574.
- Hasibuan, Z. A. & Dantes, G. R. 2012. Priority of key success factors (KSFs) on enterprise resource planning (ERP) system implementation life cycle. *Journal of Enterprise Resource Planning Studies*, 2012, 1.
- Hassabelnaby, H. R., Hwang, W. & Vonderembse, M. A. 2012. The impact of ERP implementation on organizational capabilities and firm performance. *Benchmarking: An International Journal*, 19, 618-633.
- Haug, A., Pedersen, A. & Arlbjørn, J. S. 2010. ERP system strategies in parent-subsidary supply chains. *International Journal of Physical Distribution & Logistics Management*, 40, 298-314.
- Hawking, P., Stein, A. & Foster, S. 2004. Revisiting ERP systems: benefit realization. *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*.
- Hayes, D. C., Hunton, J. E. & Reck, J. L. 2001. Market reaction to ERP implementation announcements. *Journal of Information systems*, 15, 3-18.
- Hedman, J. The CES Framework for Discussing ES. AMCIS 2000 Proceedings, 2000.
- Hedman, J. & Borell, A. 2002. The Impact of Enterprise Resource Planning Systems on Organizational Effectiveness: An Artifact Evaluation. In: Nah, F. F.-H. (ed.) *Enterprise Resource Planning Solutions & Management*. Covent Garden, London: IRM Press.
- Hedman, J. & Sarker, S. 2015. Information system integration in mergers and acquisitions: research ahead. *European Journal of Information Systems*, 24, 117-120.
- Henderson, J. C. & Venkatraman, N. 1993. Strategic alignment: Leveraging information technology for transforming organizations. *IBM systems journal*, 32, 4-16.
- Hendricks, K. B., Singhal, V. R. & Stratman, J. K. 2007. The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations. *Journal of Operations Management*, 25, 65-82.
- Heo, J. & Han, I. 2003. Performance measure of information systems (IS) in evolving computing environments: an empirical investigation. *Information & Management*, 40, 243-256.
- Hirschheim, R. & Smithson, S. 1987. Information Systems Evaluation: Myth and Reality. In: Galliers, R. D. (ed.) *Information Analysis - Selected Readings*. Workingham: Addison-Wesley.
- Hitt, L. M., Wu, D. J. & Zhou, X. 2002. Investment in Enterprise Resource Planning: Business Impact and Productivity Measures. *Journal of Management Information Systems*, 19, 71-98.
- Holland, C. P. & Light, B. 2001. A stage maturity model for enterprise resource planning systems use. *SIGMIS Database*, 32, 34-45.
- Holland, C. P., Light, B. & Gibson, N. A Critical Success Factors Model for Enterprise Resource Planning Implementation. ECIS, 1999. 273-287.
- Holsapple, C. W. & Sena, M. P. 2005. ERP plans and decision-support benefits. *Decision Support Systems*, 38, 575-590.
- Hong, K.-K. & Kim, Y.-G. 2002. The critical success factors for ERP implementation: an organizational fit perspective. *Information & Management*, 40, 25-40.
- Hong, S.-G., Siau, K. & Kim, J.-W. 2016. The impact of ISP, BPR, and customization on ERP performance in manufacturing SMEs of Korea. *Asia Pacific Journal of Innovation and Entrepreneurship*, 10, 39-54.
- Hsu, K., Sylvestre, J. & Sayed, E. N. 2006. Avoiding ERP pitfalls. *Journal of Corporate Accounting & Finance*, 17, 67-74.
- Hsu, L. L. & Chen, M. 2004. Impacts of ERP systems on the integrated-interaction performance of manufacturing and marketing. *Industrial Management & Data Systems*, 104, 42-55.
- Hsu, P.-F. 2013. Integrating ERP and e-business: Resource complementarity in business value creation. *Decision Support Systems*, 56, 334-347.
- Huang, Y.-Y. & Handfield, R. B. 2015. Measuring the benefits of ERP on supply management maturity model: a "big data" method. *International Journal of Operations & Production Management*, 35, 2-25.
- Huber, G. 1982. Organizational information systems: Determinants of their performance and behavior. *Management Science*, 28, 138-155.
- Hult, G. T. M., Ketchen, D. J. & Slater, S. F. 2004. Information processing, knowledge development, and strategic supply chain performance. *Academy of Management Journal*, 47, 241-253.

- Hunton, J. E., Lippincott, B. & Reck, J. L. 2003. Enterprise resource planning systems: comparing firm performance of adopters and nonadopters. *International Journal of Accounting Information Systems*, 4, 165-184.
- Ifinedo, P. 2011. Examining the influences of external expertise and in-house computer/IT knowledge on ERP system success. *Journal of Systems and Software*, 84, 2065-2078.
- Ifinedo, P. & Nahar, N. 2006. Prioritization of enterprise resource planning (ERP) systems success measures: viewpoints of two organizational stakeholder groups. *Proceedings of the 2006 ACM Symposium on Applied Computing*. Dijon, France: ACM.
- Ifinedo, P. & Nahar, N. 2007. ERP systems success: an empirical analysis of how two organizational stakeholder groups prioritize and evaluate relevant measures. *Enterprise Information Systems*, 1, 25-48.
- Ifinedo, P. & Nahar, N. 2009. Interactions between contingency, organizational IT factors, and ERP success. *Industrial Management & Data Systems*, 109, 118-137.
- Irani, Z. & Love, P. E. D. 2001. The Propagation of Technology Management Taxonomies for Evaluating Investments in Information Systems. *Journal of Management Information Systems*, 17, 161-177.
- Irani, Z. & Love, P. E. D. 2002. Developing a frame of reference for ex-ante IT/IS investment evaluation. *European Journal of Information Systems*, 11, 74-82.
- James, D. & Wolf, M. L. 2000. A second wind for ERP. *The McKinsey Quarterly*, 100-100.
- Jayaram, J., Dixit, M. & Motwani, J. 2014. Supply chain management capability of small and medium sized family businesses in India: A multiple case study approach. *International Journal of Production Economics*, 147, Part B, 472-485.
- Jurison, J. 1996. The temporal nature of IS benefits: A longitudinal study. *Information and Management*, 30, 75-79.
- Kale, P. T., Banwait, S. S. & Laroia, S. C. 2010. Performance evaluation of ERP implementation in Indian SMEs. *Journal of Manufacturing Technology Management*, 21, 758-780.
- Kanaracus, C. 2012. Air Force scraps massive ERP project after racking up \$1 billion in costs. Available: http://www.computerworld.com.au/article/442099/air_force_scraps_massive_erp_project_after_racking_up_1_billion_costs/.
- Kanellis, P. & Paul, R. J. 2005. User behaving badly: Phenomena and paradoxes from an investigation into information systems misfit. *Journal of Organizational and End User Computing*, 17, 64.
- Kanellou, A. & Spathis, C. 2013. Accounting benefits and satisfaction in an ERP environment. *International Journal of Accounting Information Systems*, 14, 209-234.
- Karimi, J., Somers, T. & Bhattacharjee, A. 2009. The Role of ERP Implementation in Enabling Digital Options: A Theoretical and Empirical Analysis. *Int. J. Electron. Commerce*, 13, 7-42.
- Karimi, J., Somers, T. M. & Bhattacharjee, A. 2007. The Impact of ERP Implementation on Business Process Outcomes: A Factor-Based Study. *Journal of Management Information Systems*, 24, 101-134.
- Karsak, E. E. & Özogul, C. O. 2009. An integrated decision making approach for ERP system selection. *Expert Systems with Applications*, 36, 660-667.
- Kast, F. E. & Rosenzweig, J. E. 1972. General Systems Theory: Applications for Organization and Management. *The Academy of Management Journal*, 15, 447-465.
- Kast, F. E. & Rosenzweig, J. E. 1979. *Organization and management: a systems and contingency approach*, McGraw-Hill.
- Kast, F. E. C. & Rosenzweig, J. E. 1973. *Contingency views of organization and management*, Chicago, Science Research Associates.
- Katerattanakul, P., J. Lee, J. & Hong, S. 2014. Effect of business characteristics and ERP implementation on business outcomes: An exploratory study of Korean manufacturing firms. *Management Research Review*, 37, 186-206.
- Ke, W. & Wei, K. K. 2008. Organizational culture and leadership in ERP implementation. *Decision Support Systems*, 45, 208-218.
- Kemp, M. & Low, G. 2008. ERP innovation implementation model incorporating change management. *Business Process Management Journal*, 14, 228-242.
- Kennerley, M. & Neely, A. 2001. Enterprise resource planning: analysing the impact. *Integrated Manufacturing Systems*, 12, 103-113.
- Kharuddin, S., Foong, S.-Y., Senik, R., Irani, Z. & Irani, Z. 2015. Effects of decision rationality on ERP adoption extensiveness and organizational performance. *Journal of Enterprise Information Management*, 28.
- Khazanchi, D. 2005. INFORMATION TECHNOLOGY (IT) APPROPRIATENESS: THE CONTINGENCY THEORY OF "FIT" AND IT IMPLEMENTATION IN SMALL AND MEDIUM ENTERPRISES. *Journal of Computer Information Systems*, 45.

- Kim, D., Cavusgil, S. T. & Cavusgil, E. 2013. Does IT alignment between supply chain partners enhance customer value creation? An empirical investigation. *Industrial Marketing Management*, 42, 880-889.
- Kim, H.-W. & Kankanhalli, A. 2009. Investigating user resistance to information systems implementation: A status quo bias perspective. *Mis Quarterly*, 33, 567-582.
- Kim, J. 2009. Activity-based framework for cost savings through the implementation of an ERP system. *International Journal of Production Research*, 47, 1913-1929.
- Kim, Y., Lee, Z. & Gosain, S. 2005. Impediments to successful ERP implementation process. *Business Process Management Journal*, 11, 158-170.
- King, N., Cassell, C. & Symon, G. 1994. Qualitative methods in organizational research: A practical guide. *The Qualitative Research Interview*, 17.
- Klein, H. K. & Myers, M. D. 1999. A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly*, 23, 67-94.
- Ko, D.-G., Kirsch, L. J. & King, W. R. 2005. Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS quarterly*, 59-85.
- Koh, S. C. L., Gunasekaran, A. & Rajkumar, D. 2008. ERP II: The involvement, benefits and impediments of collaborative information sharing. *International Journal of Production Economics*, 113, 245-268.
- Kohli, R. & Devaraj, S. 2003. Measuring Information Technology Payoff: A Meta-Analysis of Structural Variables in Firm-Level Empirical Research. *Information Systems Research*, 14, 127-145.
- Kohli, R. & Hoadley, E. 2006. Towards developing a framework for measuring organizational impact of IT-enabled BPR: case studies of three firms. *SIGMIS Database*, 37, 40-58.
- Kraemmerand, P., Moller, C. & Boer, H. 2003. ERP implementation: an integrated process of radical change and continuous learning. *Production Planning and Control*, 14, 338-348.
- Kræmmergaard, P. & Rose, J. 2002. Managerial competences for ERP journeys. *Information Systems Frontiers*, 4, 199-211.
- Krefting, L. 1991. Rigor in qualitative research: The assessment of trustworthiness. *The American journal of occupational therapy*, 45, 214-222.
- Kremers, M. & Van Dissel, H. 2000. Enterprise resource planning: ERP system migrations. *Communications of the ACM*, 43, 52-56.
- Krishnan, M. S., Rai, A. & Zmud, R. 2007. Editorial Overview—The Digitally Enabled Extended Enterprise in a Global Economy. *Information Systems Research*, 18, 233-236.
- Kwahk, K.-Y. & Lee, J.-N. 2008. The role of readiness for change in ERP implementation: Theoretical bases and empirical validation. *Information & Management*, 45, 474-481.
- Kwak, Y. H., Park, J., Chung, B. Y. & Ghosh, S. 2012. Understanding end-users' acceptance of enterprise resource planning (ERP) system in project-based sectors. *IEEE Transactions on Engineering Management*, 59, 266-277.
- Law, C. C. H., Chen, C. C. & Wu, B. J. P. 2010. Managing the full ERP life-cycle: Considerations of maintenance and support requirements and IT governance practice as integral elements of the formula for successful ERP adoption. *Computers in Industry*, 61, 297-308.
- Law, C. C. H. & Ngai, E. W. T. 2007. ERP systems adoption: An exploratory study of the organizational factors and impacts of ERP success. *Information & Management*, 44, 418-432.
- Lawrence, K. D., Pai, D. R., Klimberg, R. & Lawrence., S. M. 2010. Enterprise Information System and Data Mining. *International Journal of Business Intelligence Research*, 1, 34-41.
- Lee, A. S. 1994. Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation. *MIS Quarterly*, 18, 143-157.
- Lee, J., Kao, H.-A. & Yang, S. 2014. Service innovation and smart analytics for industry 4.0 and big data environment. *Procedia Cirp*, 16, 3-8.
- Lee, J., Siau, K. & Hong, S. 2003. Enterprise integration with ERP and EAI. *Communications of the ACM*, 46, 54-60.
- Legare, T. L. 2002. The Role of Organizational Factors in Realizing ERP Benefits. *Information Systems Management*, 19, 21-42.
- Lenart, A. 2011. ERP in the Cloud – Benefits and Challenges
Research in Systems Analysis and Design: Models and Methods. In: Wrycza, S. (ed.). Springer Berlin Heidelberg.
- Lesjak, D. & Vehovar, V. 2005. Factors affecting evaluation of e-business projects. *Industrial Management & Data Systems*, 105, 409-428.
- Levenburg, N. M. & Magal, S. R. 2004. Applying Importance-Performance Analysis to Evaluate E-Business Strategies among Small Firms. *E-Service Journal*, 3, 29-48.
- Lewis, S. 2015. Qualitative inquiry and research design: Choosing among five approaches. *Health promotion practice*, 1524839915580941.

- Leyh, C. & Muschick, P. 2013. Critical Success Factors for ERP system upgrades—The Case of a German large-scale Enterprise.
- Li, C. & Haynes, R. 2016. Continuous Audit and Enterprise Resource Planning Systems: A Case Study of ERP Rollouts in the Houston, TX Oil and Gas Industries. *Journal of Emerging Technologies in Accounting*, 0, null.
- Liang, H., Saraf, N., Hu, Q. & Xue, Y. 2007. Assimilation of enterprise systems: the effects of institutional pressures and the mediating role of top management. *MIS Quarterly*, 31, 59-87.
- Lin, H.-Y., Hsu, P.-Y. & Ting, P.-H. 2006. ERP systems success: An integration of IS success model and balanced scorecard. *Journal of Research and Practice in Information Technology*, 38, 215-228.
- Lin, W. T. & Shao, B. B. M. 2000. The relationship between user participation and system success: a simultaneous contingency approach. *Information & Management*, 37, 283-295.
- Lincoln, Y. S. & Guba, E. G. 1985. Naturalist inquiry. *Beverly Hills, CA: Sage*.
- Liu, A. Z. & Seddon, P. B. 2009. Understanding how project critical success factors affect organizational benefits from enterprise systems. *Business Process Management Journal*, 15, 716 - 743.
- Lozano, J. C. & Bayonaoré, S. Determinant Factors in Post-Implementation Phase of ERP Systems. International Conference on Software Process Improvement, 2016. Springer, 257-266.
- Luzi, A. D. & Mackenzie, K. D. 1982. An experimental study of performance information systems. *Management Science*, 28, 243-259.
- Lyytinen, K. & Newman, M. 2015. A tale of two coalitions—marginalising the users while successfully implementing an enterprise resource planning system. *Information Systems Journal*, 25, 71-101.
- Madapusi, A. & D'souza, D. 2012. The influence of ERP system implementation on the operational performance of an organization. *International Journal of Information Management*, 32, 24-34.
- Malhotra, R. & Temponi, C. 2010. Critical decisions for ERP integration: Small business issues. *International Journal of Information Management*, 30, 28-37.
- Malterud, K. 2001. Qualitative research: standards, challenges, and guidelines. *The lancet*, 358, 483-488.
- Manthou, V., Stefanou, C. J. & Tigka, K. 2015. The Evaluation of Business Performance in ERP Environments. *Automated Enterprise Systems for Maximizing Business Performance*, 88.
- Marabelli, M. & Newell, S. Organizational Learning and Absorptive Capacity in Managing ERP Implementation Projects. ICIS 2009 Proceedings, 2009.
- Markus, M. L., Axline, S., Petrie, D. & Tanis, S. C. 2000a. Learning from adopters' experiences with ERP: problems encountered and success achieved. *Journal of Information Technology*, 15, 245-265.
- Markus, M. L., Tanis, C. & Fenema, P. C. V. 2000b. Enterprise resource planning: multisite ERP implementations. *Commun. ACM*, 43, 42-46.
- Marshall, M. N. 1996. Sampling for qualitative research. *Family practice*, 13, 522-526.
- Marszalek, J. 2011. Queensland Health workers owe \$62 million in bungled pay. *Brisbane Times*, 31/5/2011.
- Marthandan, G. & Tang, C. M. 2010. Information systems evaluation: an ongoing measure. *International Journal of Business Information Systems*, 6, 336-353.
- Martinsons, M. & Chong, P. 1999. The Influence of Human Factors and Specialist Involvement on Information Systems Success. *Human Relations*, 52, 123-152.
- Mcadam, R. & Galloway, A. 2005. Enterprise resource planning and organisational innovation: a management perspective. *Industrial Management & Data Systems*, 105, 280-290.
- Mcfarland, C., Ross, M. & Giltrow, M. 1992. Biased recollections in older adults: The role of implicit theories of aging. *Journal of Personality and Social Psychology*, 62, 837.
- McGinnis, T. C. & Huang, Z. 2007. Rethinking ERP success: A new perspective from knowledge management and continuous improvement. *Information & Management*, 44, 626-634.
- Mckeen, J. D. & Guimaraes, T. 1997. Successful strategies for user participation in systems development. *Journal of Management Information Systems*, 14, 133-150.
- Mckeen, J. D., Guimaraes, T. & Wetherbe, J. C. 1994. The Relationship between User Participation and User Satisfaction: An Investigation of Four Contingency Factors. *MIS Quarterly*, 18, 427-451.
- Mclaren, T., Head, M. & Yuan, Y. 2002. Supply chain collaboration alternatives: understanding the expected costs and benefits. *Internet Research*, 12, 348-364.
- Mettler, T., Raber, D. & Hoffmann, H. Using Real Options in ERP-Systems for Improving Delivery Reliability. Americas Conference on Information Systems 2011 Proceedings, 2011.
- Meyer, S., Ruppen, A. & Magerkurth, C. Internet of things-aware process modeling: integrating IoT devices as business process resources. International Conference on Advanced Information Systems Engineering, 2013. Springer, 84-98.
- Miles, M. B. & Huberman, A. M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook* SAGE Publications, Inc
- Miles, M. B., Huberman, A. M. & Saldaña, J. 2013. *Qualitative data analysis: A methods sourcebook*, SAGE Publications, Incorporated.

- Mootheiril, F. & Singh, M. Achieving Organisational Effectiveness from Business to Employee (B2E) E-Business Model. PACIS 2009 Proceedings, 2009.
- Morton, N. A. & Hu, Q. 2008. Implications of the fit between organizational structure and ERP: A structural contingency theory perspective. *International Journal of Information Management*, 28, 391-402.
- Motwani, J., Mirchandani, D., Madan, M. & Gunasekaran, A. 2002. Successful implementation of ERP projects: Evidence from two case studies. *International Journal of Production Economics*, 75, 83-96.
- Murphy, K. E. & Simon, S. J. 2001. Using cost benefit analysis for enterprise resource planning project evaluation: a case for including intangibles. *Proceedings of the 34th Annual Hawaii International Conference on System Sciences*.
- Murphy, K. E. & Simon, S. J. 2002. Intangible benefits valuation in ERP projects. *Information Systems Journal*, 12, 301-320.
- Myers, M. D. 1997. Qualitative Research in Information Systems. *MIS Quarterly*, 21, 241-242.
- Nah, F. F.-H., Lau, J. L.-S. & Kuang, J. 2001. Critical factors for successful implementation of enterprise systems. *Business Process Management Journal*, 7, 285-296.
- Nah, F. F.-H., Zuckweiler, K. M. & Lau, J. L.-S. 2003. ERP Implementation: Chief Information Officers' Perceptions of Critical Success Factors. *International Journal of Human-Computer Interaction*, 16, 5-22.
- Neuman, W. L. 2003. *Social Research Methods. Qualitative and Quantitative Approaches. (5th Ed.)*, Allyn and Bacon, Needham Heights.
- Neuman, W. L. 2007. *Basics of social research: qualitative and quantitative approaches (2nd Ed)*, Pearson.
- Newell, S., Huang, J. C., Galliers, R. D. & Pan, S. L. 2003. Implementing enterprise resource planning and knowledge management systems in tandem: fostering efficiency and innovation complementarity. *Information and Organization*, 13, 25-52.
- Nicolaou, A. & Bhattacharya, S. 2008. Sustainability of ERPS performance outcomes: The role of post-implementation review quality. *International Journal of Accounting Information Systems*, 9, 43-60.
- Nicolaou, A. I. & Bhattacharya, S. 2006. Organizational performance effects of ERP systems usage: The impact of post-implementation changes. *International Journal of Accounting Information Systems*, 7, 18-35.
- Nolan & Norton 2000. SAP Benchmarking Report 2000. Nolan and Norton Institute.
- Nwankpa, J. & Roumani, Y. 2014. Understanding the link between organizational learning capability and ERP system usage: An empirical examination. *Computers in Human Behavior*, 33, 224-234.
- Nwankpa, J. K. 2015. ERP system usage and benefit: A model of antecedents and outcomes. *Computers in Human Behavior*, 45, 335-344.
- O'leary, D. E. 2004. Enterprise Resource Planning (ERP) Systems: An Empirical Analysis of Benefits. *Journal of Emerging Technologies in Accounting*, 1, 63-72.
- Orlikowski, W. J. & Baroudi, J. J. 1991. Studying Information Technology in Organizations: Research Approaches and Assumptions. *Information Systems Research*, 2, 1-28.
- Oseni, T., Rahim, M. M., Smith, S. P. & Foster, S. 2014. An initial empirical evaluation of the influence of erp post-implementation modifications on business process optimisation.
- Otley, D. T. 1980. The contingency theory of management accounting: achievement and prognosis. *Accounting, Organizations and Society*, 5, 413-428.
- Ovacik, I. M. 2011. Advanced Planning and Scheduling Systems: The Quest to Leverage ERP for Better Planning
- Planning Production and Inventories in the Extended Enterprise. In: Kempf, K. G., Keskinocak, P. & Uzsoy, R. (eds.). Springer US.
- Panayotopoulou, L., Bourantas, D. & Papalexandris, N. 2003. Strategic human resource management and its effects on firm performance: an implementation of the competing values framework. *International Journal of Human Resource Management*, 14, 680-699.
- Panayotopoulou, L. & Papalexandris, N. 2004. Examining the link between human resource management orientation and firm performance. *Personnel Review*, 33, 499-520.
- Pang, C. 2015. Market Snapshot: ERP Software, Worldwide, 2015. Gartner.
- Panorama 2011. 2011 Guide to ERP Systems and Vendors - An Independent Research Report. Panorama Consulting.
- Park, J.-H., Suh, H.-J. & Yang, H.-D. 2007. Perceived absorptive capacity of individual users in performance of Enterprise Resource Planning (ERP) usage: The case for Korean firms. *Information & Management*, 44, 300-312.
- Park, K. O. & Koh, C. E. 2015. Effect of change management capability in real-time environment: an information orientation perspective in supply chain management. *Behaviour & Information Technology*, 34, 94-104.

- Park, N., Roman, R., Lee, S. & Chung, J. E. 2009. User acceptance of a digital library system in developing countries: An application of the Technology Acceptance Model. *International Journal of Information Management*, 29, 196-209.
- Park, Y., Oh, J. & Fujimoto, T. 2012. Global expansion and supply chain integration: case study of Korean firms. *International Journal of Procurement Management*, 5, 470-485.
- Parthasarathy, S. 2009. Quantitative assessment of enterprise resource planning software customisation. *Int. J. Inf. Syst. Chang. Manage.*, 3, 265-283.
- Patel, N. V. & Irani, Z. 1999. Evaluating information technology in dynamic environments: a focus on tailorable information systems. *Logistics Information Management*, 12, 32-39.
- Paulhus, D. L. 1984. Two-component models of socially desirable responding. *Journal of personality and social psychology*, 46, 598.
- Piccoli, G., Brohman, M. K., Watson, R. T. & Parasuraman, A. 2009. Process completeness: Strategies for aligning service systems with customers' service needs. *Business Horizons*, 52, 367-376.
- Plaza, M. & Rohlf, K. 2008. Learning and performance in ERP implementation projects: A learning-curve model for analyzing and managing consulting costs. *International Journal of Production Economics*, 115, 72-85.
- Poba-Nzaou, P. & Raymond, L. 2011. Managing ERP system risk in SMEs: a multiple case study. *Journal of Information Technology*, 26, 170-192.
- Poba-Nzaou, P. & Raymond, L. 2013. Custom Development as an Alternative for ERP Adoption by SMEs: An Interpretive Case Study. *Information Systems Management*, 30, 319-335.
- Poland, B. D. 1995. Transcription quality as an aspect of rigor in qualitative research. *Qualitative inquiry*, 1, 290-310.
- Poland, B. D. 2003. Transcription quality. *Inside interviewing: New lenses, new concerns*, 267-287.
- Pollock, N. & Cornford, J. 2004. ERP systems and the university as a "unique" organisation. *Information technology & people*, 17, 31-52.
- Pope, C., Ziebland, S. & Mays, N. 2000. Qualitative research in health care: Analysing qualitative data. *BMJ*, 320.
- Poston, R. & Grabski, S. The impact of enterprise resource planning systems on firm performance. Proceedings of the twenty first international conference on Information systems, 2000. Association for Information Systems, 479-493.
- Poston, R. & Grabski, S. 2001. Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems*, 2, 271-294.
- Premkumar, G. & King, W. R. 1992. An empirical assessment of information systems planning and the role of information systems in organizations. *Journal of Management Information Systems*, 9, 99-125.
- Preston, M. S. 2008. The direct effects of field of practice on core managerial role competencies: A study across three types of public sector human service agencies. *Administration in Social Work*, 32, 63-83.
- Punch, K. F. 2013. *Introduction to social research: Quantitative and qualitative approaches*, Sage.
- Quinn, R. E. & Cameron, K. 1983. Organizational Life Cycles and Shifting Criteria of Effectiveness: Some Preliminary Evidence. *Management Science*, 29, 33-51.
- Quinn, R. E. & Kimberly, J. R. 1984. Paradox planning and perseverance: guidelines for managerial practice. In: Kimberly, J. R. & Quinn, R. E. (eds.) *Managing organizational transition*. Homewood, IL: Dow-JonesIrwin.
- Quinn, R. E. & Rohrbaugh, J. 1981. A Competing Values Approach to Organizational Effectiveness. *Public Productivity Review*, 5, 122-140.
- Quinn, R. E. & Rohrbaugh, J. 1983. A Spatial Model of Effectiveness Criteria: Towards a Competing Values Approach to Organizational Analysis. *Management Science*, 29, 363-377.
- Qutaishat, F. T., Khattab, S. A., Zaid, M. K. S. A. & Al-Manasra, E. A. 2012. The effect of erp successful implementation on employees' productivity, service quality and innovation: An empirical study in telecommunication sector in jordan. *International Journal of Business and Management*, 7, 45.
- Ragin, C. C. 2009. What is a case?: exploring the foundations of social inquiry. In: Ragin, C. C. & Becker, H. S. (eds.) 12 ed.: Cambridge university press.
- Rajagopal, P. 2002. An innovation—diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model. *Information & Management*, 40, 87-114.
- Ram, J., Corkindale, D. & Wu, M.-L. 2014a. ERP adoption and the value creation: Examining the contributions of antecedents. *Journal of Engineering and Technology Management*, 33, 113-133.
- Ram, J. & Swatman, P. M. C. Enterprise Resource Planning (ERP) Innovation Process: Towards Development of an Integrated Framework for Successful Adoption and Implementation. ACIS 2008 Proceedings. Paper 25, 2008.
- Ram, J., Wu, M.-L. & Tagg, R. 2014b. Competitive advantage from ERP projects: Examining the role of key implementation drivers. *International Journal of Project Management*, 32, 663-675.

- Ranjan, S., Jha, V. K. & Pal, P. 2016. Application of emerging technologies in ERP implementation in Indian manufacturing enterprises: an exploratory analysis of strategic benefits. *The International Journal of Advanced Manufacturing Technology*, 1-12.
- Raymond, L. 1990. Organizational Context and Information Systems Success: A Contingency Approach. *Journal of Management Information Systems*, 6, 5-20.
- Reeves, S., Kuper, A. & Hodges, B. D. 2008. Qualitative research methodologies: ethnography. *BMJ: British Medical Journal*, 337.
- Reinking, J. 2012. Contingency Theory in Information Systems Research. In: Dwivedi, Y. K., Wade, M. R. & Schneberger, S. L. (eds.) *Information Systems Theory*. Springer New York.
- Remus, U. 2012. Exploring the Dynamics behind Knowledge Management Challenges—An Enterprise Resource Planning Case Study. *Information Systems Management*, 29, 188-200.
- Ritchie, J., Lewis, J., Nicholls, C. M. & Ormston, R. 2013. *Qualitative research practice: A guide for social science students and researchers*, Sage.
- Robey, D. & Azevedo, A. 1994. Cultural analysis of the organizational consequences of information technology. *Accounting, Management and Information Technologies*, 4, 23-37.
- Robey, D., Ross, J. W. & Boudreau, M.-C. 2002. Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change. *Journal of Management Information Systems*, 19, 17-46.
- Rojas, R. R. 2000. A Review of Models for Measuring Organizational Effectiveness Among For-Profit and Nonprofit Organizations. *Nonprofit Management and Leadership*, 11, 97-104.
- Rosemann, M. & Wiese, J. 1999. Measuring the Performance of ERP Software - a Balanced Scorecard Approach. *Proceedings of the 10th Australasian Conference on Information Systems*.
- Ross, J. W. & Vitale, M. R. 2000. The ERP Revolution: Surviving vs. Thriving. *Information Systems Frontiers*, 2, 233-241.
- Rothenberger, M. A. & Srite, M. 2009. An Investigation of Customization in ERP System Implementations. *Engineering Management, IEEE Transactions on*, 56, 663-676.
- Ruivo, P., Oliveira, T. & Neto, M. 2014. Examine ERP post-implementation stages of use and value: Empirical evidence from Portuguese SMEs. *International Journal of Accounting Information Systems*, 15, 166-184.
- Sääksjärvi, M. M. T. & Talvinen, J. M. Evaluation of Organizational Effectiveness of Marketing Information Systems - the Critical Role of Respondents. *Proceedings of the 4th European Conference on Information Systems*, 1996 Lisbon, Portugal. 435-450.
- Saatçioğlu, Ö. Y. 2009. What determines user satisfaction in ERP projects: benefits, barriers or risks? *Journal of Enterprise Information Management*, 22, 690-708.
- Safavi, N., Amini, M., Abdollahzadegan, A. & Zakaria, N. H. 2013. An Effective Model for Evaluating Organizational Risk and Cost in ERP Implementation by SME. *Journal of Business and Management*, 10, 61-66.
- Sahay, B. & Ranjan, J. 2008. Real time business intelligence in supply chain analytics. *Information Management & Computer Security*, 16, 28-48.
- Saraf, N., Liang, H., Xue, Y. & Hu, Q. 2013. How does organisational absorptive capacity matter in the assimilation of enterprise information systems? *Information Systems Journal*, 23, 245-267.
- Sarker, S. & Lee, A. S. 2003. Using a case study to test the role of three key social enablers in ERP implementation. *Information & Management*, 40, 813-829.
- Sasidharan, S., Santhanam, R., Brass, D. J. & Sambamurthy, V. 2012. The Effects of Social Network Structure on Enterprise Systems Success: A Longitudinal Multilevel Analysis. *Information Systems Research*, 23, 658-678.
- Saunders, M., Lewis, P. & Thornhill, A. 2009. *Research Methods for Business Students (5th Ed)*, Pearson Education, England.
- Scapens, R. W. & Jazayeri, M. 2003. ERP systems and management accounting change: opportunities or impacts? A research note. *European accounting review*, 12, 201-233.
- Scheckenbach, T., Zhao, F., Allard, E., Burke, J., Chiwaki, K. & Marlow, S. Issues of ERP Upgrade in Public Sectors: A Case Study. *International Conference on Human-Computer Interaction*, 2014. Springer, 754-763.
- Scheer, A.-W. & Habermann, F. 2000. Enterprise resource planning: making ERP a success. *Commun. ACM*, 43, 57-61.
- Schensul, S. L., Schensul, J. J. & Lecompte, M. D. 1999. *Essential ethnographic methods: Observations, interviews, and questionnaires*, Rowman Altamira.
- Schlichter, B. R. & Kraemmergaard, P. 2010. A comprehensive literature review of the ERP research field over a decade. *Journal of Enterprise Information Management*, 23, 486-520.
- Schonberger, R. J. 1980. MIS design: a contingency approach. *Mis Quarterly*, 13-20.

- Schubert, P. & Williams, S. P. Constructing a Framework for Investigating and Visualizing ERP Benefits and Business Change. BLED 2009 Proceedings, 2009a Slovenia.
- Schubert, P. & Williams, S. P. An Extended Framework for Comparing Expectations and Realized Benefits of Enterprise Systems Implementations. AMCIS 2009 Proceedings, 2009b.
- Schubert, P. & Williams, S. P. 2011. A framework for identifying and understanding enterprise systems benefits. *Business Process Management Journal*, 17, 808-828.
- Seddon, P. B., Calvert, C. & Yang, S. 2010. A Multi-Project Model of Key Factors Affecting Organizational Benefits from Enterprise Systems. *MIS Quarterly*, 34, 305-328.
- Sedera, D., Gable, G. & Rosemann, M. 2001. A balanced scorecard approach to enterprise systems performance measurement. *ACIS 2001 Proceedings*, 74.
- Sedera, D. & Gable, G. G. A factor and structural equation analysis of the enterprise systems success measurement model. 2004. Association for Information Systems.
- Shaheen, G. 2016. Resistance to change in implementation of ERP projects. *Journal of Strategy and Performance Management*, 4, 24-38.
- Shang, S. & Seddon, P. B. 2000. A Comprehensive Framework for Classifying the Benefits of ERP Systems. *Proceedings of the 2000 Americas Conference on Information Systems*. Long Beach, CA.
- Shang, S. & Seddon, P. B. 2002. Assessing and managing the benefits of enterprise systems: the business manager's perspective. *Information Systems Journal*, 12, 271-299.
- Shanks, G., Seddon, P. B. & Willcocks, L. 2003. *Second-wave enterprise resource planning systems: Implementing for effectiveness*, Cambridge University Press.
- Sharma, R. & Yetton, P. 2007. The Contingent Effects of Training, Technical Complexity, and Task Interdependence on Successful Information Systems Implementation. *MIS Quarterly*, 31, 219-238.
- Shen, Y.-C., Chen, P.-S. & Wang, C.-H. 2015. A study of enterprise resource planning (ERP) system performance measurement using the quantitative balanced scorecard approach. *Computers in Industry*.
- Shiang-Yen, T., Idrus, R. & Wong, W. P. 2013. ERP Misfit-Reduction Strategies: A Moderated Model of System Modification and Organizational Adaptation. *Journal of Global Information Management (JGIM)*, 21, 59-81.
- Sia, S. K., Tang, M., Soh, C. & Boh, W. F. 2002. Enterprise resource planning (ERP) systems as a technology of power: empowerment or panoptic control? *ACM Sigmis Database*, 33, 23-37.
- Skok, W. & Legge, M. 2001. Evaluating enterprise resource planning (ERP) systems using an interpretive approach. *Proceedings of the 2001 ACM SIGCPR Conference on Computer Personnel Research*. San Diego, California, United States: ACM.
- Skok, W. & Legge, M. 2002. Evaluating enterprise resource planning (ERP) systems using an interpretive approach. *Knowledge and Process Management*, 9, 72-82.
- Slabbert, B., Seymour, L. & Schuler, J. 2016. Business benefits and challenges of a multiple ERP landscape.
- Snider, B., Silveira, G. J. C. D. & Balakrishnan, J. 2009. ERP implementation at SMEs: analysis of five Canadian cases. *International Journal of Operations & Production Management*, 29, 4-29.
- Soh, C., Kien, S. S. & Tay-Yap, J. 2000. Enterprise resource planning: cultural fits and misfits: is ERP a universal solution? *Commun. ACM*, 43, 47-51.
- Somers, T. M. & Nelson, K. G. 2004. A taxonomy of players and activities across the ERP project life cycle. *Information & Management*, 41, 257-278.
- Spathis, C. & Ananiadis, J. 2005. Assessing the benefits of using an enterprise system in accounting information and management. *Journal of Enterprise Information Management*, 18, 195-210.
- Spathis, C. & Constantinides, S. 2003. The usefulness of ERP systems for effective management. *Industrial Management & Data Systems*, 103, 677-685.
- Spathis, C. & Constantinides, S. 2004. Enterprise resource planning systems' impact on accounting processes. *Business Process Management Journal*, 10, 234-247.
- Srivardhana, T. & Pawlowski, S. D. 2007. ERP systems as an enabler of sustained business process innovation: A knowledge-based view. *The Journal of Strategic Information Systems*, 16, 51-69.
- Stadtler, H. 2015. Supply chain management: An overview. *Supply chain management and advanced planning*. Springer.
- Staehr, L. 2010. Understanding the role of managerial agency in achieving business benefits from ERP systems. *Information Systems Journal*, 20, 213-238.
- Staehr, L., Shanks, G. & Seddon, P. B. 2012. An Explanatory Framework for Achieving Business Benefits from ERP Systems. *Journal of the Association for Information Systems*, 13, 2.
- Stefanou, C. J. 2001. A framework for the ex-ante evaluation of ERP software. *European Journal of Information Systems*, 10, 204-215.
- Stewart, G. 2000. Organisational readiness for ERP implementation. *AMCIS 2000 Proceedings*, 291.

- Stratman, J. K. 2007. Realizing Benefits from Enterprise Resource Planning: Does Strategic Focus Matter? *Production and Operations Management*, 16, 203-216.
- Stratopoulos, T. & Dehning, B. 2000. Does successful investment in information technology solve the productivity paradox? *Information & Management*, 38, 103-117.
- Strong, D. M. & Volkoff, O. 2010. Understanding organization-enterprise system fit: a path to theorizing the information technology artifact. *MIS Q.*, 34, 731-756.
- Stross, R. 2012. Billion-Dollar Flop: Air Force Stumbles on Software Plan. *New York Times*.
- Su, Y.-F. & Yang, C. 2009. Why are enterprise resource planning systems indispensable to supply chain management? *European Journal of Operational Research*, 203, 81-94.
- Subramoniam, S., Tounsi, M. & Krishnankutty, K. V. 2009. The role of BPR in the implementation of ERP systems. *Business Process Management Journal*, 15, 653-668.
- Sugumaran, V. & Arogyaswamy, B. 2004. Measuring IT performance: "contingency" variables and value modes. *Journal of Computer Information Systems*, 44, 79-86.
- Sun, H. 2012. Understanding user revisions when using information system features: adaptive system use and triggers. *Mis Quarterly*, 36, 453-478.
- Tallon, P. P. & Pinsonneault, A. 2011. Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model. *MIS Q.*, 35, 463-484.
- Tarantilis, C. D., Kiranoudis, C. T. & Theodorakopoulos, N. D. 2008. A Web-based ERP system for business services and supply chain management: Application to real-world process scheduling. *European Journal of Operational Research*, 187, 1310-1326.
- Tarn, J. M., Yen, D. C. & Beaumont, M. 2002. Exploring the rationales for ERP and SCM integration. *Industrial Management & Data Systems*, 102, 26-34.
- Tenhiälä, A. & Helkiö, P. 2015. Performance effects of using an ERP system for manufacturing planning and control under dynamic market requirements. *Journal of Operations Management*, 36, 147-164.
- Teoh, S. Y. & Shan, L. P. 2008. Understanding the Influences of Social Integration in Enterprise Systems Use. *Journal of Enterprise Information Management*, 21, 493-511.
- Themistocleous, M. 2004. Justifying the decisions for EAI implementations: a validated proposition of influential factors. *Journal of Enterprise Information Management*, 17, 85-104.
- Tian, F. & Xu, S. X. 2015. How Do Enterprise Resource Planning Systems Affect Firm Risk? Post-Implementation Impact. *Mis Quarterly*, 39, 39-60.
- Tortorella, G. L., Marodin, G. A., Fogliatto, F. S. & Miorando, R. 2014. Learning organisation and human resources management practices: an exploratory research in medium-sized enterprises undergoing a lean implementation. *International Journal of Production Research*, 1-12.
- Trkman, P. 2010. The critical success factors of business process management. *International Journal of Information Management*, 30, 125-134.
- Tsai, W.-H., Chou, Y.-W., Leu, J.-D., Chen, D. C. & Tsaur, T.-S. 2013. Investigation of the mediating effects of IT governance-value delivery on service quality and ERP performance. *Enterprise Information Systems*, 1-22.
- Tsai, W.-H., Lee, K.-C., Liu, J.-Y., Lin, S.-J. & Chou, Y.-W. 2011. The influence of enterprise resource planning (ERP) systems' performance on earnings management. *Enterprise Information Systems*, 6, 491-517.
- Tsai, W.-H., Lee, P.-L., Shen, Y.-S. & Lin, H.-L. 2012. A comprehensive study of the relationship between enterprise resource planning selection criteria and enterprise resource planning system success. *Information & Management*, 49, 36-46.
- Tuominen, T., Kitaygorodskaya, N. & Helo, P. 2008. Achieving agility in supply chains with the help of IT. *International Journal of Electronic Customer Relationship Management*, 1, 374-389.
- Turban, E. 2008. *Information Technology for Management*, John Wiley & Sons, Inc.
- Umar, M., Khan, N., Agha, M. H. & Abbas, M. 2016. SAP-ERP Implementation: Change Management Model using Qualitative Approach. *International Journal of Computer Science and Network Security (IJCSNS)*, 16, 9.
- Umble, E. J., Haft, R. R. & Umble, M. M. 2003. Enterprise resource planning: Implementation procedures and critical success factors. *European Journal of Operational Research*, 146, 241-257.
- Uppström, E., Lönn, C.-M., Hoffsten, M. & Thorström, J. New Implications for Customization of ERP Systems. System Sciences (HICSS), 2015 48th Hawaii International Conference on, 2015. IEEE, 4220-4229.
- Uwizeyemungu, S. & Raymond, L. 2009. Exploring an alternative method of evaluating the effects of ERP: a multiple case study. *J Inf Technol*, 24, 251-268.
- Uwizeyemungu, S. & Raymond, L. 2010. Linking the effects of ERP to organizational performance: Development and initial validation of an evaluation method. *Information Systems Management*, 27, 25-41.

- Van De Ven, A. H. & Drazin, R. 1984. The concept of fit in contingency theory. DTIC Document.
- Vanderstoep, S. & Johnson, D. 2009. *Research Methods for Everyday Life: Blending Qualitative and Quantitative Approaches*, Jossey-Bass.
- Vehovar, V. & Lesjak, D. 2007. Characteristics and impacts of ICT investments: perceptions among managers. *Industrial Management & Data Systems*, 107, 537-550.
- Velcu, O. 2007. Exploring the effects of ERP systems on organizational performance: Evidence from Finnish companies. *Industrial Management & Data Systems*, 107, 1316-1334.
- Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
- Volkoff, O., Elmes, M. B. & Strong, D. M. 2004. Enterprise systems, knowledge transfer and power users. *The Journal of Strategic Information Systems*, 13, 279-304.
- Vries, J. D. & Boonstra, A. 2012. The influence of ERP implementation on the division of power at the production-sales interface. *International Journal of Operations & Production Management*, 32, 1178-1198.
- Wagner, E. L. & Newell, S. 2004. 'Best' for whom?: the tension between 'best practice' ERP packages and diverse epistemic cultures in a university context. *The Journal of Strategic Information Systems*, 13, 305-328.
- Walsham, G. 1995. Interpretive case studies in IS research: nature and method. *Eur J Inf Syst*, 4, 74-81.
- Wang, E. T. & Chen, J. H. 2006. The influence of governance equilibrium on ERP project success. *Decision Support Systems*, 41, 708-727.
- Wang, E. T., Shih, S.-P., Jiang, J. J. & Klein, G. 2008. The consistency among facilitating factors and ERP implementation success: A holistic view of fit. *Journal of Systems and Software*, 81, 1609-1621.
- Wang, E. T. G., Chia-Lin Lin, C., Jiang, J. J. & Klein, G. 2007. Improving enterprise resource planning (ERP) fit to organizational process through knowledge transfer. *International Journal of Information Management*, 27, 200-212.
- Wang, E. T. G., Ying, T.-C., Jiang, J. J. & Klein, G. 2006. Group cohesion in organizational innovation: An empirical examination of ERP implementation. *Information and Software Technology*, 48, 235-244.
- Wang, Y., Kung, L. & Byrd, T. A. 2016. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change*.
- Ward, J., Taylor, P. & Bond, P. 1996. Evaluation and realisation of IS/IT benefits: an empirical study of current practice. *European Journal of Information Systems*, 4, 214-225.
- Wei, C.-C., Chien, C.-F. & Wang, M.-J. J. 2005a. An AHP-based approach to ERP system selection. *International Journal of Production Economics*, 96, 47-62.
- Wei, H.-L., Wang, E. T. G. & Ju, P.-H. 2005b. Understanding misalignment and cascading change of ERP implementation: a stage view of process analysis. *European Journal of Information Systems*, 14, 324-334.
- Weill, P. & Olson, M. H. 1989. An assessment of the contingency theory of management information systems. *J. Manage. Inf. Syst.*, 6, 59-79.
- Weston, F. C., Jr. 2001. ERP implementation and project management. *Production and Inventory Management Journal*, 42, 75-80.
- Wetherbe, J. C. & Whitehead, C. J. 1977. A contingency view of managing the data processing organization. *MIS Quarterly*, 19-25.
- Whittington, R. 1992. Putting Giddens into action: social systems and managerial agency. *Journal of management studies*, 29, 693-712.
- Wieder, B., Booth, P., Matolcsy, Z. P. & Ossimitz, M.-L. 2006. The impact of ERP systems on firm and business process performance. *Journal of Enterprise Information Management*, 19, 13-29.
- Wier, B., Hunton, J. & Hassabelnaby, H. R. 2007. Enterprise resource planning systems and non-financial performance incentives: The joint impact on corporate performance. *International Journal of Accounting Information Systems*, 8, 165-190.
- Williamson, K., Burstein, F. & Mckemish, S. 2002. Research methods for students, academics and professionals: information management and systems. In: Williamson, K. (ed.). *Wagga Wagga: Quick Print*.
- Willis, T. H. & Willis-Brown, A. H. 2002. Extending the value of ERP. *Industrial Management & Data Systems*, 102, 35-38.
- Wood, T. & Caldas, M. P. 2001. Reductionism and complex thinking during ERP implementations. *Business Process Management Journal*, 7, 387-393.
- Worley, J. H., Chatha, K. A., Weston, R. H., Aguirre, O. & Grabot, B. 2005. Implementation and optimisation of ERP systems: A better integration of processes, roles, knowledge and user competencies. *Computers in Industry*, 56, 620-638.

- Wu, F., Liu, C., Li, H. Z., Gao, K. & Tian, J. 2006. The Benefits Evaluation of ERP Project Investment Based on Real Options. *IEEE International Conference on Systems, Man and Cybernetics*.
- Yang, C. & Su, Y.-F. 2009. The relationship between benefits of ERP systems implementation and its impacts on firm performance of SCM. *Journal of Enterprise Information Management*, 22, 722-752.
- Yeoh, W. & Popovič, A. 2016. Extending the understanding of critical success factors for implementing business intelligence systems. *Journal of the Association for Information Science and Technology*, 67, 134-147.
- Yin, R. K. 2003. *Case Study Research: Design and Method (3rd ed)*, London, Sage.
- Yin, R. K. 2013. *Case study research: Design and methods*, Sage publications.
- Yu, C.-S. 2005. Causes influencing the effectiveness of the post-implementation ERP system. *Industrial Management & Data Systems*, 105, 115-132.
- Žabjek, D., Kovacic, A. & Štemberger, M. I. 2009. The influence of business process management and some other CSFs on successful ERP implementation. *Business Process Management Journal*, 15, 588-608.
- Zach, O. & Erik Munkvold, B. 2012. Identifying reasons for ERP system customization in SMEs: a multiple case study. *Journal of Enterprise Information Management*, 25, 462-478.
- Zhong, R. Y., Dai, Q., Qu, T., Hu, G. & Huang, G. Q. 2013. RFID-enabled real-time manufacturing execution system for mass-customization production. *Robotics and Computer-Integrated Manufacturing*, 29, 283-292.

Appendix A Plain Language Statement

Plain Language Statement to be used in a research project involving human participation. It must be printed on RMIT letterhead and be written in language appropriate to the audience and any technical terms need to be explained.

Invitation to Participate in a Research Project

Project title: The Evaluation of Enterprise Resource Planning (ERP) System Benefits in Australia

Investigators:

- Mr Leon Teo (Business Information Systems PhD student, RMIT University, leon.teo@rmit.edu.au, 9925-1471)
- Professor Mohini Singh (Senior Supervisor, School of Business Information Technology, RMIT University, mohini.singh@rmit.edu.au, 9925-1355)
- Dr Vanessa Cooper (Second Supervisor, School of Business Information Technology, RMIT University, vanessa.cooper@rmit.edu.au, 9925-5786)

Dear Sir / Madam,

You are invited to participate in a research project being conducted by RMIT University. This information sheet describes the project in straightforward language, or 'plain English'. Please kindly read this information sheet carefully and understand its contents before deciding to participate. If you have any enquiries, feel free to contact any of the investigators.

Who is involved in this research project? Why is it being conducted?

- Leon Teo is a PhD student who is the primary investigator of this research study which is being conducted as part of his PhD degree at RMIT University under the supervision of Professor Mohini Singh and Dr Vanessa Cooper.
- This project has been approved by the RMIT Human Research Ethics Committee and adheres to the strict guidelines set by the Ethics Committee.
- The research study is conducted to investigate benefits achieved from Enterprise Resource Planning (ERP) systems and their impacts on organisational effectiveness of the adopting organisations.

Why have you been approached?

You have been approached because your organisation has been identified to have implemented and used ERP systems for a certain amount of time which is relevant to the purpose for this research study.

What is the project about? What are the questions being addressed?

- This proposed research aims to investigate the actual benefits achieved from ERP systems by organisations from an organisational effectiveness perspective.
- The impact of the stakeholders' input and factors like ERP systems' maturity, training and innovation on the benefits achieved will also be evaluated.

If I agree to participate, what will I be required to do?

- Participants are required to undergo an interview session lasting not more than an hour. During interview, participants will be asked questions pertaining to issues related to the ERP system project of his/her organisation.
- The interview will be audio recorded for data analysis purposes. However you may request for the recording to be terminated at any stage of the interview.

What are the risks or disadvantages associated with participation?

- There are no perceived risks associated with the research.
- However, if you are concerned about your responses to any of the questions during the interview or if you find participation in the research project distressing, you may opt to withdraw anytime.

What are the benefits associated with participation?

- Your participation will provide useful insight into issues pertaining to ERP system projects in your organisation.
- The findings of the research will help organisations better understand the value of ERP implementations and give justification for the investments made. You may also utilise the findings for your work in your organisation.
- Your participation in project is crucial to assist me to complete this very important and unexplored area of ERP system benefits research.

What will happen to the information I provide?

- Information collected will be kept confidential and the participant's anonymity will be ensured at all times if he/she wishes to remain anonymous.
- Any information provided by the participant would be safe guarded in accordance to the strict guidelines of the RMIT University Human Research Ethics Committee.
- Any information provided by the participants can only be disclosed only if 1) it is to protect the participant or others from harm; 2) a court order is produced; 3) with written permission from the participant.
- The audio recordings of all interviews will only be accessed by Leon Teo for transcription and analysis purposes.
- The results of the data collected will be analysed for the PhD thesis, and for the publication of academic journals and presentation at conferences.
- All participants will not be named and will also be kept anonymous in any publications arising from this project. Publications will be reviewed by the researcher's supervisors before submission.

What are my rights as a participant?

Participant have:

- The right to withdraw their participation at any time, without prejudice.
- The right to have any unprocessed data withdrawn and destroyed, provided it can be reliably identified, and provided that so doing does not increase the risk for the participant.
- The right to have any questions answered at any time.

Whom should I contact if I have any questions?

If you have any questions regarding this research, please kindly contact:

- Leon Teo (Investigator, PhD Student, RMIT)
 - Phone: 9925 1471
 - Email: leon.teo@rmit.edu.au
- Professor Mohini Singh
 - Phone: 9925 1355
 - Email: mohini.singh@rmit.edu.au
- Dr Vanessa Cooper
 - Phone: 9925 5786
 - Email: vanessa.cooper@rmit.edu.au

Appendix B Interview Instrument

Section A: Company's Background

1. What is the country of ownership of your company? (Tick the corresponding box)
 Australia USA Europe Japan Asia Others: _____
2. What is the estimated number of employees?
 Within the company: _____ Within the group / department: _____
3. What is the estimated annual turnover / budget for your company?
4. What is the industry classification of your company?
5. Which are the departments (business units) you have in the company? (Tick the corresponding box)
 Manufacturing Finance Logistic HR Marketing
 Sales R&D Others: _____
6. Who is your company's main competitor/s?
7. For how long have your company operated in Australia?
8. Do you outsource any activities / functions?
 a. If yes, what activities and when?
 b. Is this business function linked to your ERP systems?

Section B: ERP Technology

1. When did you implement the ERP system?
2. What were the initial reasons for adopting this ERP system for your organisation?
3. What type of technology or existing technology did your company have before the ERP implementation?
4. Which implementation approach (big bang, phased, others) was adopted for this ERP project?
5. What were the reasons for adopting this approach?
- 6a. Is it a complete or an on-going ERP project?
- 6b. If completed, when was the implementation completed?

Section C: ERP Project Background

1. Which ERP modules has your organisation implemented? Was there any upgrades implemented?
- 2a. Are there any upgrades planned for the current system?
- 2b. What are the reasons for the planned upgrades?
3. Name the vendor that supplied the ERP system: SAP Oracle/ Peoplesoft
 Others: _____
4. What was the estimated total cost of the ERP implementation (software, hardware, training, labour)? \$
5. What were the individual resources required for the project:
 Software: _____ Hardware: _____ Labour Costs: _____

Time:

Training:

Others:

6. Describe the contractual arrangements with the vendor (for ongoing support), or in the absence of vendor support, how is support being carried out in your organisation:

Section D: Stakeholders Involvement

1. Who were involved in the implementation of the ERP system project?

- | | | | | | |
|----------------|--------------------------|-------------------|--------------------------|--------------|--------------------------|
| Developers | <input type="checkbox"/> | Consultants | <input type="checkbox"/> | IT Staff | <input type="checkbox"/> |
| Top Management | <input type="checkbox"/> | Middle Management | <input type="checkbox"/> | End users | <input type="checkbox"/> |
| Supplier/s | <input type="checkbox"/> | Customer/s | <input type="checkbox"/> | Shareholders | <input type="checkbox"/> |
| Government | <input type="checkbox"/> | CTO / CIO | <input type="checkbox"/> | CFO | <input type="checkbox"/> |
- Others:

Section E: Contingency Factors

1. Was there a change management process for the ERP implementation and how was it carried out?

2. End User Training

- a. How was it carried out?
- b. Who provided the training?
- c. Was there any incentives given to the users for training?

3. How long did it take for your company realise the first wave of benefits from the ERP system?

4. Were these benefits from one or two modules only or from the whole system?

5. Due to the ERP systems, has your organisation created any new business process not previous planned?

6. Has your organisation extended business capabilities after the implementation of the enterprise system (e.g. SOA)?

7. Do you think that optimising the performance of the enterprise system is important? What do you think are the key reasons for optimising the benefits achieved from the enterprise system?

Section F: Business Improvements from ERP Implementation

1. Highlight the benefits achieved from the ERP system from a human skills / resource perspective. Please cite examples if possible.

- Empowerment of employee:
- A common vision among the staff members:
- Improved communication among employees:
- Improved communication amongst different departments/units:
- Personnel reorganisation (new positions):
- Improved quality of work life / better access to information:
- Improved individual performance / efficiency (in what ways):
- Others:

2. Highlight the benefits achieved from the ERP system from an organisation growth and opportunity perspective:

- Business growth:
- New business alliances:
- Business innovations:
- Cost leadership:
- Product differentiation:
- External linkages to other organisations (via system integration):
- Extension of market reach:
- Increased customer satisfaction:
- Improved customer service (in what way):
- Business learning within the organisation:
- Organisational changes:
- IT flexibility for organisational changes:
- Improved overall profit:

- Others:

3. Highlight the benefits achieved from the system from an internal processing, auditing and coordination based perspective:

- Standardised user interface:
- Improved data or information quality:
- Increased understanding and control of processes:
- Improved shared services among the departments / units:
- Better reporting and auditing:
- Provided greater ease of integration, scalability or portability of IT systems:
- Easier maintenance of IT systems:
- Conformity to new national taxation, laws and regulations:
- Others:

4. Highlight the benefits achieved from the ERP system from management and production perspective:

- Improved decision making and planning:
- Reduced cost in operations:
- Reduced cycle time:
- Improved productivity (in what ways):
- Improved product and service quality:
- Allowed organisation to do business more efficiently:
- Improved logistic management:
- Improved supply chain management:
- Improved partner's (e.g. suppliers, customers) services:
- Achieved return on investment on the system:
- Reduced in lost sales from lost orders:
- Reduction in WIP (Work in Progress):
- Others:

Appendix C Exemplar of Interview Transcription (PipeCo)

Tyco, about a year, no, about two years ago, Tyco was made up of three companies, three areas, three main areas – one being Tyco Electronics, one being Tyco Healthcare and the third being what we call engineering products. Now it's the fair to say that Tyco has grown by buying companies, it's a company that's specifically grown by acquisition. I think a couple of years ago, something like five years ago and ten years ago, we are buying companies every week. It grew that far, very very quickly.

We, in turn we call Tyco “taking your company over”, that's the internal joke we have. What they did last year, was during last year, was effectively they said well, we've got three big areas here, very different focus customer groups, very different strategies, so what they actually did was actually divided those was supposed to add to the Tyco Group and actually sold it to us and is now publicly listed companies. It's now called Convidien Limited or something like that. Now we don't have much anything with these guys. I think these guys are still called Tyco Electronics. So then we go on to what you would see on the website of Tyco, that if you were to type in Tyco, you would actually get a reference to those two companies. We probably stop it just there and we'll get back to it. Under here now, this, we have what we call fire and buildings, which in our speech, it includes ADT, which I believe that they are quite well known in Australia?

Sort of.

They are security companies. ADT designs the security systems, the buildings and so on. There is a company called Unistruct which makes the, actually the cable systems that goes inside of big buildings or actually any building that has cables, has metal structures that goes on the wall and it goes through the buildings. Well, usually they make all those products. This is what we call flow control, which is effectively our world. Flow control is actually made up of what we call water, which in Australia was, which you go back a few years was called tubemakers waters which was owned by BHP. They actually sold it off when we bought it. Actually, Tyco works many pipes. The other area of flow control is what we call valve end control, which is basically everything you use, eat and drink and water, everything flows through, every little process goes through one of our valves or one of our pipes.

Now you may not know it but this is one of the things that goes behind the scenes. To give you an idea about the customer base where we sit, flow control is made up of what I would call verticals, in terms of our customer base, where we fix mining industries, is huge for us. Oil and gas companies, ESSO that sort of company. what we call power, like the power industries. And lastly process, process being breweries for example, food industries, anything that makes a product, goes through a pipe, goes through a valve and there are a hundred different valves, so we, we manufacture all those valves. So Tyco is really basically made up of, of all that. And that's our little world. Now that another complex to add to this is that every region in the globe has effectively this model. So what I'm saying our world, our world is really specific to Australia and New Zealand. It sometimes includes Asia, but it's changed every couple of years. That's Tyco's world.

That's a rather big world.

To give you an idea of Tyco's worth in terms of all that, now that's about 18 billion dollars company (revenue), about 120,000 employees (globally) now. In Australia, we would be the, let me see, 5%, only 10% of that value (manpower). Interesting about our revenue though is, it's something like 30%, although in the flow control role, that's also includes fire and buildings. In the flow control role, our revenue is about 30% of the world, so you know that would be 30% of, say, I don't know, of the 15 to 18 billion, would in turn, would be the whole world. At least in the documents, this is an idea of where we stand.

And it's a very huge multinational corporation.

It is, it is. The thing that we don't do very well is that, because of, because of the way we grow by acquisitions, we haven't bought companies then fit them into the ERP system. We actually bought the companies and just let them grow. And we've done that like a hundred times, that we have now we've got this big structure and we have got these companies in there, these companies in there and we don't always talk very well. We've fully migrated all these companies into SAP and these are SAP, we're definitely SAP. These guys wont be. I'm not sure what these guys are. But there's a pyramid of smaller businesses within our group, we've got a group further in the division, there is some on (SAP) but couple waiting for releases and migration. Hopefully that is all. But we are in the process of the next 18 months to hopefully migrate all these guys all to SAP, certainly according in the pacific regions. The U.S. are still learning an old system which they plan to migrate in the next two years. Europe are running SAP, but at a very smaller base. We are running about 600 users and in Europe, 300 users, about the half of that. So that's in a different region. They are running like 100 users.

So I take it you guys here in this office are heading the, leading the direction, or showing the direction for the rest of the subsidiaries or?

For pacific region, yes. We've got ten employees which is actually going out across our businesses in pacific and we basically, it's time to go into a business, we put it through gap analysis, looking at what's different in the template, what's in the business and we go implement it and we have been at it for the last couple of years, but we still got a bit to go, working on it, a couple years to go. What did incur unfortunately in the Tyco, now everything I've said here will be fairly important quite well, was there's four regions, like three, four years ago, all started creating their own global template so unfortunately what's incurred is we have got four different templates. Now we all share the same private account and command master data but not the level of business processes. So at some a point when we, say four or five years' time, we are going to have to try to consolidate all those regions into one global template. It's going to be a difficult challenge. We pretty much created our own monster to an extent.

Yeah, because I mean ultimately its going to be a challenge because everyone is accustomed to their own template.

Absolutely. It's a challenge. And we love a challenge.

I believe you have read through the questions. Alright, so I'll go through all that quickly, all those that were mentioned, is it safe to say that their ownership of all these companies, it would be considered as States?

Yup.

Alright, so as to the number of employees within the Australian Tyco?

It's about 5,000.

Alright, so in terms of annual turnover, it's about 30% of the...?

What you should put it in here, Well, certainly within our flow control group, it's about, flow control would be about 200 million. That won't include, that doesn't include water which is not running on SAP. I guess for this discussion, we really are talking about SAP, so yup in this instance it's about, now it has to be probably double the amount, record 400 million.

Alright. In terms of classification of this company, do you have a specific?

Industrial manufacturing.

Alright. In terms of, alright, what sort of departments or rather business units you have in this organisation?

Pretty much...

Manufacturing?

Yup.

Finance?

Yup.

Logistics?

Yup.

HR?

Yup.

Marketing?

Yup.

Sales?

Yup.

Research and development?

Yup.

Alright. Is there anything I missed? Units... Business... That doesn't conform to the typical.

We've got the planning group.

Alright.

We also have a legal group, which we put H&S in.

Well, I'll put it as a group by itself?

Yup. And the only other one that we put in there is we have what we call operational excellence or business excellence (quality control), that can take a pick of what you want to term it. I don't know what's the new term in there.

So I take that it is a quality control unit?

Yeah. It's a sort of looking at business processes and looking at how we can better do that process and effectively maximise our unit.

In terms of competition for the unit, is there any major competition in this region that the organisation has to take note?

To be honest, nah. There are, we do have a monopoly. But there are a lot of smaller guys that do specialise in a type kind of valve or pipe and we do compete with them, but not at the scale of end to end products.

Yup. And being the, an MNC, you are able to offer much more comprehensive scope or more products, or rather come up with better products than the small, smaller ones.

Yup. That's really.

How long has this company been operating?

Since 1972, almost 40 years, 35 to 40 years.

Does the company outsource any activities, like HR or?

Nah. Not actually. We do, do subcontract and some of our manufacturing but no, I wouldn't call that outsourcing outsourcing.

Subcontracting for manufacturing the products?

Correct. Some, for some materials, which are part of the products. I won't say for products, it's actually for the materials within the products. You know instead of actually machining a certain part, we would actually just get a local vendor to do that.

Alright. In the next section, it will be questions pertaining to the enterprise systems or as in this organisation which is that. Okay, so when was SAP first implemented?

October 2006.

So what were the initial reasons for adopting?

Pretty much due to our old systems and to support the business growth. Audit control and also improve profitability. I think ultimately it's about improving profitability and money. And also if the users goes up, and initially from no cost to you (with legacy system) and then now a thousand dollars per users and whatever it is and they will be trying to say why will we do that with proper reasons and justification

Yeah, so it's going affect their profit margin and...

Absolutely.

It's going to take a bit of convincing to get them to adopt SAP

Yeah. And then now we get though the present pain, it's not fascinating to one day we turn off, one day we turn you on. There's a metaphorical process so there is a lot of something to do to convince those sort of guys to convert to SAP systems

Is there a champion responsible that is actually driving the change or is it based in U.S.?

No, effectively up until now, each region has effectively has their own control, their own directions. And we certainly got, at least our own M.D. well, which effectively guides the business in whichever direction we wanted to go. So we're fortunate enough to have a M.D. among that is trying to push SAP out to our businesses. He's championing it to an extent.

So he is embracing the idea.

Taken a while, but yes.

That's why you see SAP is rather vigorous in organising all these user group events.

Yeah.

That's why I was rather tempted to contact you guys because, I actually checked with a couple of organisations and I realised that at the end of the day, not many people actually evaluate what they have gotten from the SAP that they have implemented. Like you guys you have a good global template to help to roll out a system. For me, I'm trying to come out with a template that organisations can use to actually take and use and see what are the returns.

It's kind of unfortunate, it's the one area that we don't do well, even down to the day to day support changes that we do. We just naturally just do the change, but we don't look at the returns of investment, we don't look at what the gains are. Put value back into the business. Say we are costing you guys, millions of dollars to run this system every year. We are also returning million dollars in efficiency gains.

Yeah. Because when you saw the list, I was, am actually quite worried that you guys would be, like those potential participants for my research, would be intimidated by the list of benefits gained from the system because these are those that are cited by the vendors and some of the researchers found that these are some of the reasons you expect from the system. But we are, I'm trying to check on, or rather investigate whether are these all the returns that you guys are actually getting back. So what were the initial reasons for adopting the SAP in October 2006?

A legacy system that was in place for 17 years that was end of the expectancy life and its probably safe to say that the businesses had also grown beyond the legacy system. And the company needed more capability.

So is it safe to say that the primary reason was to actually to enable the company to grow?

Yup.

Before that, before the implementation, what sort/type of p or existing technologies did the legacy system use? Like in house?

It was just running on (IBM) A400 mainframe. And it was especially dumb terminal.

Was the software on the A400 developed in-house?

It was originally an Andersen consulting software but it was no longer supported by Andersen. So yes, it was basically customised to our business. Yup. And we had our own programmers that would develop and change the system to exactly how we want to do business. Basically it can be considered in-house customised and supported.

Alright. When adopting the later system, enterprise system, what sort of approach was adopted, in the sense was it a phase approach, parallel, running parallel or?

It was basically big bang. When we went live with 17 sites all in Australia on one day.

I can imagine the amount of support staff that is on standby for such a big...

It was a very interesting time. We did some long hours.

Were there particular reasons for just going big bang or not phased?

It was the big bang for our industrial valve business in Australia so it was confined to the business but it was something that couldn't be done using the phase approach. We couldn't convert half of our business because the business (units) interacts too much, it would be not feasible for the business processes.

Do you think that this SAP project has completed or there are potentially more upgrades to it?

We are currently running ECC5.0, probably going ECC6.0 in the next six months. On the other side of that, we almost continually implementing onto individual different businesses (business units). But we've literally rolled onto business to business. We need to make sure that our businesses on a common SAP platform.

So basically if you guys acquire a new business, then the plan is to just get them to adopt the system?

Well the other problem is that we have small businesses within our group that are still running legacy systems. So we are still converting them. So we've got lean project timeline. We've got it rolling in the very much the last 12 months and we've got it these 12 months rolling out SAP. In two weeks' time, we've got another go-live of 200 users in 21 sites in Australia. We don't mock around.

So SAP guys must love you.

Well, yeah, we only got small teams too, so we push our guys around.

Out of curiosity for being not related, but in terms of development, do you get the SAP guys to come in or you have your in house developers?

We don't have partnership agreement with them, we don't do any outside support, we do it all our own, so we have a team that's currently 15 people, and we do all support, we do all projects and we do all implementation.

Yup, its rather amazing for you guys to do everything in-house.

Yup, yup. What we've done over the years for 16 go-lives is actually handpick people from the boutique smaller guys

And for the training?

Well, for the actual one, we've got, we actually pair up with businesses with a consultant. So in finance, we've got two people, one's a consultant; one's a Tyco employee. So just to make sure that the business is all represented in the change and implementation

Sometimes consultant can over-compromise the technical or the functionality in the sense that they do not know the limitations what the system can do.

Yeah. And we've definitely experienced that in a few areas where ex-consultant has been in their own mindset or with their own experience and not listening to what the business requirements are. *Sometimes they can be overly ambitious.*

And the technical people can't really deliver.

Yea.

Alright, next will be questions pertaining to the SAP project. In terms of the October 2006 implementation, how many more implementations or migration you need to roll out?

Well, we've done another one, two, should be another third largest multi-implementation and probably the fourth, including these other smaller ones. We've got another four to go. And when I say implementations, they are all reasonably sized implementations.

So the other four implementations that's upcoming in the subsequent few months would be considered acquisitions or already in Tyco?

They are already part of our Tyco

How many modules were implemented across the 17 sites for the October 2006 implementation?

Pretty much all of them. Well actually across the 17 sites, no. Out of those 17 sites, three manufacturing and the rest are sales related. In terms of actual modules across the business, we have pretty much implemented the (business) suite, so effectively that's FI-CO. We've actually got CO-PA, SD and then the manufacturing guys suite – PC, MM, WM, what we call SM, which is really service management (but really plant maintenance) BW, and we also have PS. pretty much covered...

Pretty much covered everything.

Yup.

And what roughly was the estimated cost of the 2006 project?

I think it's around ten million.

Seems like 10 million is like the, around the minimum that SAP systems costs

Yeah, and that was because it was a greenfield implementation, we had no experience from where we're coming from, from where we are going to. Now our implementations these days are not more than one to two million.

That's exactly how you are getting value back from having a template.

Yup.

In terms of the implementation at that time, I assume you got, you outsourced the project because you didn't have the necessary expertise?

Nope. We've actually made the project ourselves and we supplement our resources with consultants that we get them as individuals, so you know, we went to over the world (to hire), SDG people you know, that sort of small guys, not the big sized fries that want to charge you million dollars for coming in and all. We just went out to the market and advertise and just put another out for a specialised consultant.

So basically you guys headhunt manpower to come and form the project team?

Yup. And we handpick those guys.

Alright, so in terms of the project, was ten million. How much did the software cost? At that time probably still version R3? In terms of the software, like purely without involving manpower?

Yup. That's a license software so its user based. We currently divide up by user types. So we have what we called three different licenses. One would be a full license, secondly would be a limited license and third is actually a short fall license. They are actually guys who do our stock movement (data entry). We actually have three different types. You want to know those three values? What are you actually...

I think I was intending to ask, because various projects like the value you gave, but in terms did this ten million consist of the manpower for this project?

Okay, a lot of that would be probably 10% of that maybe hardware purchase. Actually it wouldn't even it be that now. (13.58) We would be probably 5%. You know but I can tell you. Let me do a quick calculation.

So it would be safe to say that actually the 10% would be about 1 million that goes to the manpower, as in for paying salaries?

No, the 1 million would have gone to towards the purchase of the software.

1 million is to actually purchase and the other 9 million is attributed to ?

Into buying labour and training, yeah the whole project effectively. That might be the a bit high. Well, you know, you also can throw hardware in as well, so it's probably be at least half a million in the hardware. There's travel costs. There are all sorts of other costs. It'll be 5 million in labour. That would be my estimate.

Alright, so manpower-wise would be about a group of 15 people?

Back then, we had, we maxed out 25 (in the project team). That was the peak time.

Alright. That was about to go live?

Yeah, yeah.

And it took, how long did it take for the project to go live?

Probably two years.

So I take it this question doesn't apply for the project because there were no contractual agreements with, for all ongoing support, since everything is done in-house?

Yup. Just to be aware that when you say in-house we do supplement with outside consultants (for implementation). But we manage that in house (business process printing) now. That makes sense?

Yeah.

So there are no third party agreement contract or whatsoever in place in other words.

So all the SAP developers are actually working from (on site) this office?

Yeah, we've got one right here.

Alright, next we'll ask about who were the people who were involved in the implementation of the October 2006 project. So in terms of people, I take it that you have developers that were recruited together with the consultant?

Yup, yup.

Consultants were the outsiders that you mentioned?

Yup. And they traditionally covered all areas. Technical and functional.

And was the existing, I mean the legacy, as in the IT staff that were supporting the legacy system enrolled in for the project? Or support it?

Yup.

Was the top management finally involved in the project like steering committee?

Yeah, definitely the steering committee, a committee meeting every month.

In terms of your middle management?

Yup.

Did end users have a lot of say in the project when it's being implemented or maybe the middle management that has the...

Yeah. We also, what we did was because our site champions, so what they did for us was to actually create a group of almost super users at every site, so even if at sales office we would nominate one or two of these people, they became our site champions to say they effectively step up with their business process knowledge. Then they became part of the UST, training team, became part of the training that we actually use train the trainer. So they actually went back to their own site and train their own people to use the SAP system. That's easier and rather easier for them to convince the new users to buy in to the new system.

And given that this project heavily involves your own people, as in those staff, did the SAP send in anybody to assist?

One person at one point. There was a work folio I think.

In terms of system design, was there any major clients consulted? Was your enterprise system or SAP expected to be the interface with any partners?

No.

So I think that Tyco is publicly listed in U.S.?

In the U.S.

Were the shareholders made known that there's an ongoing SAP projects?

I don't think so. The stakeholders are pretty much restricted to those in the companies that involved in the implementation.

Usually IT projects, the budget is not revealed to the shareholders?

No.

Alright, so in terms of rules, regulations wise, is there any government representing this project? The CTO or CIO of the, is he involved at the checks and all that?

He's an obstacle.

He's an obstacle?

Do not quote me this.

So I'll say he signed off but... He just signed off?

Yup.

And the CFO?

Yeah, it's actually the same guy.

Same guy?

Unfortunately. He was not really interested in revamping the whole system. Does not really see the value in the implementation.

Yeah, they do not see the returns in implementing and they are usually accountants trained.

Yup. Correct. And that's why. That's the potential problem with most companies because whenever you try to propose a big project like a SAP system and it costs a couple of millions. First thing they will take is they will be try to work out how, what is the margin like that. Then for you with no concrete evidence to show what is it going to turn out is really hard to convince them. And we still currently have that problem (of justifying the investment)

To justify it's worthwhile to upgrade to ECC 6.0?

Yea.

Yup. Alright, next we'll take about certain factors that may help realise the, or make the outcome better to a certain sense. So was there any change management process for the SAP system implemented.

There was, yes.

And can you describe how was it carried out?

Not very well. Not done very well. It was difficult, because of the mindset of having 30-year dedicated Tyco employees they only knew one system. From 17 years, which you know was a dumb terminal and then you throw in a new system which is PC-based but also they also need to start to learn the end to end business process, not just what they're doing from a terminal. So there was a very large mindset change that I think we underestimated. We also didn't know at that point what the effect would be on people's role, yeah, what new role would be required, what would disappear. We understand it now much better, but back then when we had something to compare it to, it was quite difficult. People are rather sceptical.

And so did you guys get in any change management specialist or consultant come in? So it's all done in house?

That's all in-house.

Alright. I'm rather impressed because a very big IT organisation, from my research that everything is really take on-board and done in-house with their own staff.

Okay.

Most organisation will, are much more willing to spend and invest some money to change manage and get some consultants, as they want to minimise the resent and risk. Move the element of risk to the external guys as they can always put the blame on the outsiders.

Yeah, yeah, yup. And that's the thing to do.

Yeah.

But at the end of the day, it's the businesses that suffer. If you can use it to control it better to do a job, then it would be more effective. Having the control is extremely important.

Alright, next to be on end user training. In terms of training sessions or workshops, how was it carried out? At the end of the day or during their work?

Is this prior to go-live.?

Yup, alright, go on.

We basically got four or five champions in like what I mentioned before. We had effectively one or two people from each side that came in for intensive two-week training. We went through all the processes that were applicable to them. And we also offer support for them after they return to their businesses.

So they will go back to their own sites to actually impart the trainings, but was it conducted during office hours?

Yeah.

Was there any incentive for the users to take up training or?

In terms of monetary? Usually, nah.

So it was a, like learn or perish situation for them.

Yup, that's it.

Alright, so, okay, next one we will talk about the benefits. So how long did it take for your company to realise the first wave of benefits from the SAP system?

I would say six months.

So were these benefits realised from just personal modules or just all from the whole system or specific to certain ones?

There were definitely visibility that we could see across the business that was better (from the whole system). However, there was definitely were still noise (no benefits) from a couple of individual modules. WM was a prime example. We definitely still, we still do have a lot of noise from our warehouse management side of things. And that's because we come from a legacy system, where we customise the exact process to what we want to be. Now if the software were changed SAP comes in and we don't really want to customize the whole

of thing and you try to follow the best practices and then these processes doesn't exactly suit the company very well.

So in terms of benefits, do you think the modules, individual modules contribute to the benefits or the interaction of all the modules that contributes.

Actually that's probably interaction of all modules, or I would say individually as a module, you wouldn't be able to sell off each module and actually make a product. That would be my personal view. Yeah, there are probably better products out there on an individual basis. But collectively as a (SAP) system, you can't beat it.

That's true. Alright, in terms of system implementation, has your company created any new system business process instead of what was previously planned prior to the implementation?

Yup, naturally. To give you an example of that, probably demand management, sales, operations, planning, that sort of area would be something that we proved didn't do well or at all.

Alright. But this came about because of the implementation or the system itself? But were there any other ones that actually came about that is after the go-live and you realise "No we can do better

Oh, okay, like shock things?

Yeah. Like suddenly once the system goes live and you guys realise you can this better.

There was. But I'm trying to think to give examples for you. I can't think of anything now. There would have been. And there still is, to be honest, we still have a distance what we call optimisation, which we see as areas that we can improve the business.

So the next one was that has your organisation or company extended the business capabilities after the implementation of the 2006 system, such as embracing of the SOA?

A tough one. We changed from pretty much a dumb terminal environment, so it wasn't really a lot of overhead with a dumb terminal. Certainly in the office environment, there was definitely some of the management using the SAP client. We don't really have a client for the legacy systems. Soft, very soft ones, yeah.

But then I mean in terms, specifically in your industry context, there's not much interaction between the buyers and the customers.

No, kind of. No, we don't really interact at all. And that's one of the things that we need to do that we haven't had time. And there are things called quadrants which is a modern automated manufacturing supplier group for the mining industries. We need to join that electronically and we don't currently so there's a lot of things certainly we can also do it now. The e-business we've invited the BHP, BlueScope, OneSteel as our customer and there are certain areas we need to get into, we're going a step away from it unfortunately.

And in terms of those customers, potential customers but in terms of suppliers wise, are they using the traditional business processes?

Still are.

Because I was wondering Tyco has the potential to itself create a supply-based in terms of a market where you can actually set up request for tenders and suppliers to come in and actually submit and if they want to supply you with certain materials.

Yeah, yeah, now we do, we do have that potential. But this point we probably three to two steps from doing that. We will need to do all the migration roll outs first before thinking of optimising the systems.

Alright. We have come to the last section which will be the benefits list. Yeah, this list will be help you to actual reflect on the outcomes of the implementation. Surprisingly when I present the list of benefits to some of the managers, they start to think "Uhm, how come we haven't achieved that?". They actually rather pleasantly, I would put it, certainly surprised that, yeah, there's a lot of things that I actually come up that they actually didn't think about it. And they feel it's time for them to actually go back and take a look. Yeah. Alright, let's see, let's say human skills and resource perspective, in terms of empowerment of employees, in your staff members, do they get much more flexibility in what they can do and?

In comparison to the legacy system?

Yeah. Did they have more control over what they did?

They had more visibility and awareness of the business. I won't say more control and the reason why I say that is that because we are a U.S. based company where we are heavily governed by SOX. Sarbanes Oxley. So every step of the way, we have made sure that we segregate every user and every role that they have as

part of that (law & regulation) so we, it's difficult and then we probably want me to say that they've actually got more control and more power.

Alright, next benefit would be a common vision among the staff members, do they know what the company is trying to strive for i.e. goals.

Yes. I would say yes. This improves. Primarily, because targets and goals are much more visible now via the system use.

Alright, so the next one, communication among the employees would be better? I mean SAP comes along with an in-house email system I'm not sure whether you guys have this module? No?

Nah, we're using, currently using Lotus notes. We'll email and we actually getting it transferred to outlook.

So like in terms of communication wise, any...

Improvement? The thing that probably has improved is, I mean in a let's say creation of a purchase order. We have a DOA so delegation of authority. So basically what happens is if things officially go over value, they'll actually get automated an email generated to the approver. And that would be the manager or could be someone of a different department or someone throughout. So instead of actually that person, that purchasing officer, manager or next person will try to find out who needs to approve it. It automatically finds the person and that person who is the approver gets the email, they click on the link and they approve it basically. So the streamline in communications actually increases and improves.

In terms of communication among the different departments, does the system actually facilitate it?

I wouldn't say the communications improved. I think the speed of the transaction indeed improved. Yeah, instead of someone having to chase something, you know that this person at one end knows someone has the next stock. It's all these points of transactions you can be aware of or if it is going. So it would be like less communication because different people departments are able to access the information without communicating.

Personnel job scope reorganisation or were there any jobs created as a result of...

Yup.

There was reorganisation of job scope, but sadly were there any retrenchment?

Nah.

So it's actually...

That would have been a bit from SAP that you know you put SAP you save 10% of your workforce and not that this company would actually retrench our workforce because we bring the system in. It's not that way inclined but you would see the gains in put into back into sales or some sort of business benefits but I don't think it's all that.

Yup. That's not true.

Yeah, I'm sure you get those.

In terms of examples...

Demand management. Master data. We've created a couple of roles for regional logistics specifically for managing logistics in each region. That's about it.

Did they improve the quality of work life for example less frustration?

Nope. I want to say yes, but no.

Alright, so ultimately it actually creates some friction and causes friction.

Yeah, absolutely. Having said that, there are certainly some guys that have already embraced or love it and that we actually had some surprised guys that we thought that we're kind of dislike the idea.

They kind of like the idea of...

Yeah. There's a couple of guys that have to do planning for our plants and they will go through a report every week. And the report would be five pages long. And it would be those dot matrix reports. Now for SAP, you effectively get a traffic-like system, you know, strictly automated and you go in there and read the reports. Yeah. And they love it.

The next one would be in terms of individual performance and efficiency, it would be generally improved?

Yes, yeah. I agree. Truthfully the soft benefits that we had for our organisation is the control and compliance its because we are a US based organisation. And also that has we still have our CEO in jail. And the ENRON period, Tyco was actually one of one of those companies. So our CEO, our CFO our global U.S. guys got caught up in that. Both of them are still now in jail.

I see.

That's why we are very heavily governed by SOX and then Compliance control. And there is a need to push a proven system capable to introducing the auditing controls to all the businesses. And that's why we need to prove to the shareholders that we don't have any sort of guys anymore.

Okay, next we'll approach to see if there's any productive gains from the system from the organisational growth and opportunity perspective.

You can put yes. We are able to grow faster but in terms of you know, growing you know, on one platform across the whole business. Previously we were unable to put across our legacy system into other businesses because it's just didn't have the capability of doing that so yeah so...

Was it able to build any new business alliances with partners and suppliers?

It is (capable of), but we don't.

Did it bring about systems innovation, new ways of doing business or?

Yeah. It still has given us some frameworks for those business processes. And you know I think we're probably doing well, a few things, a lot better than what we used to.

Did it help you to actually attain cost leadership?

Yeah, some costs have been reduced for the processes.

But then having said that you guys monopolize the market so no?

Yeah. To be honest we, that's not, we, one of our, these objectives so we're not applicable to that.

Okay. In terms of product differentiation, did SAP actually help R&D to offer better range of products or the products actually didn't change?

Yeah. Would it normally? Would you see that even happening?

In certain cases like, it, in the food industry where customisation of products is rather fast and quick, yeah, able to actually through business intelligence, allows the companies to actually come up with products really fast to cater various markets. And they will mix all the combination, so from the analysis, usually it's like in the past, they have to really have proper BI systems...

Sure.

But if you have a proper enterprise system like SAP, you can just send the data straight to your design and production so they can customise it.

Yeah, okay.

Yeah.

The valve industry just doesn't change that much. And products often are made to order based on customer requirements.

Yeah. So the next one would be external linkages to other companies, like your business partners?

No. There aren't any but we planning.

Okay let me reconfirm something. In terms of valves and controls which this company is – Is there other subsidiaries below this company?

No. But when I say valve control, we have this thing called Tyco Flow Control Pacific. All that, all of that, subsidiaries fall under that.

Alright.

That's the way u see it. So we still one entity.

Oh, alright.

So, we're just one part of that entity. We're the main part but would say there is anyone underneath us, which is a part of the entity.

Alright. Next one would be extension of your current market reach. So did, after the implementation of the SAP, did it actually help you extend the reach? Get more, like other industries?

It is now. Yes, it is better. I wouldn't say back then, but it is now.

Why wouldn't you say back then?

Because we didn't fully implement a couple modules. We didn't implement project systems at that point. We didn't really have a hand over service, the service you know a valve company for most revamp, re-manufacturing or fixing and... We don't traditionally do that very well. And with something that we can market, we've now grown our business to actually concentrate on two parts about in end to end service. Every role service sales. Yup. We manufacture, we sell it, we service it. And we also now project manage the implementation of those products. So we can revise end to end service and have visibility of things. That whole value change.

I believe now all the big organisations are doing servicing market now. It's been very, yup, a long lasting revenue where you can actually can secure a long contract and...

Correct. Yeah, yeah. And to be honest now, five years ago, we, our service was next to inexistence. The only business we have which we sell it sell the valve. No service at all. You want it, you want service, just buy a new one. Now we re-condition or re-manufacture and or renew it.

The car industry is also doing the same thing trying to get all the customers back for servicing. In terms of customer service satisfaction, was there any study done after the implementation?

Customers of SAP group? Or our customers of the company?

Of the company.

Not that I know of, no. As far as I know, the customers didn't really see that much of an impact other than seeing new forms.

For the next one, probably you will touch it a bit. It was, was there any improved customer service though? In terms of response, time and?

Probably better visibility. We could actually predict that the lead time that are delivery times so the valve guys can actually see that on the system and that makes them more confidently predict when they're doing a product. So there are point of some value-added there. Less stock out. We have the a more healthy inventory.

Alright. Next one will be business learning within the organisation. Did it actually provide any form of business learning?

Do we grow in for business learning? No. But we always do and prior to previously to that, we had Oliver Wight principals come in, we had MRP principals come in, that sort of fundamentals training happen that would have been two years before that, maybe even before that, so that would normally would lead up to but there's the project.

Has the organisation actually evolve as a result of the implementation like did it actually change the way it does businesses or has the system processes been relatively similar prior to the implementation)?

As a whole, the business processes are similar. It's probably fairly hard to change, you know, core bit of the processes and we made the most of the other ERP systems that follow the same roughly core process. That's how they can do it as efficiently as its can be. So that probably hasn't changed a great deal. What it's given us is that we have the flexibility to change a business process and change the way we do businesses internally and externally.

Okay, the last, so organisation wasn't much, but flexibility for organisation change is there?

Yup.

Alright, that's the million-dollar question. Has it improved your overall profit?

I'd love to say yes. I'm sure that people here would say no. So we are it. It's difficult to say. Particularly where two and a half years or three years ago when we went live, three years now, the mining industry in Perth really exploded. So at the, at throughout one time, when we went live and we, our profits went up. Yeah, and it's a huge amount. So would you contribute that to SAP, yeah, difficult to say.

Difficult to say, yeah.

Look, love to say yes though. The times were just too incidental but those were going really well. I had, it'll be hard to say that we're actually grown to SAP.

But then gradually for the last, say past the mining boom, subsequently did you think it has contributed?

Yeah, it hasn't been detrimental. Yeah we haven't stopped business. Now we're gaining the first month that we sold some big sales, attributed to SAP. And then every month after that, every year after that, we've increased slightly.

Probably it seems like not a really obvious thing.

Indirectly.

Because I mean, a lot of consultants would come in and or rather SAP will claim its part of its system that resulted in the benefits.

Yeah. Exactly. And it's really hard to actually to say unless you pinpoint how much savings you actually get in terms of efficiency.

And no organisation is willing to go through the tedious task of measuring man hours equivalent to value

Absolutely.

Alright, the next one will be in terms of auditing and cost initial perspective, I mean the next few benefits that I'm going to highlight. Alright, so in terms of standardised user interface, I believe it actually provides the company a much more satisfied interface?

It is a standard user interface, yes, but it's, we already had one from the legacy systems.

Alright.

So, difficult to say that there was any difference.

Alright. Another side question will be, is the company using web-based interface or?

Nah.

Fully...

Fully just a SAP client

Alright. Has it improved the data information quality you guys generated?

Yup.

The visibility has increased?

Yup. Like what I mentioned the visible by the reports is much better after the implementation.

In terms of financial reporting and analysis, is it much clearer?

Yup. Absolutely.

Did it help your company to understand and control the process?

Yup. Absolutely.

Alright, is there any improved among, of shared services among the departments? Or was there a lot of bickering after the implementation like there will be a new re-scoping of responsibility between the various departments and you have to...

Yeah, that's definitely a bit of fuss in there. But on the whole, I would say the interaction was probably better, because everyone knew where the lines (business processes) were. Everyone is accountable in the approval processes.

And everyone has information?

Yup.

Would you agree that with the SAP implementation, it actually paves way for greater ease of integration, scalability or portability of your system?

Yup, absolutely. We have been porting the same system to our various businesses. In a way it has actually made things much easier.

In comparison to your previous system, the legacy system, is it easier to maintain the system?

Probably easier, but not cost effective. Our IT staff increased as you can see. Our legacy system was very there was 3 of us to maintain the systems Now you got 15 that cost about five times.

Yup. Alright. Does it help you to actually conform to new law or regulations much easier? If there's a taxation law that passed by the government.

It actually, it helps us to some extent, because we are able to submit the bank statements quickly for accounting and whereas before it was a fairly laborious job. So yes, that helps.

Is there any auditing benefits.

We are audited three times a year. Twice a year internally. And depending on the guys, it's a laborious process. Going through that process not just once. But it's a lot easier with SAP. Ten times easier, cause SAP even provides all the audits trails for all the things you do, it's provides the methodology of change and control. Yeah, there's a lot of soft benefits about SAP, the segregation of duties. Now I can go on and on. Again, if you look at our history and time issues, with SAP, we won't be able to do that without SAP.

Alright, next will be the benefits achieved from SAP from the management perspective and production perspective. So did, I'm not too sure whether did it actually improve decision making and planning?

Yes. It would have. Planning decisions for the procurement of our raw mats is much easier now.

But in terms of, did it enable your top management to actually make the decisions based on reports generated?

Yup.

Alright. Is there any evidence that shows reduced cost in the operations?

No.

Alright. In terms of cycle time?

Yup. Lead times are calculated more accurately now.

So improved productivity?

Yes, I'd say yes. For example, our external sales guys can just interact with the quotes relatively quickly and effectively and then be focused back here in the business and back here with customer.

Is it help about to bring about better product quality?

Like the product quality, as in?

Like improved and better products produced from the plants?

Didn't make any difference.

Okay. But service wise, it's increased?

In terms of actual process, yeah. In terms of service to our customer?

Yeah.

Yeah, but it's difficult.

Overall, do you agree that it actually allows your company to do business more efficiently?

Yup. Less time on certain business processes. Getting back to customers is really faster now with SAP.

Did the SAP system bring about better logistic management, like warehousing?

There was logistic control, yes, and visibility of stock levels and SKUs.

Alright, in terms of warehousing space to store your raw supplies, was there any obvious evidence or?

No. would be it different from our legacy systems. Not really...

Because one of the things that actually consultants usually sell to customers is that it helps companies to actually predict or forecast how much supplies you can need as part of the...

We do that. We actually, you are probably right. We do actually give our, some of our chief vendors and certainly our overseas vendors and as according to our schedule. So when we forecast then demand to be and then they can make that and supply to that demand. So yeah, you spoke of a possibility there.

Alright, the next one will be improved partner's service, do you have any?

No.

Alright. In terms, from the management perspective, did they actually think they had an ROI?

No.

Alright. In terms of lost orders or lost sales, in the past, did you encounter any lost order or sale?

We've some difficulties in the first month with lost orders. And then it went on fine after fixing all the bugs.

Alright. Reduction in work in progress like...

No.

I have finished most of the interview. But I have few questions that are not part of the interview questions.

Yup. No worries.

Alright. Okay, in terms of evaluating the outcomes of the ROI of the enterprise system that you have implemented, how rank up is its rank in terms of priority with the management?

It doesn't and that's part of our problem that we put this, put SAP to the businesses and we don't get back and then we'll then look at what benefits were.

Alright. But would it takes, I mean, in terms of evaluation, what would it take to content the management that the system is actually value for money?

Money.

Money? So at the end of the day, it's the financial results that should be the benefit shown?

Yeah.

So do you agree that soft benefits is not really part of...

Soft benefits, I think we'll probably will get all agreed on. And we can definitely see them because and I think the management, they all would definitely know what they are and feel they are and value it. But in terms of our steering committee saying they return, they want to see financial returns. And that's where it's difficult to put on a value, they would definitely also see that there's a return of soft benefits. So there's definitely some support there. And that's shown by widely by SAP across the whole business. If they saw that there wasn't any benefits, they wouldn't even be allowing it to spend millions to put it through SAP throughout all the businesses and let the legacy systems go on and because they're allowing us now, pushing us to do that, to me, it tells us that they support and see some gains in what we're doing.

But do you agree that upgrading is a must for you to constantly achieve in benefits?

From my perspective and from an IT perspective, yes, though it's difficult to quantify. And it's very difficult to get the support from top management to do that.

So currently, from your previous two of these implementations, which was, did it go straight to ECC5.0?

Yeah, yeah. We went live from ECC5.0.

And there was no upgrade done prior until you have...

No. We went straight from legacy system to ECC5.0.

And now they're selling you guys or rather...

But then SAP is pushing us to ECC6.0, so then we're talking about doing a technical upgrade, not sure about the functional side, but then...

But did you see is there any particular reason for this upgrade, despite the push on it?

From my perspective, yes. Because at some point, we're going to need to do ebusiness and we want to go into a portal for it. I want to go into that arena and prepare for the time where our customers will come to us and say we want to interact with you, easier and quickly. And for ECC5.0, there can be limitations. So for us to

be able to react quicker to management desires when they occur, we've got to be on the right platform. We got to be better be position better than what we are now.

Currently the, I mean, besides ECC6.0, like the new concepts such as SOA,

Yeah.

How long do you think your company?

I don't even see SOA on our plan now. If it's not on our plan, it's going to be five years away, so you know I can't say anything right now. It doesn't matter, it doesn't add value to what we need.

So currently, you just need a system that actually suffices as a core that builds the foundation.

Yup. That makes sense?

Yeah, that makes sense.

Okay.

And okay, if you were tasked to come up with an evaluation or assessment group or template for your SAP implementation, what would you think would be the value that you would wish to record or categories that you would want to evaluate?

This is after the effect, after the?

Yeah, after the effect.

I come from a business side, so I would like to know what the effect on people's roles are. I would like to know what the business process effects are. What the return on business is. In terms of what gains *Everyone wants to get the financial side*

Considering that the upgrades are quite frequent, like every three to five years, companies do spend a lot money on the upgrades.

Yup.

One of the challenges of companies is to justify the need to change or upgrade when the existing version is still working.

Have we got? What is this to gain, what we gain from doing that. What else. And the financial side of the it actually. Much like that.

Absolutely. That's because my superior is pushing me for those sort of role, I am a bit driven by financial, but you know, definitely a push from the business. Strategically we're, our costs are rather significant, a pretty sizable cost compared to what they came from.

Agreed and to be honest, if I have to go to the board now and say we have to upgrade from ECC5.0 to 6.0 and it's going to cost you 2 million dollars, they would not let me do that. So I've got to come up with a better way to convince them. Otherwise, they won't want to have it. So they would rather wait til the same platform for until the next one. It is difficult to tell them that that going to cost you to do as much in the long term.

But one of the challenges that we've got.

Absolutely. Yeah. And we're not a cutting-edge company that requires the latest, greatest, so it's a bit easier for us to just to wait and make sure that we are on the guinea pigs. So there are some advantages to that. We got through a point where we've gone from implementation to implementation and it is very difficult to say like for the next three months or a year we're not going to do any more implementation, we are just going to do upgrade or do patches with the entire system. So how you convince the board that we're going to remain fairly productive instead of what they say of unproductive for one period of time. How do you justify that? So there's definitely some difficulties there. That's the best we can come from the business perspective. what's the value that's sitting there doing the patch or upgrade and what's the gain for customers or gain for the business so familiar with the process?

Sure. Absolutely.

Oh yeah. I sit in those conferences and they sell you all the benefits, and you go Great. But when you go back to your own company and sell it to them. Very difficult.

Absolutely. And if you tell them it's a million dollars and they'll walk away. Just don't tell them that. But a good one. We like to tell them that.

Its rather easy to be convinced when you go for like a SAP user group talk and they sell you the benefits?

Yeah it's that way and you want to come back and you yourself doing, try to sell the benefits to your management...

It's so much difficult...

Yeah, especially something like they want to know the price tag.

Yup. Alright. This will conclude my interview.

Appendix D Commercial Document (Anonymised)

BENEFITS ANALYSIS - FRONT OFFICE SYSTEMS REVIEW												
Arena	Ref.	Description of benefit	Valuation notes	NSW	VIC	SANT	QLD	TAS	WA	National	Total	Comments
Sales	S1	Automation of input process of contracts, cancellations, variations	# people at \$60K/year each	60,000	60,000	30,000	30,000	30,000			210,000	
	S2	Automation of gains & losses reporting processes	2 people nationally at \$60K/year each	60,000	60,000						120,000	
	S3	Date activated, campaign driven, market intelligence system feeding sales team.	#steps x 1 contract x 12 months x average annual margin per contract	93,600	112,320	31,200	31,200	14,976	18,720		302,016	Margin is on average rate basis, not year one.
	S4	Management of updates, contract renewals, complaints, queries, leads, cancellations, customer surveys & contacts via CRM process. Reduce losses/downrates. React to top customers reduced spend report.	#contracts/month X average contract value	9,360	14,976	12,480	6,240	4,992	6,240		54,288	
	S5	Reduction in time spent preparing specific customer reports or invoices, including national customers	# people x % of time x 60K each	9,000	12,000	6,000	6,000	3,000	3,000		39,000	0
Technical	T1	Reduced maintenance costs in software.	RMS current is \$350K/yr New will be approx \$170K/yr. Allocated by # users	60,703	42,109	20,234	20,781	18,047	12,578		547	175,000
	T2	Reduced duplication of software licence costs in future.	1 person x \$3K each for RMS licence.	3,000	3,000	3,000	3,000	3,000	3,000		18,000	
	T3	Reduction in complexity and cost of business continuity plans and test runs twice a year	Expected reduction in fees payable	8,672	6,016	2,891	2,969	2,578	1,797		78	25,000
											0	
											0	
Admin	A1	Reduction in effort to do weekly reporting, rebates, dealers mcs, tipping mcs bar divisions, KPI reports, benchmark reports	Estimated # personnel x est cost/person	225,000	70,000	50,000	50,000	50,000	0	0	445,000	

Appendix E Exemplar for Coding of Themes (EnviCo)

<p>The CFO and the CIO.</p> <p><i>Were both involved.</i></p> <p>Change management comes in two types. I don't know which one you're talking about here.</p> <p>One is project change, the other one is business change management.</p> <p><i>Business change management.</i></p> <p>Alright, I was going to say, in the project change management, whatever theories you might know that has been to work, I never knew any of those theories that didn't work that way. If I wanted to change something, I'd pretty much had a lot of power to change things that are within the project. Within the business, we did a business impact analysis which is a series of documents, what impact did this system go to, how are our business in these types of uses, so it's sort of uses-centric. [The for a call centre operator, how is their life going to change? If you work in the logistics department, how is their life going to change? If you were in the resource recovery, how is their life going to change? If you were a sales person, how is their life going to change? If you were a contract administration, how is their life going to change?] So we did all the analysis which is generic at first and then as we got to each stage, we would visit that stage. And we would sit down with the key users which would be one at least from each of those groups, we'll work out locally what was going to change. And then it really became the job of the local management team to drive it for now. Cause that's how our business actually runs. The state management team runs their business. I can't go into their business and tell them what to do. I can go in there and tell them what they should do, I can tell their boss if they're doing stuff that I think is silly, but I'll always tell them first. And you know what, I've been around this business 15 years, it's not like I don't know that people are talking to. You know, if I was concerned about something, I'd go and knock on the state managers' door and say Dean I'm looking at this, this is my concern. And this is what someone your business is saying that they won't do about it, I'm not convinced that it works but it might, but you got to decide whether you want to go review that. And I, you know, we're pretty sleeves rolled up hands-on group of people We're in waste and recycling and there isn't any airs and graces in this.</p> <p><i>This is a rather straightforward, flexible approach, but...</i></p>	<p>Leon 15/6/2014 2:47 PM Comment [32]: Change management - ERP projects and business operations</p> <p>Leon Teo 15/6/2014 2:47 PM Comment [33]: Change management - Business impact analysis</p> <p>Leon Teo 15/6/2014 2:44 PM Comment [34]: Business operation changes</p> <p>Leon 15/6/2014 2:49 PM Comment [35]: Change management - end users impact</p> <p>Leon Teo 15/6/2014 2:47 PM Comment [36]: Empowerment - local business units</p> <p>Leon Teo 15/6/2014 2:48 PM Comment [37]: Change management - Communications</p> <p>Leon 15/6/2014 2:49 PM Comment [38]: Change management - managerial support</p> <p>Leon 13/4/2014 10:13 PM Comment [39]: Receptive to business improvements</p>
--	--