An Enterprise Resource Planning System Implementation Process as a Co-emergence of Organisational Learning and Communities of Practice

Mehmood Ahmad Chadhar

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

Information Systems Technology and Management
Australian School of Business
UNSW Australia

2014

Originality Statement

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at UNSW or any other educational institution made to the research by others, with whom I have worked at UNSW or elsewhere, is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression if acknowledged.

Signed: ……..

Date: ……..

Copyright Statement

Authenticity Statement

I certify that the Library deposit digital copy is a direct equivalent of the final officially approved version of my thesis. No emendation of content has occurred and if there are any minor variations in formatting, they are the result of the conversion to digital format.

Signed: …….

Date: …….

Affectionately Dedicated to

My Father -Muhammad Hanif Chadhar
&
My Mother – Khurshid Bibi

Acknowledgment

In the name of Allah, Most Gracious, Most Merciful

All praise and glory to Almighty Allah (Subhanahu Wa Taalaa) who gave me courage and patience to carry out this work. Peace and blessing of Allah be upon last Prophet Muhammad (Peace Be upon Him).

First and foremost I want to thank my supervisors Professor Dubravka Cecez-Kecmanovic and Dr Zixiu Guo for all you have taught me in this long journey. The knowledge and wisdom you have imparted upon me has been a great help and support throughout my career. I believe my success is at least in part due to your sincere support and supervision. I want to express my deepest gratitude for believing in me. You have been an excellent friend, teacher, supervisor and a great inspiration for me. You have inspired me to pursue my goals with hard work and dedication. You have shown me the value of honesty, sincerity and trust in business. I truly appreciate and value everything I have learned from you. It will forever remain a major contributor behind my success and achievements. I really look forward to the day I can do the same for someone else.

A special thanks to Associate Professor Chung-Li Tseng and Professor Patrick Finnegan for helping to streamline the PhD process and indeed this helped to achieve this millstone in my life. I would like to thank Professor John Yearwood and Professor Andrew Chan from Federation University Australia with their help and support this process. I would also like to thank Elite Editing for their help as a main editor for my thesis. I would like to also like to thank everyone at the Bravo Australia for their help and encouragement as it enriched my learning journey and motivated me going through thick and thin. A big thanks to Dr Joze Kuzic for supporting me when I was going through difficult times of my life.

I would also like to take this opportunity to formally acknowledge all my fellow colleagues at the school at UNSW and Federation University Australia. Your encouragement and help has made this journey enjoyable.

Finally to my family especially my father Haji Muhammad Hanif Chadhar and mother Hajin Khurshid Bibi for praying for me day and night for this success. I believe your prayers and blessings, helped me to get to where I am now. You have been special to me and it gives me honour to dedicate my thesis to you. I wholeheartedly I would like to thanks my all brothers and sisters Gulzar Ahmad, Maqsood Ahmad Chadhar, Dildar Ahmad, Abrar Ahmad, Asrar Ahmad, Naseem Akhtar and Nahid Akhtar for your support and encouragement. I also like to thank my wife Asma Mehmood for her patience and sacrifice during this process.

Abstract

In the information systems (IS) discipline, there has been a continued interest in comprehending and explaining how the implementation of enterprise resource planning (ERP) systems instigate organisational change processes and bring about desirable outcomes. Extensive literature on ERP implementation identifies numerous factors that affect organisational changes, including staff training, top management support and involvement, active user participation, external knowledge acquisition, knowledge co-creation and sharing, staff learning and many more. Despite the maturing of ERP technologies and a wealth of knowledge available on ERP implementation, organisations continue to experience considerable difficulties and rarely achieve desired outcomes. The key challenge for an organisation implementing an ERP system, emphasised in the literature, is to understand and enact new business processes inscribed in ERP and thus undergo a profound organisational change.

The thesis addresses this challenge by approaching ERP implementation as an organisational learning process. When an organisation is planning and configuring ERP and then implementing it in its specific business processes, all its actors have to learn, individually and collectively, and engage in instigating change in practice. To conceptualise ERP implementation as an organisational learning process, the thesis builds from two theories of learning: community of practice (CoP) theory that draws attention to situated learning in practice and a theory of single- and double-loop learning by individuals, groups and an organisation as a whole. Within such a theoretical foundation, the thesis examines the following research questions: How does organisational learning emerge and assist the actors in an ERP implementation? How do CoPs facilitate organisational learning during an ERP implementation?

To answer these questions, a qualitative case study was conducted in an information technology (IT) services company in Australia during its SAP implementation (over 14 months in 2009–2010). The analysis of empirical data (interviews, observations and

company documents) reveals that the company first failed to implement SAP (Phase 1), then succeeded in SAP-enabled transformation at the operational level (Phase 2) and eventually achieved the desired organisation-wide transformation (Phase 3). Importantly, these three phases of SAP implementation were characterised by not learning, single-loop learning and double-loop learning respectively. In-depth analysis also revealed that the spontaneous formation of communities of practice around SAP interpretation and application in practice in different departments stimulated 'learning by doing', leading to single-loop learning. Further institutionalisation of communities of practice and the formation of a 'community of communities of practice' across the company resulted in double-loop learning and a successful transformation of processes company-wide. Lessons from this case study suggest that the emergence, maturing and institutionalisation of communities of practice were the key mechanisms by which SAP implementation transformed from not learning to single-loop and double-loop learning, leading to gradual SAP-enabled transformations.

Grounded in the empirical findings, the thesis proposes a processual model of ERP implementation as practice-based organisational learning as a major theoretical contribution. It posits a relation between a gradual ERP-enabled organisational transformation and ongoing practice-based learning by doing in emerging communities of practice mutually intertwined with single- and double-loop organisational learning. The proposed model addresses the key challenge of ERP implementation by contributing to a practice-based and more refined understanding of its complex and emergent nature. Further, it opens up new avenues for exploration of practice-based learning and ERP-enabled organisational change processes. The model is also expected to help practitioners to plan, monitor and manage ERP implementation and organisational change better.

Contents

List of Figures

List of Tables

List of Abbreviations

AP	Accounts Payable
BTF	Business Transformation Forum
CIL	Continuous Improvement Log
CIO	Chief Information Officer
CM	Change Management
CoP	Community of Practice
CRM	Customer Relationship Management
CSF	Critical Success Factor
ES	Enterprise Systems
ERP	Enterprise Resource Planning
ESS	Employee Self-Service
HD	High-Definition
HR	Human Resources
IS	Information Systems
IT	Information Technology
KPI	Key Performance Indicator
LPP	Legitimate Peripheral Participation
MSS	Manager Self-Service
NHS	National Health Service
PLM	Product Lifecycle Management
PO	Purchase Order
PSG	Product and Services Group
SCM	Supply Chain Management
SRM	Supplier Relationship Management
UHREC	University Human Research Ethics Committee

Chapter 1: Introduction

1.1 Introduction to the Chapter

The objective of the first chapter of the thesis is to introduce the nature of interpretive-based research that focuses on enterprise resource planning (ERP) implementation and use, and its relationship with organisational learning and communities of practice (CoPs). This chapter commences with a concise outline on the nature of this study and the existing literature in related fields. This background escalates to the motivation for the study and research objectives, which guide this research. This is followed by a justification of the theoretical and practical contributions of this research. The chapter concludes by describing the structure and organisation of the thesis.

1.2 Research Background

Advances in technology and information systems (IS), especially for enterprise systems (ES), have enabled restructuring and redefining of the techniques companies operate to achieve business goals. ES have facilitated access to information across organisations with the help of standard and integrated business processes. This ability to share and communicate information and knowledge means that a small change in any part of the organisation can resonate in all areas of an organisation simultaneously (Motiwalla & Thompson 2011). Consequently, today's organisations, regardless of their size and location, are expected to adapt and to learn (Ke & Wei 2006; Boudreau & Robey 2005; Robey, Ross & Boudreau 2002; Robey, Boudreau & Rose 2000). This encourages some organisations to seek and nurture competitive advantages through adoption and innovative use of ES, organisational learning and adaptability (Teo, Singh & Cooper 2010; Shang & Seddon 2007, 2002; Marabelli & Newell 2013).

ES include ERP systems, customer relationship management (CRM), supplier relationship management (SRM), product lifecycle management (PLM) and e-procurement software. This study focuses on ERP systems, the most important class of ES. ERP systems is an industry term used to cover a variety of activities using software

that assists businesses in managing various functions such as product planning, purchasing, inventories management, supplier relationship, customer service and order tracking (Klaus, Rosemann & Gable 2000; Lee, Siau & Hong 2003; Motiwalla & Thompson 2011; Marabelli & Newell 2013).

ERP implementation is regarded as one of the persistent organisational changes of the past decade (Davenport 2000; Morris & Venkatesh 2010). ERP systems have been embraced by a majority of large and medium-size organisations throughout the world (Liang et al. 2010; Grabski, Leech & Schmidt 2011). ERP system implementation is different from other purpose-built information systems (IS) implementation (Ho, Wu & Tai 2004; Lee and Lee 2000). Packaged software ERP systems do not match organisational business systems and structures and thus need to be customised. ERP systems are based on generic models of business processes and are claimed to incorporate best practices for any given industry (Robey et al. 2002, Ross & Vitale 2000). When ERP systems are implemented, it is the organisation that has to adapt to the model embedded in the system. This typically requires a considerable change and presents problems for organisations. ERP systems have promised to provide businesses with opportunities to attain benefits by such factors as cost reduction, cycle time reduction, production improvement, production quality improvement and customer service improvement (Connolly 1999; Deloitte Consulting 1998; Holsapple & Sena 2005; Utecht, Hayes & Okonkwo 2004; Kennerley & Neely 2001; Shang & Seddon 2002; Themistocleous et al. 2001; Xu et al. 2002; Shang & Seddon 2007; Teo, Singh & Cooper 2010).

However, many ERP systems projects have failed and could not deliver the claimed benefits (Hustad & Olsen 2011; Chang & Chou 2011). Ineffective implementation of ERP systems is frequently reported in both academic and practitioner literature (Barker & Frolick 2003; Xue et al. 2005; Ke & Wei 2006; Chen, Law & Yang 2009; Chang & Chou 2011). For the adopting organisation to achieve the anticipated benefits from ERP systems implementation, it is recommended that the ERP systems-embedded business processes be adopted by abandoning the organisation's existing business processes, which carries a risk (Motiwalla & Thompson 2011). Markus and Tanis (2000) cautioned that ERP systems implementation may help in certain performance improvements; however, considering the budget, human efforts and the amount of changes—both technical and business oriented—that it introduces, a failure to comprehend different

aspects of implementation can have severe implications such as over budgeting, longer implementation duration and failure to achieve the anticipated benefits. For instance, Zhang and his colleagues (2005) reported that a Standish Group survey on ERP systems implementation revealed that implementation cost 178% more than estimated, and took 2.5 more times than anticipated. Moreover, in reality, ERP systems implementations could not return the desired benefits. A survey by the Deloitte Consulting Company, which consisted of 164 interviews from 500 companies, revealed that the companies' anticipated benefits did not match with the actual benefits. It was found that 48 per cent expected inventory reduction, but only 40 per cent achieved it; 42 per cent anticipated headcount reduction, but 32 per cent attained it; 24 per cent predicted improved productivity, but 31 per cent achieved it (Deloitte Consulting 1998). More recently, a survey conducted by Panorama Consulting Solutions revealed that over 50 per cent of ERP projects were over budgeted, over 60 per cent took longer than the estimated time, and 60 per cent of respondents received under half of the expected benefits from their ERP systems implementation (Panorama 2013). These results are based on data from 172 respondents who completed a survey on the Panorama website. Seventy-one per cent reported revenues of $300 million or less and 21 per cent of respondent companies had revenues of US$1 billion or higher. Along with these trade report findings, academic studies have claimed that the percentage of ERP systems failure is over 60 per cent (Devadoss & Pan 2007; Langenwalter 1999). This statistical evidence highlights that ERP systems do not always match with organisation expectations of effective management of enterprise resources and that, contrarily, their implementation can lead to financial disaster. Thus, there is little doubt that ERP systems implementation represents an important context valuable of study in IS research (Liang et al. 2007; Grabski, Leech & Schmidt 2011; Morris & Venkatesh 2010).

1.3 Motivation for the Study

Although underutilised systems continue to be a problem, there has been remarkable progress in illuminating different mechanisms to comprehend the complexities and dynamic of ERP systems implementation and use. Organisational learning is considered one such mechanism that can help in advancing the understanding of ERP systems implementation and use, and thus lead to achieving the anticipated benefits.

Organisational learning is imperative, considering the significance of the interaction of people during ERP systems implementation, because it reduces the complexity and uncertainty of the process (Tomblin 2010).

This study was motivated by the need to develop a better understanding of the relationship between organisational learning and ERP systems implementation in a real-life organisational context. Much of the organisational learning literature draws from the experiences of companies with traditional IS; however, the relationship between organisational learning and ERP systems is more critical considering the unique characteristics of ERP systems and the amount of change they introduce to the adopting organisation (Robey, Ross & Boudreau 2002; Shehab et al. 2004). Shang and Seddon (2007) argued that organisational learning is necessary for successful ERP systems implementation and achievement of the desired benefits. In addition, Tomblin (2010) observed that organisation inability to learn can lead to ERP systems implementation failure. Although many researchers have recommended that in-depth qualitative studies be conducted to understand the organisational learning phenomenon during ERP systems implementation (Poston & Grabski 2001; Chang & Chou 2011), few studies have investigated how organisational learning emerges and enables ERP systems implementation. Chang and Chou (2011) noted the lack of literature on how organisations engage in learning and how learning is transformed during ERP systems appropriation. Recent reviews (Grabski, Leech & Schmidt 2011; Moon 2007; Esteves & Pastor 2001; Esteves & Bohorquez 2007; Botta-Genoulaz, Millet & Grabot 2005; Jacobs & Bendoly 2003) indicate that a majority of ERP systems research focuses on ERP systems success factors and economic effects but seldom on the learning involved in implementation processes. In addition, researchers have suggested that studies should focus on what is needed for an organisation to move from poor implementation to more successful implementation. However, in the researcher's knowledge, no existing studies have investigated such a phenomenon in detail. Accordingly, the lack of empirical findings inspired and initiated this research.

Another major motivation for this study is that the development of deep understanding of the relationship between ERP systems implementation and organisational learning requires consideration of social learning aspects such as CoP. CoP plays an important role in learning; adopters of information technology (IT) prefer to learn from their colleagues

than through formal methods of learning because they trust their colleagues' knowledge of organisational practices (Robey, Boudreau & Rose 2000). Lave and Wenger (1991) referred to this type of learning as 'situated learning' because it is situated in practices in contrast to formal learning methods (i.e. training). During the past decade, social learning has attracted much attention from researchers because it has emerged as an alternative to formal learning for increasing organisational learning, which is often reported to be resisted despite its many benefits (Robey, Boudreau & Rose 2000). This does not mean that formal training should be ignored, but it suggests that other learning mechanisms such as situated learning need to be explored because they can provide benefits to organisations that are unattainable through other means, especially in the case of ERP systems, where ineffectiveness of formal training is often reported as one of the main reasons for organisations' failure to achieve the anticipated benefits (Nicolaou 2004a; Tsai & Hung 2008; Kerr et al. 2012; Venugopal & Rao 2011; Al-Mashari & Al-Mudimigh 2003; Xue et al. 2005; Wheatly 2000; Grossman & Walsh 2004; Hsu, Sylvestre & Sayed 2006). Formal training is mainly considered ineffective because it fails to overcome knowledge barriers that often inhibit learning in ERP systems implementation (Robey, Ross & Boudreau 2002), and some researchers have suggested that CoPs can be an alternative mechanism for overcoming such barriers and fostering learning (Brown & Duguid 1991, 2002; Lave & Wenger 1991).

Although some researchers have pointed out the urgent need for in-depth qualitative analysis into the co-emergence of organisational learning and CoPs during ERP systems implementation (Broendsted & Elkjaer 2001; Robey, Ross & Boudreau 2002), few studies have addressed how organisational learning and CoPs constitute each other. To address this gap, Wang and Ramiller (2009) suggested that community learning is important for organisational learning in ERP systems implementation; however their study did failed to fill the gap. One of the main limitations of their study was their use of trade journals as the primary data source; the journalists and publishers behind the trade journals represent only one of the many types of actor involved in the community and thus they do not reflect a diversity of views. Therefore, this is still an under-researched area (Grabski, Leech & Schmidt 2011), which provides the rationale for studying how CoP and organisational learning mutually constitute each other in ERP systems implementation in a real-life organisational context.

Researching the relationship between ERP systems implementation and organisational learning as well as CoPs is significant for various reasons. First, given the existing state of knowledge, the development of a theoretical explanation of this relationship grounded in empirical substance would make a considerable contribution to the IS discipline in general and ERP systems literature in particular. Second, a deeper understanding of the ways in which CoP may affect organisational learning will assist companies in their planning and adoption of ERP systems. Third, a plausible and theoretical explanation of how ERP systems affects organisational learning will provide practitioners and researchers with further insight drawn from empirical evidence of ERP systems implementation, especially in cases of IS failures in general and ERP systems in particular.

1.4 Research Objectives

The foremost aim of this research is to advance comprehension of the nature and dynamics of ERP systems implementation and organisational change by investigating the emergence of organisational learning mechanisms and the ways in which they enable complex organisational changes. A further objective is to gain deep understanding of the constituting role of CoPs in this learning process. To accomplish these aims, this study carried out an extensive literature review in both the IS discipline and organisation studies. The exploration of the literature led to the selection of some foundational learning theories that facilitate profound investigation of organisation, ERP systems and learning phenomena. In particular, Argyris and Schön's (1978, 1996) work on organisational learning and Lave and Wenger's (1991) concept of CoPs provided a sophisticated and rich foundation for the study.

The thesis examines the following research questions:

1. How does organisational learning emerge and assist the actors in an ERP implementation?
2. How do CoPs facilitate organisational learning during an ERP implementation?

These research questions are investigated through a longitudinal interpretive case study of ERP systems (SAP) implementation in a large IT consultant company (Bravo

Australia). By developing and implementing SAP, Bravo Australia aimed to change its business processes and introduce new business strategies. My ability to observe firsthand the disruption of regular practices due to SAP implementation and to engage as a researcher with the SAP implementation that eventually led to organisational learning provided a rare opportunity to study the effects of ERP on organisational learning as well the role of CoPs in a real-life context.

1.5 Thesis Organisation

The thesis is composed of six chapters. Chapter 1 presents a synopsis of the research topic and the motivation for this study. The need to investigate ERP systems implementation and organisational learning is justified. The research objectives and detailed research questions are provided.

Chapter 2 reviews the main areas of literature that are relevant to the research questions—ERP system implementation, and organisational learning and CoPs—through a discussion of ERP systems from historical and rational perspectives. Then, two general streams of research—the deterministic approach and the emergent process approach—used to study ERP systems implementation, use and associated implications are discussed. The chapter then discusses the importance of examining organisational learning in this perspective. The literature review continues with an examination of the learning theories of Argyris and Schön (1978) and Lave and Wenger (1991). The chapter concludes with the research question for this thesis.

Chapter 3 introduces, justifies and details the research methodology used in the empirical components of the study. This chapter begins by reiterating the research questions and then discusses the philosophy and approach adopted to conduct the case study. Next under discussion is the case study method used, including the appropriateness and criticism of the method, sources of the empirical materials (interviews, documents, archival records and direct observations), the approach adopted to obtain this material, interview details and the approach used to prepare the empirical material for analysis. This chapter also

covers the approach used to code, analyse and interpret the empirical material, as well as the limitations and ethics consideration that arose through the research.

Chapter 4 presents the findings from the case study conducted over a two-year longitudinal period (2008–2010), which sheds light on pre-implementation activities and includes the first-level analysis of empirical data from Bravo Australia where SAP was implemented. This chapter tells the story of SAP implementation and use from the perspective of the research participants. The first-level analysis was conducted by examining how the actors viewed the ERP systems implementation and the resulting changes in their work processes. Because of the longitudinal nature of the study and multiple data sources, it was possible to investigate the entire process.

Chapter 5 provides an interpretation of the findings using the lens of Argyris and Schön's (1978) theory of organisational learning (modified by Snell & Chak 1998) infused with analysis of CoPs (Lave & Wenger 1991; Wenger 2000; Wenger, McDermott & Snyder 2002). It provides the major argument that the emergence and institutionalisation of CoPs are the key mechanisms that have enabled and instigated SAP implementation as single- and double-loop learning processes. Grounded in the empirical findings, a new model of an emerging process of ERP systems implementation is developed for future examination. This model posits a relation between gradual SAP-enabled organisation performance and ongoing practice-based 'learning by doing' in an emerging CoP mutually intertwined with single- and double-loop organisational learning, for future examination.

Chapter 6 draws together the findings from this research and presents concluding remarks. This chapter discusses the theoretical and practical contributions derived from a narrative way of conceptualising the relationship between ERP systems implementation, organisational learning and CoPs. The chapter concludes by highlighting the research limitations and suggesting potential future research topics of interest to the field of IS in general and ERP systems and organisational learning in particular.

1.6 Conclusion

This chapter has laid the foundation for the thesis. It started by describing the background behind the research interest in organisational learning and CoPs for IS. The ERP system as the exemplar of IS for this research was introduced. Next, the chapter justified why the research into the organisational learning and CoPs in ERP systems is necessary and meaningful by demonstrating two major motivations. From the background description and research motivations, the research objectives and two research questions were derived. Finally, a summary of each chapter in this thesis was provided. The next chapter reviews the existing literature related to the research area and identifies the research problems.

Chapter 2: Literature Review

2.1 Introduction

This chapter examines the relevant literature to reiterate the rationale behind and importance of this study. This is done by first discussing the ERP implementation literature, which is categorised under two broad approaches known as the deterministic approach and the emergence process approach (Orlikowski 2010); these two streams of study are explored and compared. This leads to an in-depth analysis of Argyris and Schön's (1976, 1996) theory of organisational learning, which is extensively recognised in the literature. The discussion of Argyris and Schön's work leads to a discussion on the need to investigate and comprehend the role of ERP systems and its influence on the complex socio-organisational phenomenon of organisational learning, and the potential function of CoPs (Lave & Wenger 1991) as a means for generating a deeper understanding of the effect of ERP systems on organisations and the ways in which they learn.

2.2 Enterprise Resource Planning Systems Implementation

In this section, some background information on ERP systems is presented, focusing on the characteristics of ERP systems. The discussion then sheds some light on the ERP systems life cycle in general and the post-implementation stage in particular. It will also cover the benefits and issues related to ERP systems adoption and use, concentrating on the research approaches in ERP systems implementation, namely, the deterministic and emerging process approaches. Finally, some key issues documented in the ERP systems literature are highlighted.

2.2.1 Enterprise Resource Planning Systems

2.2.1.1 What are Enterprise Resource Planning Systems?

ERP systems have received considerable attention from IS researchers over the past two decades, and they have also emerged as a notable phenomenon among practitioners

(Ciborra 2000; Ram, Corkindale & Wu 2013b) for many reasons, including their associated implementation costs, risks, technical issues, managerial problems, adoptions, use, effects and integrations (Markus & Tanis 2000; Sangster, Leech & Grabski 2009; Grabski, Leech & Schmidt 2011). The history of ERP systems can be traced back to the 1960s. Manufacturing software developed during the 1960s and 1970s, advancing from inventory management systems to material requirements planning (MRP) software (Monk & Wagner 2006). Since 1975, MRP has been upgraded and extended to become the standard (MRP II) (Chung & Snyder 2000). MRP II systems have advanced to incorporate financial accounting systems and financial management systems along with manufacturing and material management systems (Umble, Haft & Umble 2003). However, problems associated with MRP II encountered in managing production facilities' orders, production plans and inventories have led to the design and development of a fully integrated solution called ERP systems (Chung & Snyder 2000).In addition, these systems can integrate both suppliers and customers with the manufacturing environment of the organisation (Gupta 2000). In the view of certain scholars, ERP systems were the first of its kind to compound both business processes and total organisational IT into a single integrated solution (Al-Mashari & Al-Mudimigh 2003;Chung & Snyder 2000; Haag, Cummings & Phillips 2007).

The importance of ERP systems has been enhanced by trends such as globalisation, electronic commerce and expresses economic development (Liang et al. 2010). The major objective of organisations is an integrated system that meets their requirements by providing fast, accurate and real-time information, and assistance in decision-making (Davenport 2000; Davenport 1998; Motiwalla & Thompson 2011). Six main factors emphasise the need for ERP systems in companies. Companies need, first, a common database; second, to improve and standardise their processes; third, to monitor ongoing processes; fourth, to decrease operating costs; fifth, to improve relations with customers and suppliers; and, finally, to improve their decision-making capability (Ross & Vitale 2000; Liang et al. 2010). However, Cooke and Paterson (1998) and Davenport (2000) suggested that standardising of business processes and integration of software are the main motives behind ERP systems innovation. These different rationales for ERP systems implementations are classified by Ross and Vitale (2000) in terms of infrastructure, capability and performance respectively as shown in Figure 2.1.

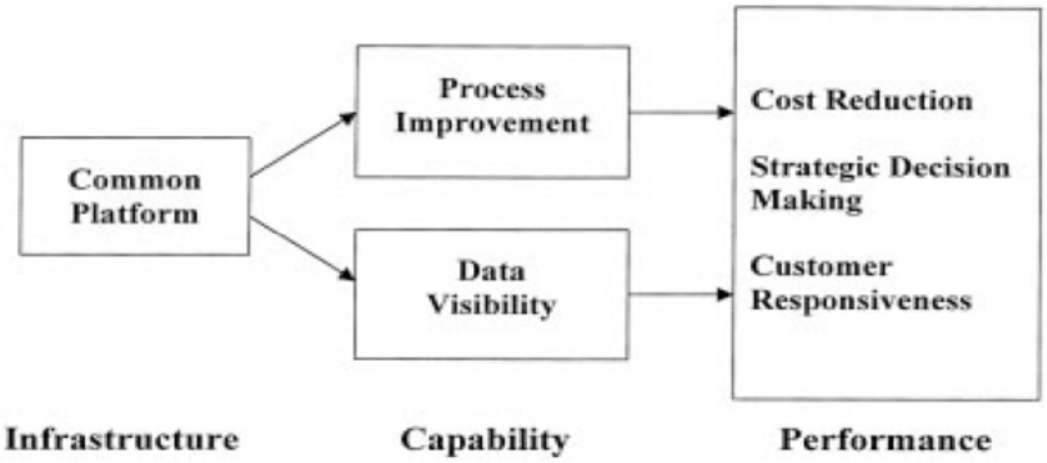


Figure 2.1: Motivations for ERP (Ross & Vitale 2000, p. 235)

2.2.1.2 Enterprise Resource Planning Systems Characteristics

ERP systems have several characteristics that are distinct from other IS such as integrated modules, common definitions, common database, best practices business process , enterprise integration and value chain preference rather than functions (Davenport 1998; 2000). Each of these has significant implications for ERP systems implementation and the accomplishment of anticipated benefits from such implementation (Markus & Tanis 2000). In the following section, two important characteristics of ERP systems are discussed: enterprise integration and best practices.

2.2.1.2.1 Enterprise Resource Planning Systems Integration

One of the main rationales for organisations to adopt ERP systems is their embedded enterprise-wide integration functionality. Duplication of the data is among the main challenges for many organisations and leads to high maintenance costs. The reason often noted by researchers for this duplication is decentralisation of the data. ERP systems are designed to address the data related issues using a centralised database (Somers, Nelson & Karimi 2003). In an ERP system, a single entry of the information is automatically updated across business units, which leads to seamless integration of the data flowing through a company (Haag, Cummings & Phillips 2007; Davenport 1998, 2000).

When new information is entered in one place, related information is automatically updated (Considine et al. 2010; Motiwalla & Thompson, 2011). Thus, an ERP system can bring about the seamless integration of all the data flowing through a company (Considine et al., 2010, Motiwalla & Thompson 2011; Davenport 2000). Enterprise integration logic embedded in ERP systems goes beyond physical computer integration (i.e. using computer communication networks and protocols) and system integration (i.e. building integrated systems based on shared data, exchange formats and common architecture) (Considine et al. 2010; Motiwalla & Thompson 2011; Barki & Pinsonneault 2005). Integration, both logical and physical, is one of the prominent functionalities of ERP systems. This coordination is notable because it facilitates information sharing within and across the organisation, which enhances coordination and consistency in the value chain of an organisation (Motiwalla & Thompson 2011; Magal & Word 2012). Additionally, the coordinating and integrating mechanisms, such as standardisation of work processes, norms, skills and output, and supervision structure, all help to achieve business integration (Considine et al. 2010; Motiwalla & Thompson 2011; Davenport 1998; Ke & Wei 2006; Magal & Word 2012).

In short, the integrated nature of the business processes embedded in ERP systems requires special consideration because it affects different important aspects of a business. These integrated processes bring a new culture of business operations and collaboration that can be difficult to assimilate in an organisation's existing environment, which is normally based on functional silos. Therefore, I argue that the traditional project management methodologies (e.g. top-down approach) and support strategies (e.g. on-the-job training) may not be sufficient. It is important to reconsider and reshape these implementation strategies by considering the implications these systems can have on individuals and business operations.

2.2.1.2.2 Best Practice

The 'best practice' is a generic solution that is embedded in an ERP system (Davenport 1998). Embodying such a solution is another underlying idea used in developing ERP systems. ERP systems vendors and their business partners have investigated business processes across a wide variety of firms and industries, and then modelled those they consider the best in their software (Bingi, Sharma & Godla 1999). Kremers and Dissel

(2000) summarised the potential benefits of adopting the 'best practice' in ERP system as follows: ERP systems are supposedly based on best practice generic business processes. Therefore, when buying an ERP system, off the shelf, organisations obtain these practices and subsequently are pushed into the direction of implementing them.

Applying the best practices embedded in the systems' reference models is a major reason for some organisations to adopt ERP systems that is advocated by ERP systems vendors and consultants. It is believed that through these standardized processes, the ERP system allows different units to be coordinated, and thereby supports integration (Volkoff et al., 2004). Koch and his colleagues (1999) suggest that ERP systems adoption not only provides an opportunity for organisations to shed their aging legacy systems, but also has the potential to change old working processes and counter-productive company cultures; in sum, to radically redefine how a business is run. However, many researchers question the term 'best practice' (Van Stijn & Wensley, 2005; Wagner & Newell, 2004; Schrage 2003; Frantz et al., 2002). Organisations adopting ERP systems software need to configure the software to meet their local needs. They are encouraged to adopt a 'vanilla system' (that is, without modifications), since the 'best' business practices are supposedly embedded in this standard configuration (Wagner & Newell, 2004). Because it is the vendor, not the customer, that defines what 'best' means, the standardised solution embedded in the ERP system may conflict with the existing unique business processes, the current way of doing business with the adopting organisations. It is argued that best practices enforce certain standards at the cost of strategically important local nuances (Schrage 2003, Frantz et al., 2002); the approach of implementing ERP systems best practices to achieve competitive advantages is thus questioned, as it is believed that the competitive advantages are derived from the unique local business processes (Wagner & Newell, 2004).

2.2.1.3 Enterprise Resource Planning Systems Life Cycle

ERP systems implementation is not one-step process. Organisations need to go through many interrelated stages to complete the implementation. Literature in the ERP systems arena presents various models for the different stages of ERP systems life cycles. Understanding these models is necessary because training requirements and objectives

vary across the different stages. This section presents the proposed life cycles in ERP systems implementation.

According to Cooper and Zmud (1990, p. 124), IT implementation 'is an organisational effort directed toward diffusing appropriate information technology within a user community'. The literature on IS lists a few life cycle models to guide technology adoption and use process. For example, Cooper and Zmud (1990) designed a framework comparing initiation, adoption, acceptance, reutilisation and infusion. They extended the traditional model and included post-implementation activities. Similarly, Rogers (2003) proposed a five-stage innovation process in organisation: agenda setting, matching, redefining or restructuring, clarifying and reoutlining.

In the context of ERP systems, models for the different implementation stages have been proposed. For example, Chang and Gable (2000) proposed ERP life cycle stages as shown in Figure 2.2.

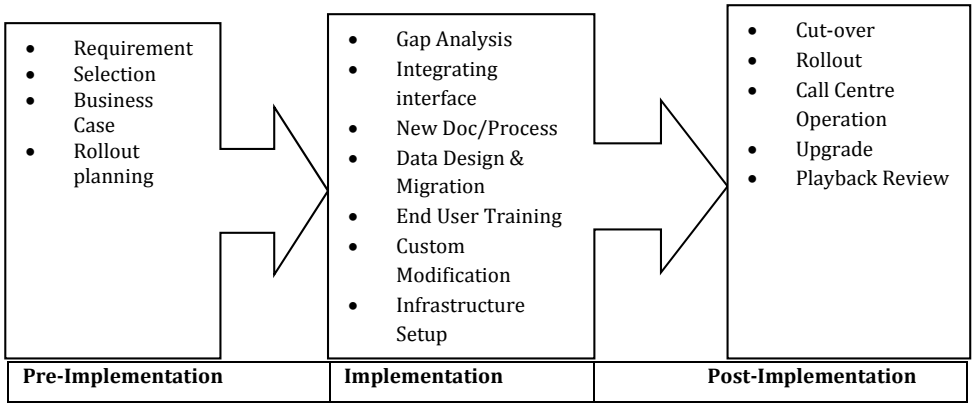


Figure 2.2: ERP Life Cycle of Chang and Gable (2000, p. 972)

Chang and Gable's (2000) framework consists of three stages: pre-implementation, implementation and post-implementation. Similarly, Markus and Tanis (2000) proposed a four-stage ERP systems life cycle model as shown in Figure 2.3, including project charting, project configuration, shakedown, and onward and upward. The project charting phase deals with the selection of software and budgeting for it. The second phase, project configuration, is concerned with system installation and running it in an organisational unit. In this phase, key activities include software configuration, system integration, testing, data conversion, training and rollout.

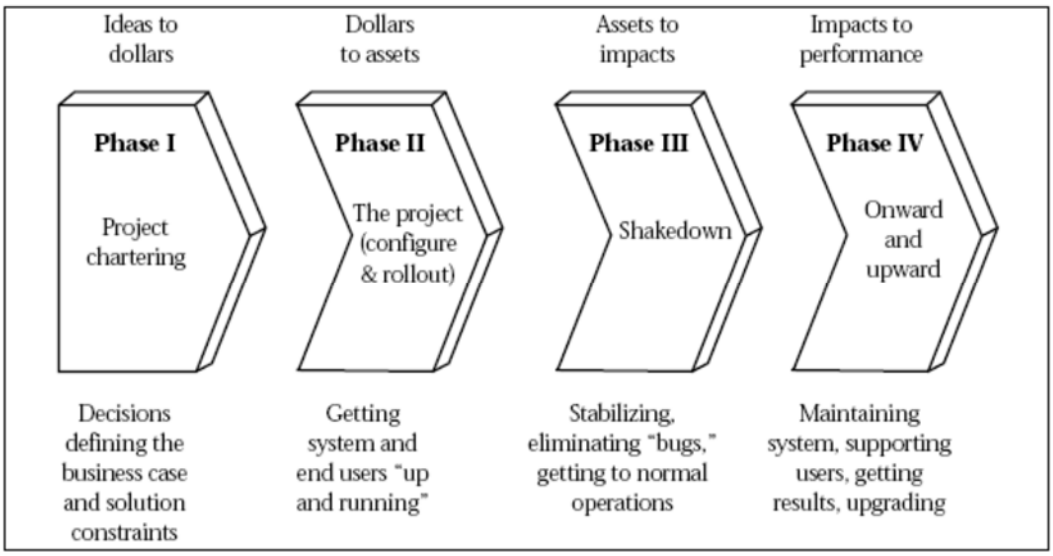


Figure 2.3: The ERP Life Cycle of Markus and Tanis (2000 p. 189)

The shakedown phase deals with the 'organization's coming to grip with enterprise system'. Activities included in this phase are bug fixing and recovering, systems performance tuning, retraining and employing temporary staff to handle certain issues. The last stage of their proposed life cycle is 'onward and upward', which continues from normal operation until the system is replaced or upgraded with a new system (Markus & Tanis 2000). This phase is mainly concerned with business improvements, enhancement of user skills and evaluation of the post-implementation phase. Considering its importance, the next section will discuss the studies being conducted in this phase.

2.2.1.3.1 Post-Implementation Stage

The post-implementation stage in a system's life cycle is quite significant and comprises various processes that are critical to a system's success (Nicolaou 2004a). Recent ERP systems literature reviews (Esteves & Bohorquez 2007; Esteves & Pastor 2001; Jacobs & Bendoly 2003; Botta-Genoulaz, Millet & Grabot 2005; Grabski, Leech & Schmidt 2011) highlight that a majority of the ERP systems literature considers the implementation phase by focusing on critical success factors (CSFs) and ERP systems selection, but seldom on post-implementation effects. The post-implementation stage is referred to as the stage in the ERP systems life cycle when the systems become available to the staff for regular

usage to accomplish routine activities (Motiwalla & Thompson 2011). This identifies a significant research gap, because there is an immense requirement for continued improvement and assessment as ERP systems evolves over time (Grabski, Leech & Schmidt 2011).

Some efforts have been made to investigate this stage. For instance, although they did not address post-implementation usage directly, Sangster, Leech and Grabski (2009) highlighted the organisations who have struggled initially with ERP systems have failed to achieve the anticipated benefits from the implementation. Their study recommended that, to achieve success, the way that the system is adopted and used needs to be changed. Muscatello and Parente (2008) found limited research on post-implementation and, to fill this gap, they conducted case studies of different manufacturing firms and made suggestions for future research. They suggested future research on how business process change is managed in the ERP systems post-implementation phase and the relationships among the process, organisational, and ERP systems technical changes.

It is important to note that post-implementation is not isolated from the previous phases and that success at one phase does not guarantee success in later phases (Peslak, Subramanian & Clayton 2007). In this regard, a life cycle model by Cooper and Zmud (1990) can provide a foundation for investigating long-term system maturity and evolution issues. Research based on the ERP life cycle is starting to identify many motivations and factors that change over the different phases of the life cycle (Grabski, Leech & Schmidt 2011). Similarly, Markus and Tanis (2000) observed that organisations experience problems at all phases of ERP system life cycles and, most alarmingly, the problems occurring at later phases have root causes from earlier phases. Therefore, researchers should help organisations to determine what they should measure and monitor key performance indicators (KPIs) throughout the life cycle of ERP systems. This will assist organisations to develop a comprehensive approach for assessing and managing ERP post-implementation research (Esteves 2009; Grabski, Leech & Schmidt 2011), and thus achieve the anticipated benefits from ERP implementation. The next section will shed light on the benefits that can be achieved from implementing ERP systems.

2.2.1.4 Enterprise Resource Planning Systems Benefits

The reason for the popularity of ERP systems is their perceived benefits such as standardising the business process (Davenport 1998; Cooke & Paterson 1998; Lee, Siau & Hong 2003; Panorama 2013), keeping track of goods (Gattiker & Goodhue 2000, 2004), an unproblematic database (Lee, Siau & Hong 2003; Panorama 2013), easy and fast tracking of errors (Sia et al. 2002; Shang & Seddon 2007), accessibility of real-time information (Ross & Vitale 2000; Zygmont 1999; Motiwalla & Thompson 2011), sharing the information throughout the organisation and empowering individuals in the organisation (Sia et al. 2002; Panorama 2013), providing solutions for problems associated with a legacy system (Holland & Light 1999; Lonzinsky 1998; Ross & Vitale 2000; Panorama 2013), fewer development risks (Kelly, Holland & Light 1999), integration with existing software systems (Spathis & Constantinides 2003; Panorama 2013), support in decision-making (Lonzinsky 1998; Holsapple & Sena 2003), keeping customers competent in the market (Lonzinsky 1998; Shang & Seddon 2007), and decreasing production costs (Holsapple & Sena 2003; Shang & Seddon 2007). A comprehensive list of potential benefits from ERP systems was presented by Shang and Seddon (2002), as shown in Figure 2.4 that highlights and classifies the benefits.

Dimensions	Subdimensions
Operational	1.1 Cost reduction
	1.2 Cycle time reduction
	1.3 Productivity improvement
	1.4 Quality improvement
	1.5 Customer service improvement
Managerial	2.1 Better resource management
	2.2 Improved decision making and planning
	2.3 Performance improvement
Strategic	3.1 Support for business growth
	3.2 Support for business alliance
	3.3 Building business innovations
	3.4 Building cost leadership
	3.5 Generating product differentiation
	3.6 Building external linkages
IT infrastructure	4.1 Building business flexibility for current and future changes
	4.2 IT cost reduction
	4.3 Increased IT infrastructure capability
Organizational	5.1 Changing work patterns
	5.2 Facilitating organizational learning
	5.3 Empowerment
	5.4 Building common vision

Figure 2.4: Enterprise Systems Benefits Framework (Shang & Seddon 2002, p. 236)

The benefits can be classified into operational, managerial, strategic, IT strategic and organisational oriented. These benefits make ERP systems popular among organisations throughout the world. The popularity of ERP systems is also evident from the projection that ERP will be a US$50.3 billion industry by 2015 (Kajeepeta 2011).

2.2.1.5 Enterprise Resource Planning Systems Issues

Despite the numerous claimed benefits and the millions of dollars invested in ERP systems (Panorama 2013), adopting ERP systems into organisations is a complicated process. Scholars have considered that realising the high promises of ERP systems comes at a cost because the process of transitioning to ERP systems is neither easy nor quick (Robey, Ross & Boudreau 2002; Panorama 2013; Ram, Corkindale & Wu 2013b). The changes required by ERP systems implementation often prove to be overwhelming and lead to implementation failures in many organisations (Maguire, Ojiako & Said 2010; Ram, Corkindale & Wu 2013b), as shown in the Table 2.1.

Table 2.1: List of ERP systems Projects Problems/Failures

Organisation Name	Year	ERP systems Project Problems and Failures
Woodward	2012	The aerospace and energy system components manufacture lost 33% of profit and revenue due to ERP-related issues.
U.S. Military	2012	Many ongoing ERP projects are drastically behind schedule and over budget.
U.S. Air Force	2012	After spending $1 billion in expenses, the project was scrapped because it failed to create 'any significant military capability'.
California Courts	2012	The project was abandoned because there was not enough money to continue rolling it out.
Beverage distributor	2012	The beverage distributor of major brands sued Epicor because they found the ERP software 'useless'.
Avantor Performance Materials	2012	The chemical product makers sued IBM for mismatching software and its organisational needs.
Whaley Foodservice Repairs, South Carolina, USA	2011	Epicor was sued by the commercial kitchen equipment company for a project that cost the company more than five times the original estimated amount of $190,000.
State of Idaho	2011	Idaho faced problems due to design defects and other issues that led to various payment delays and faulty claims processing after installing a new system provided by Unisys. The state could suffer a loss of millions of dollars due to faulty Medicaid claims.
National Health Service (NHS) United Kingdom	2011	After spending about £12 billion (US$18.7 billion), the NHS abandoned a project that was aimed at centralising the electronic health records of its citizens.
ParknPool, USA	2011	The furniture seller company sued Epicor over a failed ERP project
Montclair State University, New Jersey, USA	2011	PeopleSoft implementation at Montclair State University faced problems leading to the university filing a lawsuit against Oracle for the botched implementation.
Marin County, California, USA	2011	Marin County filed a lawsuit against Deloitte Consulting and SAP over a failed ERP project.
Ingram Micro Australia	2011	The problem with SAP implementation at Ingram Micro led to a significant drop in its net income twice in 2011
CityTime Payroll System project, New York, USA	2011	The project failed due to cost overruns, from a budgeted $63 million to an estimated $760 million, and a criminal probe.
CareSource Management Group, USA	2011	The group halted the ERP project and sued Lawson for damages of $1.5million because the software it provided did not deliver the expected results.
The Victorian Order of Nurses, Nova Scotia, Canada	2010	The implementation of SAP's payroll system resulted in issuance of faulty pay cheques to nurses for at least six months.
Lumber Liquidators	2010	Problems with the SAP system were encountered.
Dillard's, Inc	2010	JDA's i2 implementation failed to meet the customer's expectations.
Ferazzoli Imports of New England	2009	Epicor's system did not meet the customer's expectations as promised.

Sources: Ram, Corkindale and Wu (2013a); Kanaracus (2012); Kimberling (2011)

Table 2.1 provides a list of the recent ERP project problems and failures. The table highlights that the organisations adopting ERP systems not only failed to complete the

implementation within the allocated budget and time, but they also struggled to achieve the anticipated benefits. There are some notable issues that researchers believe are the main reasons for these failures, for example, expensive implementation (Gattiker & Goodhue 2004),integration (Davenport 1998; Themistocleous et al. 2001; Kimberling 2011), internal focus (Sia et al. 2002; Markus, Petrie & Axline 2000; Lee, Siau & Hong 2003; Haymen 2000; Kanarcus 2012), upgrading and modification (Marcus & Gould 2000; Ram, Corkindale and Wu 2013a), mismatching with existing business processes (Themistocleous et al. 2001; Gattiker & Goodhue 2004; Kimberling 2011), inadequate support for decision-making (Gattiker &Goodhue 2004 ; Kimberling 2011), inadequate support from management (Ross & Vitale 2000; Gattiker & Goodhue 2004; Ram, Corkindale and Wu 2013a), upgrading and modification, coping with business process, support for decision-making and cultural issues (Akhgar, Siddiqi & Al-Khayatt 2002; Davenport 2000; Everdingen & Waarts 2003; O'Kane 2001; Mandal & Gunasekaran 2003; Ram, Corkindale and Wu 2013a ; Sheu, Yen & Krumwiede 2003; Sheu, Chae & Yang 2004; Yen & Sheu 2004).Moreover, it is important to recognise that user training and failure to comprehend how ERP systems change business processes are important factors related to failures (Davis & Wilder 1998; Kanaracus 2012 ; Nicolaou 2004a). According to a report by Benchmarking Partners (1998), major 'go-live' surprises that organisations encountered were associated with the fact that it was difficult for the user to grasp the degree of discipline required to accomplish daily tasks due to the integration nature of the ERP systems. Staff failed to comprehend that their actions now had an immediate effect downstream. Therefore, ,ERP researchers have suggested that the success or failure of an ERP systems implementation is rarely tied to the features of the ERP system itself, but rather is often associated with the job or processes of re-engineering that typically accompany such systems (Peppard & Ward 2005; Davenport 2000; Morris & Venkatesh 2010).These findings support the need for future research to help reduce the failures (Ram, Corkindale & Wu 2013b).

The next section will review the major research perspectives in the field of ERP systems implementation, in accordance with Orlikowski's (2010) framework for classifying the management literature. The two main approaches used to categorise the literature published in the ERP systems field are the deterministic approach and the emergent process approach, and the next section will discuss the relevant dimensions of the literature in each of these approaches.

2.2.2 Deterministic Approach in Enterprise Resource Planning Systems Research

The deterministic approach assumes that the technology is an 'exogenous and relatively autonomous' catalyst of organisational change and consequently drives various human and organisational outcomes such as firm performance, individual work routines and decision-making (Orlikowski 2010, p. 6).

2.2.2.1 Economic Effect of Enterprise Resource Planning

One of the important themes in the deterministic approach is evaluating ERP systems implementation from an economic perspective and attempting to compare ERP systems implementation and its effect on adopting organisations before and after ERP systems implementation, and then comparing the results of ERP systems adopters and non-adopters from different industries and areas such as manufacturing, banking and health care service organisations (Esteves & Bohorquez 2007; Esteves & Pastor 2001; Jacobs & Bendoly 2003; Moon 2007; Botta-Genoulaz, Millet & Grabot 2005; Grabski, Leech & Schmidt 2011; Nicolaou 2004a, 2004b; Wieder et al. 2006). Although the studies using this approach, have contributed to the ERP systems knowledge to some extent, they have failed to predict a timeline to achieve these benefits. For instance, a study by Nicolaou (2004b) found that an organisation will take approximately two years to realise the benefits from an ERP system. However, these findings did not find any support from other studies. For example, Wieder and his colleagues (2006) found no significant performance differences between ERP systems adopters and non-adopters, either at the business process level or at the overall firm level. One of the reasons for these contradictory results is a lack of theoretical foundations to illuminate the reasons for failure or success during the implementation. It can also be argued that the evaluation of ERP systems implementation from a deterministic perspective is not comprehensive because it fails to include the aspects of implementation that are organisational and social in nature (Orlikowski 2010).

2.2.2.2 Critical Success Factors Research on Enterprise Resource Planning

Another stream of research that fits within the deterministic approach is the CSF approach. This section reviews the literature that seeks to identify the factors important for the success of ERP systems implementation. The research studying CSFs has dominated not only the deterministic approach but also the overall ERP systems implementation literature. Although this stream has contributed to the ERP systems literature, it has failed to provide a theoretical foundation for studying the complexities associated with ERP systems implementation. Several CSFs have significantly received greater attention in the ERP systems literature. This research investigates ERP systems implementation from an organisational learning perspective; therefore, certain popular CSFs such as education and training, and user involvement are reviewed in detail. Finally, this section concludes with a review of the research surrounding post-implementation issues.

Many studies have consistently identified a set of core factors that are critical to the success of ERP systems implementations, as shown in Table 2.2.

Table 2.2: ERP systems Critical Success Factors

Critical Success Factors	Studies
System quality	Dezdar and Sulaiman (2009); Ram, Corkindale and Wu (2013b)
Cultural and structural changes Readiness, Organisational culture	Dezdar and Sulaiman (2009)
Project management and evaluation Project management capabilities	Dezdar and Sulaiman (2009); Somers, Nelson and Karimi (2003); Finney and Corbett (2007); Snider, Da Silveira and Balakrishnan (2009); Motwani et al. (2002)
Business plan and vision	Nah and Delgado (2006); Al-Mashari, Zairi and Okazawa (2006); Finney and Corbett (2007); Dezdar and Sulaiman (2009)
Enterprise-wide communication Strong communication inwards and outwards, Communication plan	Motwani et al. (2002); Snider, Da Silveira and Balakrishnan (2009); Finney and Corbett (2007)
Project champion or sponsor	Finney and Corbett (2007); Deodar and Suleiman (2009)
BPR and minimum customisation Software configuration Integration of business processes	Vathanophas (2007); Nah and Delgado (2006); Bingi, Sharma and Godla (1999); Somers, Nelson and Karimi (2003); Motwani et al. (2002); Finney and Corbett (2007); Dezdar and Sulaiman (2009)
Training employees User training and education Job redesign	Finney and Corbett (2007); Vathanophas (2007); Dezdar and Sulaiman (2009); Snider, Da Silveira and Balakrishnan (2009); Cooke and Paterson (1998)
Teamwork and project team composition, competence and compensation Selecting the right employees Balanced team Small internal teams	Plant and Willcocks (2007); Bingi, Sharma and Godla (1999); Somers, Nelson and Karimi (2003); Finney and Corbett (2007); Dezdar and Sulaiman (2009); Snider, Da Silveira and Balakrishnan (2009)
ERP vendor support	Bingi, Sharma and Godla (1999); Somers, Nelson and Karimi (2003); Dezdar and Sulaiman (2009)
ERP consultants Consultant quality Use of consultants Qualified consultants	Somers, Nelson and Karimi (2003); Finney and Corbett (2007); Dezdar and Sulaiman (2009)
System integration	Al-Mashari and Al-Mudimigh (2003); Bingi, Sharma and Godla (1999)
User involvement, participation and support	Dezdar and Sulaiman (2009)
Sustained (top) management support and commitment	Finney and Corbett (2007); Plant and Willcocks (2007); Dezdar and Sulaiman (2009); Snider, Da Silveira and Balakrishnan (2009); Nah and Delgado (2006)
Interdepartmental cooperation	Somers, Nelson and Karimi (2003); Plant and Willcocks (2007); Dezdar and Sulaiman (2009);
Steering committee	Finney and Corbett (2007); Somers, Nelson and Karimi (2003)
Management of expectations	Somers, Nelson and Karimi (2003)
Careful package selection	Somers, Nelson and Karimi 2003); Finney and Corbett (2007); Dezdar and Sulaiman (2009); Vathanophas (2007)
Data analysis, conversion and integrity	Somers, Nelson and Karimi (2003); Finney and Corbett (2007)
Charismatic leadership	Wang, Chou and Jiang (2005)
Fit between ERP and organisation	Baki and Çakar (2005)
Implementation strategy and time frame	Dezdar and Sulaiman (2009))
Organisational transformation and software migration	Vathanophas (2007)
Formal project plan or schedule	Bingi, Sharma and Godla (1999)

Source: Ram, Corkindale and Wu (2013b)

Among the CSFs, user training and involvement in ERP implementation are considered the main factors for ERP systems implementation (Davenport 1998; Nicolaou 2004a). Along with these exploratory studies, some researchers with the objective of classifying the CSFs, have attempted to link them to different phases of implementation by using ERP systems life cycle (Light, Holland & Wills 2001; Holland & Light 2001; Markus & Tanis 2000). For each phase, different factors play different roles (Wei, Chien & Wang 2005; Somers, Nelson & Karimi 2003) Other studies have attempted to find relationships among the various factors (Akkermans & van Helden 2002; King & Burgess 2006). For instance, King and Burgess (2006) created a dynamic CSF model in which individual factors are linked in causal chains. This model was expected to elaborate ERP systems success better because it attempted to link technological aspects with human aspects. Instead of being well rounded, some CSF studies have focused merely on organisational context and characteristics (Ragowsky, Adams & Somers 2005; Gattiker & Goodhue, 2004; Morton & Hu 2008). For example, Gattiker and Goodhue (2004) conducted a study to examine the relationship between organisational structure and ERP systems performance at the operational level. The authors concluded that ERP systems implementation is more successful when interdependence is high and differentiation low among the business units of an organisation. Morton and Hu (2008) examined the fitness between ERP systems and organisational structure and its effect on the likelihood of implementation success. Their study highlighted various structural dimensions, such as formalisation, structural differentiation and decentralisation, and proposed that substantial forms of organisations are more likely to succeed in ERP systems implementation because their organisational structures have a higher degree of fit with ERP systems software.

The studies have contributed to the ERP systems literature by highlighting the factors that are important for different phases of implementation. However, the majority of the studies lack a theoretical foundation and consequently have failed to explain in detail how these different factors can contribute towards ERP systems implementation. Therefore, these studies' contributions towards in-depth insight of ERP systems implementation are limited (Robey, Ross & Boudreau 2002; Grabski, Leech & Schmidt 2011).

Because this study is concerned with ERP systems implementation from an organisational perspective, two of the CSFs—user's involvement and training—are noted as significant (Brown & Duguid 1991; Robey, Ross & Boudreau 2002). These factors will be discussed in detail in the next sections.

2.2.2.2.1 User's Involvement and Top-Down Approach in Enterprise Resource Planning Implementation

User involvement in ERP systems implementation is regarded as one of the main CSFs (Shanks et al. 2000; Nah, Zuckweiler & Lau 2003; Nah & Delgado 2006; Liu & Seddon 2009).It is important to note that most ERP systems implementations follow a top-down approach because the majority of the decisions associated with the project are owned by the senior management and do not consider the big picture (Glover, Prawitt & Romney 1999). The users' involvement is seldom found in the early phases of the implementation, and their involvement is normally first noticed at training delivery phase (Chen & Chang 2006). Some authors have argued that, in a top-down environment, top management and staff will not have the same vision for the systems and staff will struggle to comprehend the necessity and rationale for the system (Kwak et al. 2012). This can lead to the users' uncertainty and resistance or under-utilisation of the system (Amoako-Gyampah 2004b). Therefore, researchers have considered user involvement as one of the main CSFs for ERP systems implementation (Grossman & Walsh 2004; Hsu, Sylvestre & Sayed 2006).

> This [staff involvement] ensures that undocumented knowledge is covered and provides a greater buy-in from the organization. The kiss of death for a system is if the organization rejects the changes that the system requires. Conquering cultural issues is mandatory for a successful implementation (Grossman & Walsh 2004, p. 39)

Hsu, Sylvestre and Sayed (2006) explained that everything in the ERP system, from user interface to the actual generation of reports, is different from the legacy system, mainly because of its unique characteristics (e.g. integrated and best practice); therefore, if staff who actually perform these activities are not involved in all phases of the implementation, the productivity of the systems will be affected. Similarly, using a case study, Barker and Frolick (2003) found that successful implementation required staff involvement in all phases of implementation. Without staff involvement and total backing by everyone involved, ERP systems implementation will ultimately fail. Bagozzi (2007) suggested

that interdepartmental collaboration is required to re-engineer the flow of information and communication.

In light of the above discussion, it can be argued that reliance solely on a top-down approach might not lead to achieving the implementation objectives because it bars users' engagement in the early phase of implementation. This disengagement can lead to user resistance and consequently to under-utilisation of the systems. Therefore, an approach that combines user involvement with top-down approach should be used for better outcomes from the ERP systems implementation.

2.2.2.2.2 User Education and Training

User education and training is considered an important CSF for ERP systems implementation and one of the main activities of change management (CM) strategy (Al-Mashari, Zairi & Okazawa 2006). The objective of training and user education is to provide users with the knowledge and skills to comprehend and use ERP systems and its embedded processes effectively. Training can enhance the acceptance and ability to use an information system (Compeau et al. 1995), which is why user training is often noted as one of the main CSFs in the ERP systems implementation literature (Grabski, Leech & Schmidt 2011), and inadequate and limited training is one of the main issues of ERP systems implementation (Nicolaou 2004a; Tsai & Hung 2008; Kerr et al. 2012; Venugopal & Rao 2011; Al-Mashari & Al-Mudimigh 2003; Xue et al. 2005; Wheatly 2000; Grossman & Walsh 2004; Hsu, Sylvestre & Sayed 2006). Hayes, Hunter and Reck (2001) argued that inadequate training may result in organisations not achieving the anticipated objectives when they adopt ERP systems.

There are various reasons listed in the literature for this inadequacy. For instance, Kerr and his colleagues (2012) found that the training model used for ERP systems training design and delivery is 'simplistic' and ignores the social context. One of the reasons for such a simplistic model is that ERP systems are considered similar to traditional systems. In the ERP context, traditional information system training approaches are inappropriate because the adoption of ERP systems requires the implementation of cross-functional, integrated, end-to-end business processes; ERP systems are not simple applications that affect a single area (Grabski, Leech & Schmidt 2011). ERP education and training must

consider the new and unique collaborative nature of user tasks, and the effect they have on the organisation because these systems are not simply software but critical infrastructure (Jacobs & Bendoly 2003; Lyytinen & Rose 2003). Therefore, user learning should not be limited to acquiring technical skills; it should include business process knowledge, cross-functional problem-solving skills and an understanding of task interdependence (Sein, Olfman & Bostrom 1987; Sein, Bostrom & Olfman 1999; Sein & Santhanam; 1999; Gupta, Bostrom & Huber 2010).

Delivering training too early is another reason for training ineffectiveness. A study by Venugopal and Rao (2011) found that when users were given the training six months before going live, they forgot all they had learnt. However, when the training was given 'just in time', the users found it useful. Moreover, the study suggested that when the top management did not sanction the additional training, ERP systems implementation was a failure, but when the top management supported the activities, the results were favourable. In another case study by Nicolaou (2004a), it was found that when the user training was oriented to software functionality, without offering a clear and overall view of business process integration of SAP, the training was ineffective. One of the companies in the case study responded to this problem 'by radically changing its training methods, instituting a certification process, where employees would have to pass a certifying test before given access' (Nicolaou 2004a, p. 42). The second company in the case study faced the same issue and rectified it by providing extra training. Another similar study highlighted that top management support is important for achieving benefits from ERP systems implementation. It also pointed out the need for continuous training for both users and managers, even after going live with ERP systems implementation, to achieve the anticipated benefits from ERP systems implementation (Staehr 2010, p. 235):

> Training needs to be ongoing throughout both the Shakedown and Onward and Upward phases. This is needed at both user and managerial level, and incentives may be necessary to bring managers to training sessions and to encourage them to use the ERP system to improve decision-making capabilities.

Yi and Davis (2003) also asserted the importance of post-live training because the complexity of ERP systems limits the amount of knowledge users can absorb before actually using them. Similarly, Yu (2005) suggested that training should not be viewed as a one-time preparation for initial ERP systems use, but should be considered a continuous process. Ongoing and experimental learning is necessary because it develops expertise for addressing the issues (Orlikowski & Hofman 1997) in the dynamic and

complex environment created by an integrated ES. Accordingly, Chang and Chou (2011) recommended post-implementation learning for effective usage of ERP systems.

In light of the above discussion, it can be concluded that training pitfalls in ERP systems implementation can be avoided by following these recommendations:

1. Deliver the training close to going live.
2. While designing the training content, the trainer should consider the social context, and the integrated and cross-functional nature of the ERP systems.
3. Continue the training in the post-implementation stage to support the learning that is necessary to realise the anticipated benefits from the ERP systems implementation.

This section has reviewed the literature using the deterministic approach and noted some limitations in the literature. First, the dominant theme in the deterministic approach is 'critical success factors'; however, because it lacks a theoretical foundation, it fails to explain the complexities associated with ERP systems implementation (Grabski, Leech & Schmidt 2011). Second, ERP systems implementation is considered static and is believed to have a deterministic influence on the adopting organisation, which fails to illuminate the dynamic of the long-term implementation process. In other words, the research has been mostly technologically oriented and does not explain in detail the social effects of ERP systems implementation. Third, although issues related to user involvement and training were discussed, the studies failed to explain how such issues can be addressed or alternative techniques can be used to fill the knowledge gaps created as a result of inadequacy of user training and involvement. In addition, the deterministic view overlooks the social aspect of implementation. In the next section, the literature using the emergence process approach will be reviewed to determine whether it addresses these limitations.

2.2.3 Emergent Process-Based Research

Unlike in the deterministic approach, scholars adopting an emergent process perspective believe that technology results from the continuous interaction of human choices, actions, social histories and institutional contexts (Orlikowski 2010). In addition, ERP systems

implementations are not considered merely technical artefacts but a socially defined and produced phenomenon.

2.2.3.1 Enterprise Resource Planning Implementation Processes

The emergence process approach in the ERP systems implementation literature comprises various themes. One of the streams in the process approach is to comprehend ERP systems implementation through the lens of the mechanisms that organisations adopt to overcome knowledge barriers (Robey, Ross & Boudreau 2002). Using the lens of organisational memory theory, Stijn and Wensley (2005) found that disparities can exist between the memory content in the ERP system and related content in individuals' memories, and the organisational structure and culture. These disparities or memory mismatches can lead to underperformance of ERP systems. A study by Robey, Ross and Boudreau (2002) also found that knowledge barriers hinder successful implementation of ERP systems implementation. Both organisational learning and knowledge management perspectives contribute to ERP research by showing how the old knowledge about business processes, which are deeply embedded in organisational memory, may conflict with and become barriers for the implementation of new knowledge associated with ERP systems. This theoretical lens acknowledges the importance not only of organisational members, but also of the context in which they operate.

2.2.3.2 Enterprise Resource Planning and Organisational Learning

Another major stream of thought that influences the emergent process perspective is the organisational learning and knowledge management research (Robey, Ross & Boudreau 2002; McGinnis & Huang 2007; Stijn & Wensley 2005; Ke & Wei 2006) . For example, Robey, Ross and Boudreau (2002) reported on a comparative case study of 13 industrial firms implementing ERP systems. These firms were compared based on their dialectical learning process. The authors showed that the most fundamental dialectic occurs between 'on the one hand, the old knowledge embedded in business processes and practices associated with legacy systems and, on the other hand, the new business processes and practices that ERP systems is designed to support' (Robey, Ross & Boudreau 2002, p 37). The importance of organisational learning (OL) for ERP implementation is noted by different scholars in the ERP systems literature (Botta-Genoulaz, Millet & Grabot 2005;

Marabelli et al. 2013; Marabelli & Newell 2009, 2013; Tomblin 2010; Teo, Singh & Cooper 2010; Ke & Wei 2006; Janson, Cecez-Kecmanovic & Zupančič 2007). Shang and Seddon (2007) argued that organisational leaning is significant and necessary for the success of an ES implementation and to achieve the anticipated benefits. Because of certain qualities pertaining to the ERP systems implementation process, organisational learning is required to ensure its success. For instance, the process of implementation promotes the convergence of cross-functional information and knowledge at the organisational level, and hence organisational learning is important for the success of ERP systems (Ke & Wei 2006; Davenport 1998, 2000). Moreover, organisational learning may alleviate the distinction that prevails at the individual level by enabling users to comprehend how their tasks fit into the overall processes, thus leading to the organisational objectives being achieved by those processes (Tomblin 2010).

Further, Chang and Chou (2011) explained that ERP systems implementation encourages all the relevant units to work together to accomplish the objectives of an organisation. ERP systems implementation enhances communication and develops a tighter integration of business processes because these support users to work together. Such collaborative work ultimately affects the systems operations (Davenport 1998, 2000). In addition, ERP systems strengthens relationships among the users more than legacy systems do. Therefore, learning emerges as users interact in the context of established routines and procedures (Chang & Chou 2011). Although some researchers have pointed out the urgent need for qualitative insight into the phenomenon for organisational learning emergence in ERP systems implementation (Poston & Grabski 2001; Grabski, Leech & Schmidt 2011), few studies have addressed how organisational learning emerges and affects ERP systems implementation. As Chang and Chou (2011) pointed out, very limited literature exists on how organisational learning transforms ERP systems appropriation.

In the studies presented in Table 2.3, some attempts were made to explore ERP systems implementation in the organisational and knowledge management phase.

Table 2.3: ERP systems and Organisational Learning Studies

Author(s), year	Paper	Findings
Robey, Ross and Boudreau (2002)	Learning to Implement Enterprise Systems: An Exploratory Study Of The Dialect Of Change	With the help of a comparative study for ES implementation, the authors showed that the most fundamental dialectic occurs between 'on the one hand, the old knowledge embedded in business processes and practice associated with the legacy systems and, on the other hand, the new business processes and practice that ERP is designed to support'.
Janson, Cecez-Kecmanovic and Zupančič (2007)	Prospering in a Transition Economy through Information Technology-Supported organizational Learning	Using a longitudinal case study, the authors found that top management support in the form of paying attention to organisational learning, intertwining learning and working and encouragement for new products and processes provide the rationale to implement and use IT systems (such as Lotus Notes, document management systems and SAP), which consequently helped in organisational learning in the form of single-loop, double-loop and triple-loop learning.
Lee, Lee and Lee (2007)	Knowledge Transfer in Work Practice: Adoption and Use of Integrated Information Systems	The authors studied the ERP implementation from the knowledge transfer perspective and found that the likely consequences of knowledge transfer between the organisation perspectives embedded in ERP and individual apprehension, conceptualisation the mode of human interactions and the type of work practice.
Marabelli and Newell (2009)	Organisational Learning and Absorptive Capacity in Managing ERP Implementation Projects	This study focused on the double-loop learning process that occurs over the implementation phase of ERP, which they depict as a series of learning cycles. The authors suggested that the learning process acquires the absorption of knowledge, future perspective, and phases of explorative and exploitative learning that overlap.
Wang and Ramiller (2009)	Community Learning in Information Technology Innovation	The authors empirically investigated the interrelationship between community learning and organisational learning. The study found that various organisational factors influence knowledge distribution at different times. The study findings suggest that research analysts and technology vendors take leadership early on in highlighting the 'know what' (interpretation)and 'know why' (rationales) for ERP, while at a later stage the adopters come to dominate the discourse as its focus shifts to the 'know how' (strategies and capabilities).
Teo, Singh and Cooper (2010)	The Impacts of Organizational Learning and Innovation on Enterprise Systems Benefits of Australian Organizations	The authors found that organisational learning and innovation influence the ES benefits. These benefits are: (1) improved individual performance, (2) improved productivity, (3) improved decision-making, (4) reduction in operation costs from shared services and (5) improved ES project management. On the other hand, organisational innovation results in (1) improved integration with CRM and supply change management (SCM); (2) improved business processes and (3) external linkages as well as IT flexibility.

Tomblin (2010)	Theory Development in Enterprise Systems and Organizational Learning	The authors claimed that ERP implementation can be considered an organisational learning process. They proposed two frameworks. The first framework was built for ERP support of organisational learning by emphasising ERP-decision-support capabilities. The second framework, based on existing theoretical constructs, was put forward as a possible basis for investigating the relationship between ERP implementation learning and post-implementation support of organisational learning.
Marabelli and Newell (2013)	Knowledge Creation and ES Implementation: The Absorptive Capacity Lens	This study found that when external knowledge involves IT artefacts, to understand knowledge absorption processes fully, it is important to have the practice perspective of knowledge and power. Further, this discussion explains how 'prior' knowledge, such as knowledge about the functionality of an ES or knowledge about the potential of an ES, can be used in an organisation and help in achieving the implementation gaols
Marabelli et al. (2013)	Managing Knowledge in Large-Scale Virtual Projects: A Community-Based Approach	Using a case study for an ES implementation, the authors found that management can support the formation of virtual CoPs. Further, these CoPs help in engaging the right stakeholders for ES implementation that helps in developing a collaborative environment that is essential for ES implementation.

Table 2.3 clearly shows that ERP implementation can be narrated and comprehended by investigating the mechanisms through which firms have attempted to address knowledge-related issues through their learning capacity. The authors mentioned that factors such as previous knowledge and top management support are significant for organisational learning to emerge in ES implementation. Other studies suggested that organisational learning can support the achievement of benefits. The studies not only acknowledged the importance of organisational learning for ERP systems implementation but also emphasised the importance of future research to explore how organisational learning and ERP systems implementation co-emerge. Although these studies contributed towards the literature in organisational learning, they did not provide any detailed explanation on what inhibits and triggers organisational learning to emerge in ERP systems implementation. Wang and Ramiller (2009) attempted to explain this process of organisational learning emergence; however, they did not study the actual users of the system but rather used trade journals as their primary source of the data. Although the writers of these trade journals can shed some light on the process, they do not represent the views of the participants in this phenomenon, which are necessary to comprehend the organisational learning process fully. Moreover, their studies provided some insight into the co-evolving of organisational learning and CoPs; however, they did not explain this process in detail. In addition, the ERP systems literature is dominated by examples of organisations' failure to achieve the benefits and failure can be associated with the organisations' inability to learn (Tomblin 2010). Nevertheless, the above studies (e.g. those listed in Table 2.2) did not provide any mechanisms from the organisational learning perspective that could be used to transform these failures into successes. Further, these studies did not explain benefits of learning in the context, which is required considering the ineffectiveness of formal ways of learning (Robey, Ross & Boudreau 2002). Therefore, it is evident that the area of organisational learning is under-researched and studies, in real-life contexts with theoretical foundations, are required to fill the gaps in the literature.

2.2.4 Conclusion to Literature Review on ERP systems Implementation

The literature highlights some of the distinguishing characteristics of ERP systems and the many associated benefits that provide organisations with the rationale to implement ERP systems. These implementations are costly, risky and complicated, as is evident from the organisations that are still struggling to achieve the anticipated benefits. This struggle

has more to do with people and processes than the technicalities associated with ERP implementation (Davenport 1998; Ke & Wei 2006; Morris & Venkatesh 2010). To address these issues, the literature review thus far has identified that the research on ERP systems implementation has various approaches with accordingly different ontological assumptions. The review highlights that technological determinism is common and dominant within the ERP systems literature. Performance impact research, factor research and studies of user adoption of technology treat the ERP system as an 'exogenous' force with the technical capabilities to bring about beneficial organisational effects in a deterministic manner and do not consider the social implications (Botta-Genoulaz, Millet & Grabot 2005). Many ERP scholars have argued that the success or failure of an ERP system implementation has less to do with systems features and more to do with the tasks or business processes embedded in these systems (Davenport 2000; Peppard & Ward 2005; Scheer & Habermann 2000). In other words, a system is a combination of people and technology and to obtain the maximum output from it, people have to use it in an appropriate way. Thus, the anticipated outcomes cannot be derived merely by implementing ERP systems rather than based on its subsequent utilisation and acceptance by the users (Rikhardsson & Kræmmergaard 2006). This suggests that the perspective of considering ERP systems as a 'deterministic' technology is not valid (Boudreau & Robey 2005) and leads to exploration using the emergent process approach, which challenges the notion that technology is an autonomous and external force. This approach argues that the technology results from the ongoing interaction of human choices, actions and organisational contexts (Orlikowski 2010). It is used by ERP systems researchers to understand how knowledge barriers emerge in the implementation and suggest a mechanism to avoid and address the pitfalls of these barriers. Moreover, organisational learning is suggested as a foundational theoretical lens to understand the complexities and dynamics in ERP systems implementation. Although various scholars have attempted to understand the effects of organisational learning—such as, ERP systems knowledge and exploration (Marabelli & Newell 2009) and ES benefits (Teo, Singh & Cooper 2010)—what remains poorly understood is how ERP systems implementation and organisational learning co-emerge. In addition, the role of CoPs in organisational learning and ERP systems implementation has not received much attention from researchers. Although some efforts have been made to investigate the role of CoPs in organisational leaning, such as top management support for knowledge management though CoPs and the role

of different stakeholders in community emergence (Wang & Ramiller 2009), these studies did not elaborate on how organisational learning and CoPs constitute each other.

These two concepts provide a unique opportunity to comprehend ERP systems implementation and usage better. Therefore, detailed examinations of these two concepts—organisational learning and CoPs—are presented in the next two sections.

2.3 Organisational Learning

2.3.1 Introduction

The history of research on organisational learning is comprehensive and spans over 40 years (Argote 2011; Argote & Miron-Spektor 2011). However, Cohen and Sproull (1996) noticed significant advancement and attention in the field in recent times, and a recent survey by Argote (2011) in organisational studies showed that this field of research is growing. According to a comprehensive literature review undertaken by Easterby-Smith (1997), there were as many published articles referring to organisational learning in 1993 as there were in the whole decade of the 1980s. It was noted that mainstream publications on organisational learning are fragmented and cover numerous issues, ranging from the theoretical, to the practical, to the descriptive view of best practice (Roberts et al. 2012). This review of organisational learning literature begins with a concise discussion on the theoretical background of organisational learning and later focuses on the cognitive view of Argyris and Schön (1978, 1996) on organisational learning.

2.3.2 'Organisational Learning' versus the 'Learning Organisation'

Despite the popularity of organisational learning, the review of the literature revealed that researchers have little consensus in terms of definition, perspective, conceptualisation and methodology. An extensive review of the organisation literature revealed that two terms are being widely used without comprehensible clarifications: 'organisational learning' and 'learning organisation' (Örtenblad 2001; Dodgson 1993). It is important to illustrate the difference because they describe different means and thus should not be used reciprocally(Örtenblad 2001). Organisational learning describes the process and behaviours that make an organisation learn, whereas learning organisation is a proposition

of the ideal characteristics of an organisation. The particularity between these two is explained by Argyris and Schön (1996, p. 67):

> One stream of literature—perspective, practice-oriented, values oriented, value-committed, sometime messianic, and largely uncritical-treats the phrase, 'learning organisation', as the catchword or what it is front-running. Organisations are doing and whatever the rest of the word needs to do to catch with them.
>
> The second stream, also probably stimulated by the ideas in good currency triggered by the wave of the new global competition, treat organisational learning in research topic for scholars, mainly in schools of management and business. The second branch acquired to be distant from practice, sceptical of first-branch claims, no perspective, and neutral with respect to its definition of learning—that is open to the view that learning maybe good or bad, linked or not linked, to effective actions or desirable outcome.

Along with Argyris and Schön's comprehensive explanation of organisational learning, other scholars have also defined this term. These definitions, as summarised by Jap (2008), are presented in Table 2.4.

Table 2.4: Organisational Learning Definitions

Year	Author	Definition of Organisational Learning
1978	Argyris and Schön	Organisational learning is a process of detecting and correcting errors.
1984	Draft and Weick	Organisational learning is acquiring knowledge about the interrelationships between an organisation's actions and its environment.
1985	Fiol and Lyles	Organisational learning is a process of improving actions through better knowledge and understanding.
1989	Strain	Organisational learning is the principal process by which innovation occurs. The author argues that the rate at which learning occurs defines the organisational learning.
1990	Senge	An organisation where people continuously involve themselves in the process of enhancing their learning capacity to achieve the anticipated results, where the patterns of thinking are redefined and nurtured, where collective application aspirations are set free and where people are continually learning how to learn, is referred to as a learning organisation.
1991	Day	Organisational learning comprises the following processes: open minded inquiry, informed interpretations and accessible memory.
1991	Huber	An entity learns if, through its processing of information, the range of its potential behaviour is changed.
1992	Lee, Courtney and O'Keefe	The organisational learning process is a cycling process in which individual actions lead to organisational interaction with the environment and the responses of the environment are interpreted.
1998	Snell and Chak	Learning is a meaningful change in the process, structures, assumptions or concerns that connect individual members.

2000	Robey, Boudreau and Rose	Learning is an organisational process both intentionally and unintentionally.
2001	Broendsted and Elkjaer	Learning is a tool facilitating access to and participation in social practice, including a shift from peripheral position to becoming a full member of a particular CoP.
2003	Heiskanen and Assinen	Learning is a reflective practice via different action strategies.
2006	Bondarouk	Learning is experience-based group learning: acting, reflecting. Knowledge disseminating, sharing understanding, and mutual adjustment.
2007	Janson, Cecez-Kecmanovic and Zupančič	Learning is the ability to question individual and collective assumption and work processes and change them together with the described goals in response to changing social, economic, political and commercial environments.
2011	Argote	Organisational learning can be conceived as having three sub-processes: creating, retaining and transferring knowledge.
2012	Roberts et al.	Organisational learning theory is concerned with the development of insights, knowledge and associations between past actions, the effectiveness of those actions, and future actions.

These various definitions highlight the different conceptualisations and explanations of organisational learning, and the lack of consensus among scholars. It is notable from the different definitions that certain scholars have adopted a 'process-oriented' perspective while others have maintained a descriptive perspective to rationalise the state of organisational leaning. Although there is no agreed definition or explanation of organisational learning, these various conceptualisations can be classified along two dimensions: the descriptive and the normative (Robinson 1995; Robinson 2001). Each dimension is now discussed in greater depth.

2.3.3 Descriptive and Normative Views of Organisational Learning

The descriptive view sees organisational learning as a commonplace process of dynamic organisational routine, in the light of opinions from the inside or outside environment. In contrast, the normative view is considered by some a relatively exceptional experience that occurs only under certain conditions. Actors who support this view seek to understand the operations of organisations to determine how this learning can best be achieved.

According to the descriptive view of organisational learning, actions are corrected as an outcome of the interpretation of feedback. The lessons learnt through experiences are captured in such a way that they can be available to those who have not experienced the lessons, either directly or indirectly. These practices are then transferred to others via

formal and informal socialisation exercises, and also recorded in the organisation's collective memory (Levitt & March 1988). Many scholars within descriptive studies believe that there is no single best way for organisations to learn, and there is a good probability of misinterpretation of feedback resulting in the wrong correction of subsequent action (Fio & Lyles 1985; Levitt & March 1988).

In contrast, the theorists who follow the normative view of organisational learning believe learning is a collective activity that only occurs under certain conditions. They further view organisational learning as a means of organisational improvement that does not happen by chance or random actions, but through the progress and utilisation of specific skills. In the absence of set actions or intervention, the organisation will inhibit learning through many forces or barriers. These descriptive theorists, as well as practitioners, focus on learning about the conditions that construct excellence in organisational learning, so that organisations will be more capable of readily making changes that solve rather than hide problems (Robinson 1995; Robinson, 2001).

Theorists subscribing to the normative view (Leithwood, Jantzi & Steinbach 1995; Leithwood, Leonard & Sharratt 1998; Argyris & Schön 1978; Senge 1990; Rait 1995; Garvin, Edmondson & Gino 2008) believe that organisational life is not favourable to learning. According to Senge (1990), organisational learning barriers or 'disabilities' emerge because of the ways that individuals have been trained to think and act. Limited cognitive skills and capabilities of individuals often cause poor performance and organisational failure. Organisational learning is especially difficult when problems involve dynamic complexity, that is, when cause and effect are not closely related in time and space and change does more harm than good (Kim & Senge 1994). Thus, the complexity of the system weakens an organisation's ability to learn from past experience. In an effort to avoid or solve these learning problems, normative theorists look to organisational leaders to set up proper conditions that are prerequisites for and conducive to organisational learning taking place.

2.3.4 Argyris and Schön's Theory of Organisational Learning

Many scholars have contributed towards the organisational learning literature; however, Lipshitz (2000) argued that Argyris and Schön's contributions are more prominent than the others. His claim is supported by Easterby-Smith (1997), who proposed that the literature in organisational learning comprises six different disciplines using distinct ontologies and focusing on different aspects: sociology and organisational theory, strategy, production management, psychology and organisational development, management science, and cultural anthropology. Easterby-Smith (1997) noted that Argyris and Schön (1978) have contributed to at least two of the six disciplines. He further elaborated his claim by explaining that Argyris and Schön conceptualised the psychology and organisational development discipline, contributing the themes of cognition and underlying values, the problematic of defensive routines and the transfer of knowledge from individual to collective learning. Their second major contribution is in the discipline of management science, which involves the theme of knowledge, error correction, and single-loop and double-loop learning. This work is highly applicable to the theme of conflict and organisational politics, which is part of the discipline of sociology and organisational theory. In the light of these claims, it is fair to summarise that Argyris and Schön's contribution towards organisational learning is more prominent than that of any other author or group.

Fulmer and Keys (1998) supported Easterby-Smith's views about Argyris and Schön's prominent contribution in the organisational learning discipline in an article in *Organizational Dynamics* with the title 'A Conversation with Chris Argyris: The Father of Organizational Learning'. Similarly, Abernathy (1999) praised the work of Argyris and Schön in the field of organisational learning in an article in *Training and Development* titled 'A Chat with Argyris, a HRD Guru'. Despite their major contribution and influence, Lipshitz (2000) argued that their work is rarely followed or understood, although it is frequently referenced. The fact that Argyris and Schön have left their mark principally on the rhetoric of organisational learning is unfortunate, because their works have much more to offer to both researchers and practitioners of organisational learning.

Argyris and Schön's (1996) famous theories of single-loop and double-loop learning have been developed from their theory-in-use (see Figure 2.5), and their theory-in-use is based

on their theory of action. Their theory of action refers to organisational task knowledge, which may be variously represented as systems of beliefs that underline action and as prototypes from which action is derived. They argued that theory of action has the advantage of including strategies of action, the values that govern the choice of strategies, and the assumptions upon which the overall theory is based. This theory of action is applicable to both individuals and organisations, and may take two distinct forms. The espoused theory represents the theory of action, advanced to explain or justify a given pattern of activity. In contrast, the theory-in-use denotes the theory of action implicit in the performance of that pattern of activity.

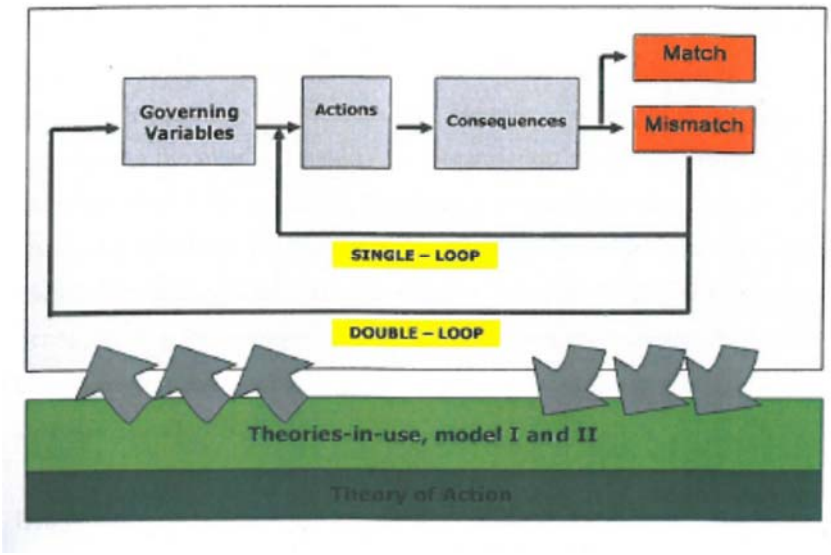


Figure 2.5: Argyris and Schön's (1999) Presentations of Single-Loop and Double-Loop Learning

According to Argyris and Schön, if human beings deal with issues that are embarrassing or threatening, their reasoning and actions follow a particular model of theory-in-use, which they call 'Model I Theory-in-Use'. Model I informs the actions that enter into the primary learning loop, but also inhibits double-loop learning. However, if human beings could examine the mistaken assumption, reconcile incongruities, make specific any vagueness, test notions, bring together scattered information to make meaningful patterns, and bring to the surface previously withheld information, these conditions, which are all enablers of double-loop learning, are also the key components of a Model II Theory-in-Use, which give rise to primary inhibitory loops. Argyris and Schön summarised that

single-loop learning and double-loop learning are consequences of learning from Model I Theory-in-Use and Model II Theory-in-Use schemes respectively.

According to Argyris and Schön (1996), organisational learning's system reciprocally depends upon the theories-in-use that individuals convey to their behavioural worlds. Individuals' theories-in-use help to develop and sustain an organisational learning system. However, this learning system adds to the strengthening and restructuring of each individual's theory-in-use. One of the most important kinds of double-loop learning is second-order learning, in which members of an organisation investigate and reshape the organisation's learning system. This second-order learning is the prevailing paradigm of organisational inquiry. It occurs as a result of a shift from the conditions for Model I Theory-in-Use to the conditions for Model II Theory-in-Use learning. Gregory Bateson (1972, cited in Argyris & Schön 1996, p. 29) called second-order, deutero learning and Pentland (2003) called Argyris and Schön's single-loop learning and double-loop learning operational and strategic learning respectively.

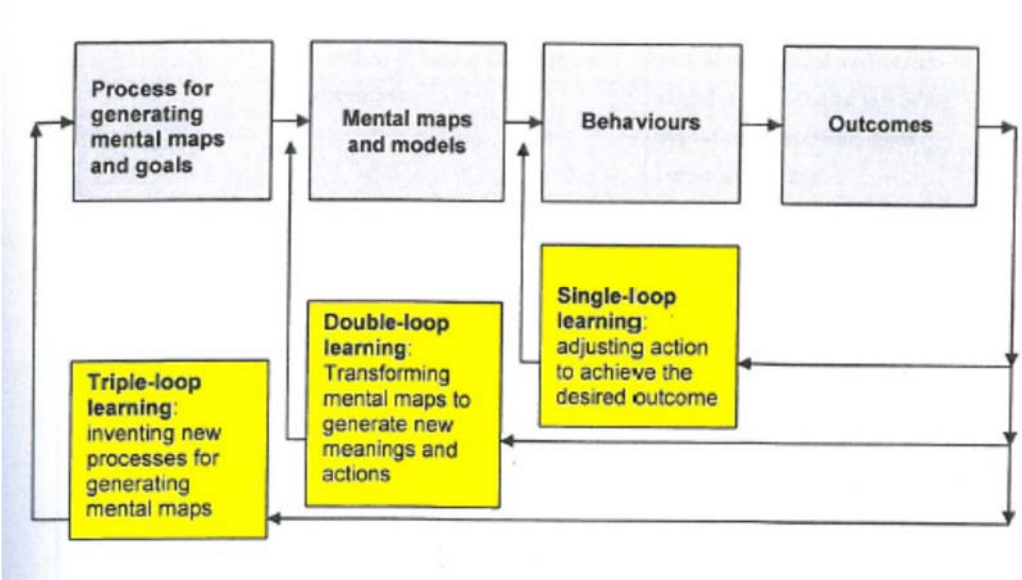


Figure 2.6: Single-, Double- and Triple-Loop Learning (Snell & Chak 1998, p. 339)

In the light of Argyris and Schön's theoretical approach, other researchers have further developed theoretical models for organisational learning, such as Snell and Chak (1998), who proposed a level of learning framework for organisational learning as shown in Figure 2.6. They claimed that previously designed models by Argyris and Schön (1978), Hawkins (1991, 1994) and Torbert (1994) have each identified various systemic levels of

learning for individuals and organisations. They proposed four levels of learning, as opposed to the original two levels by Argyris and Schön. The first level is 'zero (loop)' or 'not learning'; the second is single-loop learning; the third is double-loop learning; and the fourth is deutero- or triple-loop learning. This level of learning framework from Snell and Chak (1998) is essentially an interpretation of Argyris and Schön's single-loop and double-loop learning organisational learning theory and organisational deutero-learning.

Level of learning	Manifestation for individuals	Manifestation for organizations
Not learning	**Isolation**—failure to receive feedback on actions, failure to take in any new information.	**Fragmentation**—no linkage between individuals' mental models and shared mental models. Loss of the individual means loss of that person's expertise.
Single loop learning	**Adapting**—becoming more skilful; registering that one's actions are not achieving their goal, adjusting one's actions to increase the possibility of achieving the goal.	**Consolidating**—adding to the firm's knowledge and competency base without altering present policies, present objectives, present mental maps or basic activities.
Double loop learning	**Developing**—choosing to learn different kinds of skill; understanding why one's prior meaning-making or goal-seeking systems were inadequate and led to incongruities and omissions. Reframing problems from a position of deeper insight.	**Transforming**—changing the firm's knowledge and competency base by collectively reframing problems, developing new shared paradigms or mental maps, modifying governing norms, policies and objectives.
Deutero or **triple loop** learning	**Inventing**—becoming aware of the limitations of *all* grand frameworks; creating ways of coming up with new structures of thought and action suitable for particular occasions and monitoring the effects of these frames.	**Co-inventing**—collective mindfulness. Members discover how they and their predecessors have facilitated or inhibited learning, and produce new structures and strategies for learning.

Figure 2.7: Levels of Learning (Snell & Chak, 1998 p. 340)

This model, as shown in figure 2.7, of organisational learning provides a well-developed theoretical foundation to highlight and categorise different levels of learning involving both individuals and organisations. However, this model does not describe how different learning levels emerge and operate together. In addition, it does not address how the collective mindset can affect organisational learning. The recognition of these limitations in Argyris and Schön's (1996) (and various developments) and the search for a conceptual link between IS and organisational learning lead to an examination of the concept and different stages of 'community of practice', which will be discussed in Section 2.4.

2.3.5 Conclusion on Literature Review on Organisational Learning

This section discussed the literature associated with organisational learning. It elaborated the difference between 'organisational learning' and 'learning organisation'. It was noted that there is no prescribed definition of 'organisational learning' and different scholars have categorised organisational learning in two dimensions: descriptive and normative. This was discussed to conceptualise organisational learning. Finally, the theory by Argyris and Schön (1978) and its extension by Snell and Chak (1998) were discussed. Although the respective theory and model by these authors present a good level of learning, it is not clear how these different levels emerge and interlink between these levels. Considering the limitation of these models, the concept of CoPs can be used to elaborate the emergence of these different organisational learning concepts. The next section will discuss the CoPs in detail.

2.4 Communities of Practices

Earlier in this review, a description was provided of the learning paradox, whereby formal programs for increasing organisational learning might be resisted despite their potential positive effects. The learning paradox is less apparent because improvement is increased through learning that is disconnected to the formal training efforts; however, knowledge barriers are overcome through learning that emerges from the social context of the work. One reason for resisting formal training is that adopters of IT prefer to learn from trusted colleagues who understand the relevant details of the work as practiced (Robey, Boudreau & Rose 2000). This type of learning is situated in practice rather than conveyed through formal means. Wenger (1998, p. 31) used the term 'situated learning' to describe the view that 'learning is an integral and inseparable aspect of social practice'. Thus, users of IT are likely to learn about new technologies through learning that is situated in practice rather than learning from formal training programs. Because work practice differs fundamentally from the way that organisations describe their operations in manuals and training programs, situated learning should be regarded as an important, consequential process (Brown & Duguid 1991). Indeed, situated learning may provide benefits to the organisation that are unattainable through other means. The relevant network of

participants who share the same enterprise—that is, a 'community of practice'—may be effective in overcoming barriers to learning a particular application of IT (Lave 1991 1993; Lave and Wenger 1991; Brown & Duguid 1991; Robey, Ross & Boudreau 2002; Robey, Boudreau & Rose 2000; Marabelli et al. 2013).

2.4.1 What is Community of Practice?

Although there are many definitions of CoPs, the definition of Hildreth, Kimble and Wright (2000) is relevant and useful for this study. The authors defined CoPs as 'a group of professionals informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge' (p. 3). A related definition comes from Wenger, McDermott and Snyder (2002, p. 7), who defined CoPs as 'groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis'. Although the use of the term has become quite widespread, the term actually stems from theories based on the idea of learning as social participation (Wenger 1998). It is important to note that CoPs and IT are intertwined because they support each other: CoPs help the adoption of IT and IT can act as a linkage mechanism between different CoPs (Pan & Leidner 2003).

According to Wenger (1998, pp. 73–85), mutual engagement, joint enterprise and shared repertoire are the dimensions of a CoP. The first component is mutual engagement. Practice does not exist in the abstract, so CoPs reside among people engaged in certain common actions or ideas. This is an important factor because it means that CoPs can be formed from members of different social categories or from different geographic regions. The second component is joint enterprise. Wenger stated that the importance of the joint enterprise is constantly renegotiated by the individual members. The joint enterprise goes beyond stated goals (e.g. mission statement or objectives), and creates mutual accountability among participants. The third component is a shared repertoire: 'The repertoire of a community of practice includes routines, words, tools, and ways of doing things, stories, gestures, symbols, genres, actions, or concepts that the community has produced or adopted in the course of existence' (Wenger 1998, p. 83). The above ideas are very much related to the ideas of Brown and Duguid (1991). In their seminal study, the authors explained that the creation of knowledge within CoPs is characterised by three

key elements. These include (1) narratives, used for diagnosing problems and representing repositories of existing knowledge; (2) collaboration, fuelled by participants engaged in and sharing common practice; and (3) social constructivism, whereby participants develop a common understanding of their practice and how to solve problems. Brown and Duguid based their findings primarily on ethnographic studies undertaken by Orr (1986, 1990, 1996). These studies are important, according to Brown and Duguid (1991), because they help to illustrate how organisations depend upon complex relationships between groups. Such relationships (as far as organisations are concerned) do not formally exist, but may be most responsible for performance. Through these informal relationships, knowing is validated and shared, and evolves through processes by individuals who engage in the negotiation of meaning and through sharing insights and narratives.

Brown and Duguid (1991) argued that situated learning emerges as a response to a situation when top management assumptions and core beliefs become different from those of the staff. As a result of such a misunderstanding, many modern processes and technologies, particularly those designed to down skills, threaten the robust working, learning and innovating communities and practice of the workplace. They further argued that any such intent can render CoPs more invisible and, as a result, the knowledge and experiences gained from the practice can disappear completely. In such a situation, the gap between espoused and actual practice may become too large for communities to bridge. In order to enhance working, learning and innovating, an organisation must close the gap, and this is only possible when the organisation transforms itself into a community of CoPs. To do this, the organisation has to acknowledge and appreciate CoPs and start to view the learning process beyond the traditional ‘canonical abstraction of the practice’ (Brown & Duguid 1991, p 41) to the comprehensive and detailed oriented based on both formal and informal paradoxes.

2.4.2 Characteristics of Community of Practice

There are many characteristics associated with CoP. These include membership composition (homogenous versus diverse), formality (structured and formal versus unstructured and informal), dispersion (distributed versus centralised), location (within organisations or across organisations) and focus (broad versus closely defined). They can

be small or large; however, smaller CoPs can develop a higher level of trust. Further, within the circle of a small CoP, initial discussion and feedback normally demonstrate less fear of failure in front of a larger group. CoP is characterised by mutual learning, shared practice and joint exploration of ideas. These communities can further be strengthened through their collaboration across time and distance by the use of shared artefacts (Hildreth, Kimble & Wright 2000). The CoPs provide the individuals with a social platform for interactions and, consequently, their interactions lead to knowledge creation and learning. Therefore, a deeper insight into these social interactions is necessary to understand the process of knowledge acquiring and learning (Jakubik 2008). This learning process in work place is connected to continuous activities and practices, which are carried out by CoPs with the help of social interaction rather than by isolated individuals.

2.4.3 Participation in Community of Practice

The importance of CoPs stems from the realisation that knowledge is not disjointed from its context (Pan & Leidner 2003). In different knowledge-acquiring activities, the knowledge seekers require a common platform to share knowledge, experiences and expertise with other people who do what they do. Such a knowledge-acquiring and participation process was explained by Lave and Wenger (1991) through the concept of legitimate peripheral participation (LPP). According to Wenger, McDermott and Snyder (2002), LPP is the process by which newcomers in a community acquire the knowledge required to be a community member, through gradually increasing levels of participation in communities during which they simultaneously move from being peripheral members of the community to becoming central and legitimate members of it. According to Lave and Wenger (1991), learners must have access to the peripheries of communities, for example, tacit knowledge passed from the experienced people, actual observations and reflection on work practices or participation in work in progress. At the periphery, they learn what constitutes acceptable practices and how to communicate properly (George, Iacono & Kling 1995). Through this process, they eventually become practitioners and insiders, and then pass the tacit knowledge to newcomers.

LPP is a type of situated learning, and it is a process that reiterates the view that learning is fundamentally a social process rather than solely psychological. Lave and Wenger

supported their theory through observations of different apprenticeships (Yucatec midwives, Vai and Gola tailors, U.S. Navy quartermasters, meat cutters and non-drinking alcoholics in Alcoholics Anonymous). In these situations, people initially join communities and learn from the periphery. As they become more competent, they move closer to the centre of each particular community. Thus, learning is not seen as the acquisition of knowledge by individuals so much as a process of social participation. The nature of the situation as the social context significantly affects the process of learning and participation in the community. As Brown and Duguid (1991, p. 48) point out, in learning occurring through practice, 'the central issue in learning is becoming a practitioner not learning about practice' (p. 48).

2.4.4 Top Management Role in Community of Practice

The role of management is quite significant for cultivating CoPs (Krishnaveni & Sujatha 2012; Zboralski 2009). The top management should consider the CoPs an extra opportunity to enhance the performance and play its role by supporting the CoPs rather than destroying them (Krishnaveni & Sujatha 2012). It is important to note that the role in CoPs is different than the traditional management in that it does not involve reporting on the relationship between the CoP and the sponsor (Thompson 2005; Wenger 2004). These authors recommend that the management role be to 'seed' resources into emerging CoPs that can demonstrate that they can add to value chain. Zboralski (2009) suggested that the top management should use a precautionary approach while dealing with a CoP because excessive interfering might hinder the CoP members' interactions. However, the top management should be well aware of all the members of the CoP and provide them with the required support in terms of time for members to participate, technical infrastructure and an awareness of knowledge sharing. In addition, Wenger, McDermott and Snyder (2002) recommended having a sponsor who can provide assistance in the formation and development of a CoP. This sponsor can have diverse responsibilities and roles. For instance, a sponsor can be a control agent who has the responsibility to involve top management in control processes and requires the leader of the CoP to provide a specified number of best practices to be developed within the CoP in specified time intervals (Krishnaveni & Sujatha 2012).

Various authors have also recommended having a governing structure for CoPs—regrouping leaders from different CoPs in an organisation so that they can discuss common issues, content problems, technical deficiencies and ways to obtain support from the top management by justifying the positive implications of CoPs for organisations (McDermott 1999; Spencer et al. 2003; Borzillo 2009). Similarly, other authors emphasise the importance of the 'sponsor's social role as the CoPs' link to senior level management (Fontaine & Millen 2004; Wenger 2000, 2004; Wenger, McDermott & Snyder 2002).

2.4.5 Conclusion on Literature Review on Community of Practice

This section briefly described the important concepts related to CoPs. It highlighted the importance of situated learning in IS implementation in general and ERP systems in particular. It was noted that various definitions exist for CoP and, therefore, the different characteristics of CoPs were elaborated. In addition, some popular themes relevant to this study (e.g. participation in CoPs and top management) were discussed. This completes the review of the learning theories of organisational learning and CoPs, which are used to understand ERP systems implementation and use from an organisational learning perspective. The next section will discuss some of the efforts being made to understand this phenomenon.

2.5 Research Questions

The diversity of research on ERP systems highlights a number of different levels of analysis offering interesting new perspectives into the complexities of the ERP system artefacts and the organisational context. The review of the literature highlighted that much has been written about ERP systems implementation and use. Unfortunately, the majority of the research (such as the articles on CSFs) has been survey based without a strong underlying theory; hence, the utilisation of strong theoretical development and rigorous research design is needed (Grabski, Leech & Schmidt 2011). A successful ERP systems implementation can provide many benefits for the adopting organisation. However, the review of the literature highlights that even now organisations are struggling to achieve the anticipated benefits from ERP systems implementation. In addition, the literature on

ERP systems implementation has grown exponentially and most studies have adopted either the deterministic approach or the emergent process approach. The deterministic stream of research argues that ERP systems are autonomous external forces that have a deterministic influence on the user organisation (Botta-Genoulaz, Millet & Grabot 2005), and studies following this approach often ignore the human aspect of ERP systems implementation (Wagner & Newell 2004). In contrast, the emergent process approach considers ERP systems implementation as an actor that interplays with the human actors and intertwines with the organisation through a complex ongoing process (Markus & Tanis 2000; Wagner & Newell 2004). This particular stream provides a strong platform for comprehending the ERP systems implementation process in detail as a part of organisational development (Marabelli & Newell 2009). However, this view also has some limitations because it does not provide in-depth analysis of the ways in which organisations can develop well with ERP systems, especially in a complex and dynamic environment (Markus & Tanis 2000; Wenger 2004; Kallinikos 2004; Staehr, Shanks & Seddon 2012). Moreover, the key challenge for an organisation implementing an ERP systems, as emphasised in the literature, is to comprehend and enact new business processes inscribed in ERP systems and thus undergo a profound organisational change.

The thesis addresses this challenge by approaching ERP systems implementation as an organisational learning process. The learning is significant and prerequisite to achieving the anticipated benefits from ERP systems implementation (Tomblin 2010; Shang & Seddon 2007; Staehr, Shanks & Seddon 2012). In addition, organisational learning is imperative because learning about the interaction of people during ERP systems implementation reduces the complexity and decision uncertainty of the process (Tomblin 2010). Researchers have called for inquiries to understand the co-emergence of organisational learning and ERP systems implementation. However, recent ERP systems literature reviews (Esteves & Bohorquez 2007; Esteves & Pastor 2001; Jacobs & Bendoly 2003; Moon 2007; Botta-Genoulaz, Millet & Grabot 2005; Grabski, Leech & Schmidt 2011) have indicated that the majority of ERP systems research focuses on ERP systems selection, success factors and the economic effects of the implementation, but seldom on understanding the learning process in ERP systems implementation. This identifies a very important research gap and a rationale for studies on ERP systems use and learning.

This thesis set out to fill this research gap by conceptualising ERP systems implementation as an organisational learning process. The main research questions, which helped in undertaking this in-depth investigation, are:

1. How does organisational learning emerge and assist actors in an ERP implementation?
2. How do CoPs facilitate organisational learning during an ERP implementation?

To answer these research questions, two theories of learning are used: CoPs, and single- and double-loop learning. The reason for choosing CoPs to explain organisational learning is that the chosen theory alone does not explain how this learning emerges. CoPs, which promote situated learning, have been suggested as an alternative to overcoming knowledge-related issues that inhibit learning(Lave 1991, 1993; Lave & Wenger 1991; Brown & Duguid 1991; Robey, Ross & Boudreau 2002; Robey, Boudreau & Rose 2000; Marabelli et al. 2013). Unlike formal training, situated learning depends on individual participation in CoPs, in which new members learn from experienced members (Lave & Wenger 1991). Lave and Wenger (1991, p. 31) use the term 'situated learning' to describe the view that 'learning is an integral and inseparable aspect of social practice'. Thus, users of IT are likely to learn about new technologies through learning that is situated in practice rather than learning from formal training programs. CoPs' role in IT implementation is significant because they provide contextual knowledge that is embedded in organisational practices and are more appreciated by the staff than abstract knowledge, which is normally offered during formal training sessions (Ke & Wei 2006; Robey, Ross & Boudreau 2002; Lave, 1991, 1993; Lave & Wenger 1991). In the case of ERP implementation, despite the billions invested in ERP systems and associated training, many users still lack the know-how to leverage computing to their work successfully. The traditional literature on teaching methods and individual learning seems inadequate to explain how workers are able to learn about these systems, not as a series of isolated abstract skills, but as an integral part of their work practices (George, Iacono & Kling 1995). This is evident from the ERP literature, in which formal training is often reported as ineffective and inadequate for learning (Nicolaou 2004a; Tsai & Hung 2008; Kerr et al. 2012; Venugopal & Rao 2011, Al-Mashari & Al-Mudimigh 2003; Xue et al. 2005; Wheatly 2000; Grossman & Walsh 2004; Hsu, Sylvestre & Sayed 2006). Although researchers have called for investigations into how CoPs constitute organisational learning (Robey, Ross & Boudreau 2002; Broensted & Elkjaker 2001), recent reviews

reflect that this area is still under research. Both of the research questions have been formulated in direct response to the need to explain the complexity and emergent nature of ERP systems implementation through the lenses of CoP and organisational learning theories.

2.6 Conclusion

The review of the literature highlighted that despite the popularity of ERP systems, ERP systems implementation is still yielding disappointing results: over budgeting, low payoffs, dissatisfied users and no increase in organisational effectiveness. However, such failures are not experienced uniformly; a growing number of studies have documented contradictory results by comparing organisations that have implemented and used the same ERP system. The relative ability of each organisation to learn and use the same technology can be considered a way to account for such differences.

Organisational learning is a means to explain and overcome the implementation problems and use of IT. Such an understanding has been particularly important for companies because of their high investments, long-term commitments and implications, and the high risk of failure. Although the importance of organisational learning for ERP implementation is highlighted by many, this unique aspect has not been studied extensively. This research aims to advance the understanding of ERP systems implementation from an organisational learning perspective.

In the literature, Argyris and Schön's theory of single-loop and double-loop learning has been extensively used by IS researchers as a theoretical lens to comprehend how IT facilitates organisational learning. In the literature, it was also noted that formal programs for enhancing organisational learning might be resisted despite potential positive effects, because adopters of IT prefer to learn from their colleagues and this learning is situated in nature and often referred to as 'situated learning'. CoPs, which are often cited in the literature, provide a platform for situated learning to occur. Because these two theoretical lenses have the potential to provide deeper insights into the research deficiencies, they are brought forward.

The research questions were formulated in direct response to the research deficiencies, with the objective to improve understanding about ERP systems implementation and use. The questions are: How does organisational learning emerge and assist the actors in an ERP implementation? How do CoPs facilitate organisational learning during an ERP implementation?

The objective of the literature review was to provide an introduction to the study's methodology and theory in the fieldwork. It presents the findings in the context of the study's philosophical perspective, facilitating discussions that integrate both findings and past studies. The next chapter outlines the philosophical position of the study with regard to research, provides a detailed description of Bravo and describes the method and tools used to collect and analyse the data.

Chapter 3: Research Methodology

3.1 Chapter Overview

This chapter presents the philosophical assumptions underlying the research and provides arguments for the selection of the specific research methods used with the ultimate goal of answering the following research questions:

1. How does organisational learning emerge and assist the actors in an ERP implementation?
2. How do CoPs facilitate organisational learning during an ERP implementation?

This chapter describes and justifies the choice of theoretical perspective, methodology and subsequent research methods, all selected with the ultimate goal of addressing this thesis's research objectives and research questions. Following on from this section, the process that was adopted in carrying out the research is described, including data collection, data analysis and interpretation. The last section discusses the possible research limitations and ways in which they were addressed, along with the ethical considerations made throughout the study.

3.2 Theoretical Grounding

In the light of Crotty's (1998) discussions on the foundation of social research, the epistemology, theoretical perspective, methodology and research method on which this research project is based are now presented as an explanation for the method adopted to answer the research questions and objectives.

The research design for this study is based on the research objectives and questions explained earlier. According to Jenesick (1999) and Cheek (2004), in developing a research design, the following five principles need to be cautiously considered:

1. the connection of the design of the empirical study to the paradigm or perspective being used,

2. the materials that allow the researcher to address the problems of praxis and change,
3. the target of the study (who and what),
4. the strategy of inquiry that will be used, and
5. the preferred method or research tools that will be used for collecting and analysing empirical materials.

The literature reviewed listed various approaches to IS and the dominant approach was the positivistic. According to Orlikowski and Baroudi (1991), IS research can be classified as positivist if there is confirmation of a formal proposition, quantifiable measures of variables, hypothesis testing and conclusions drawn about the phenomena, from a representative sample to an affirmed population. Denzin and Lincoln (2000) added that the positivistic approach is primarily quantitative in nature and highlights the importance of the measurement and analysis of casual relationships between the variables. Champions of positivistic studies argue that their work is achieved from within a value-free framework. However, this claim is not necessarily precise. Positivist research design places a premium on the early identification and development of research questions, a set of hypotheses, the location of research sites, and the development of a statement concerning sampling strategies as well as a specification of the research strategies and method of analysis that will be employed. Trauth (2001) observed that, given the positivistic research tradition in North America, it is not surprising that early research in IS was dominated by the positivistic tradition (Eisenhardt 1989; Lee 2001; Markus 1983; Paré & Elam 1997).

In the 1990s, interpretive research appeared as an important aspect in IS research (Walsham 1995), and has since become a legitimate research approach in IS. Interpretive research has been related with qualitative research. 'Qualitative' places an emphasis on the *qualities* of entities and the *processes* and *meaning* that are not experimentally examined or measured in terms of quantity, amount, intensity or frequency. Qualitative research emphasises the socially constructed nature of reality, in some cases the close relationship between the researcher and the research subject, and the situational constraints that outline inquiry (Walsham 1995). In addition, qualitative research recognises the value-laden nature of (any) inquiry, and the ways in which social experience is both created and given meaning.

The choice of research method and methodology was informed by a theoretical perspective embedded in the constructivist epistemology. Different theoretical perspectives imply different research methods and constructive epistemology leads to several theoretical perspectives. Interpretive was chosen as the research approach because it assumes human or social actions are inherently meaningful, and to understand the meanings of an action, a researcher needs to interpret the action's meanings, and what it does in the given context (Schwandt & Marquardt 1999). To achieve these interpretive objectives, the researcher conducts 'the systematic analysis of socially meaningful actions through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds' (Neumann 2003, p. 62).

Interpretivist research is used to develop an understanding of social life and to study complex phenomena. Nandhakumar and Jones (1997) argued that interpretivist research is also used to comprehend the phenomenon from the participant's point of view, and always constitutes interpretation by both researcher/s and actor/s. They further argued that this approach considers the social world as an internally created, fluid and fragile entity that exists as people experience it, and people thus give it meaning. Further, Neumann (2003) suggested that people may or may not experience reality in the same way, so diverse interpretations of reality are likely. Interpretivist and critical researchers argue that researchers are inherently implicated in their research. Walsham (1995) observed that the interpretivist researcher questions the possibility of being value for either researchers or actors, and also visualises importance and meaning in everything. However, interpretivist researchers do not consider one set of values superior to others.

The aim of this research is to acquire an understanding of the thoughts of individuals and groups in organisational and social contexts, with the goal of achieving deep insights into ERP systems phenomena and organisational learning; therefore, an interpretive field study is the preferred method. Klein and Myers (1999) suggested a set of principles for carrying out and evaluating interpretive field studies in IS. These principles are now briefly discussed, because they are applicable to this research and its legitimacy and rigour.

Through the analyses of the case data, I investigated how the company and its members engaged with the SAP and interpreted it in their own practices. I followed up their stories regarding their experiences with the SAP and the ways in which they engaged with it and used it throughout the implementation phases. The deep analysis allowed me to understand how they learned as individuals and groups (departments), and how the company as a whole learned. To interpret the case, I used existing theories of organisational learning, that is, single and double-loop learning and CoP. Following the principle of abstraction and generalisation by Klein and Myers (1999), such interpretation leads to a processual model of SAP implementation and organisational learning in the case company. This model presents an abstraction from and theoretical generalisation of empirical data.

During the analysis of the empirical data, I applied the principle of multiple interpretations (Klein & Myers 1999) by looking into the environment within which the particular interviews took place and the broader organisational contexts present at the time of the events the interviewees talked about. Consulting documents were also very helpful for understanding the contexts and processes at different phases of the project. By applying the principle of multiple interpretations, I was able to see the bigger picture and wider context of the experiences and stories reported by interviewees; I was then able to interpret them within their context. This increased my ability to understand and appropriately interpret the empirical data.

3.3 Research Methods

3.3.1 Case Study Research

I have chosen an interpretive *case study* as my principal research approach due to exploratory nature of organisational learning and CoPs in SAP implementation, and the revelatory aims of the thesis. First, Klein and Myers (1999) noted that a case study can be critical, positivist (Yin 2009) or interpretivist (Walsham 1993). An interpretive case study investigates a phenomenon in its natural setting through interviews, direct observation, the analysis of documentation and archive records, and the examination of physical artefacts (Benbasat, Goldstein & Mead 1987). Similarly, Walsham (1993) argued that case studies facilitate the main vehicle for research in the interpretivist

tradition. Because the aim of this research is to develop a rich, contextual understanding of how an SAP influences organisational learning, the case study is an appropriate method. It allows a focus on the 'sticky, practice-based problems where the experiences of the actors are important and the context of actions is critical' (Bonama 1985, cited in Benbasat, Goldstein & Mead 1987, p. 369).

Second, Emory and Cooper (1991) suggested that the type of 'research questions' determine the research methodology. Interpretivist case studies concede answering 'how' and 'why' research questions, instead of testing the relationship between dependent and independent variables. In this study, the researcher aimed to understand deeply how organisational learning emerges and assists actors in an SAP implementation. The case study was the preferred method to answer this type of research question.

Third, the emergence of organisational learning in ERP systems implementation is a context-related phenomenon. According to Walsham (1993, pp. 4–5), the interpretivist case study aims at 'producing an understanding of the context of IS, and the process whereby IS influences and is influenced by the context'. He added that a case research method is appropriate when the phenomenon cannot be investigated outside of its context. For this research, the phenomenon of organisational learning emergence in SAP implementation and use is complex, because it involves different hierarchies of the organisation. Implementing and using various ERP systems in different organisations may lead to different payoffs. By selecting this methodology, this study is able to achieve a rich understanding of the complex phenomenon of SAP implementation and use within its natural setting, which further justifies the choice and appropriateness of a case study strategy.

In addition, the co-emergence of organisational learning and CoPs in SAP implementation is a contemporary issue over which the researcher has little control and cannot predict what will emerge from the study. Yin (1998) argued that a case study strategy is especially useful in situations in which the researcher has no control over the events as they unfold. In the process of studying a phenomenon, unexpected issues can arise and new concepts can emerge that add new comprehension to the investigation. Therefore, the highly emergent nature of the study itself justifies adopting the interpretivist case study as a methodology.

Finally, Darke, Shanks and Broadbent (1998) argued that case studies are useful when the phenomenon is broad, complex and underexplored. The co-emergence of organisational learning and CoPs in SAP implementation is a relatively new phenomenon and underexplored. This study is exploratory in nature and therefore the case study strategy is appropriate.

It is important to note that the case study methodology is local and more particularistic by nature. By choosing this method, researchers tend to study fewer cases than their objectivistic counterparts, but in this process, they tend to explore the phenomenon in detail in a certain context. However, various researchers (Lee & Baskerville 2003; Walsham 2006) have argued that such research is still generalisable because the definition of generalisability should be extended to 'the validity of a theory in a setting different from the one where it was empirically tested and confirmed' (Lee & Baskerville 2003). This acknowledges that generalisations can take the form of 'concepts, theories, specific implications and rich insights' (Walsham 2006). Lee and Baskerville (2003) suggested that interpretivist generalisations are forms of generalising from empirical findings to theoretical statements as opposed to generalising from empirical findings to general populations.

Before commencing the study and the formal data collection, several preliminary interviews were held with senior managers and consultants across similar ERP systems implementations to determine which project would be the most appropriate for investigation given the objectives and nature of the study. I chose a case of an SAP implementation at Bravo Australia. Importantly, I obtained the necessary endorsement to carry out a longitudinal case study on this project by Bravo's top management.

3.3.2 Case Selection and Justification

The scope and scale of the research project influences the selection of the case organisation (Brief et al. 1991). In order to study both the organisation that conducted the SAP project and the people who carried out the SAP implementation, it was important to identify an organisation with specific characteristics. The case study organisation had to

have a successful case of SAP implementation coupled with actors who contributed towards this success.

Bravo Australia was selected for a number of reasons, which are briefly discussed below and elaborated further on in this chapter. The case selection focus was an SAP implementation project that had recently been completed and exemplified the relationship with organisational learning. According to Neuman (2010), there needs to be a convincing level of risk and complexity inherent in the project so that a degree of richness in data can be secured. It was widely acknowledged by different scholars that SAP ERP systems implementation project are quite complicated and hence SAP ERP systems implementation was selected. Another motive for selection for Bravo was the practicality of gaining access to Bravo. After several efforts to gain access to various companies and discussions about the prospective SAP projects, a large IT company in Australia called Bravo Australia was chosen.

Moreover, Bravo was selected because of its IT strategy and innovative use of SAP to undertake transformation of its business processes. It was noted that the top management claimed to have a successful implementation in terms of completing the SAP project within the scheduled time; however, the inside story from middle management and operational users was different. It provided the rationale to investigate the SAP project in detail by exploring the related issues and strategies being used to rectify them.

3.3.3 Organisation Profile: Bravo Australia

Bravo is a large, multinational IT solution provider with a rich history straddling approximately 80 years. It has long-term clients including over half the Fortune Global 500 and in every sector—finance, government, healthcare, justice, manufacturing, retail, telecommunications, transport, distribution and utilities.

Bravo World's total revenue extends as far as US$39 billion dollars and is regarded as the world's third largest IT solution providing group. It has an annual investment of more than US$2 billion in researching and developing cutting-edge business technologies, resulting in over 32,000 patents with more being added all the time. It has over 10 million customers and 160,000 professional staff in 60 countries around the world. It manages IT

solution services that generates more than half of the total revenue, approximately 21 per cent for ubiquitous product solutions, 13 per cent for device solutions and the remaining for other solutions as shown in Figure 3.1.

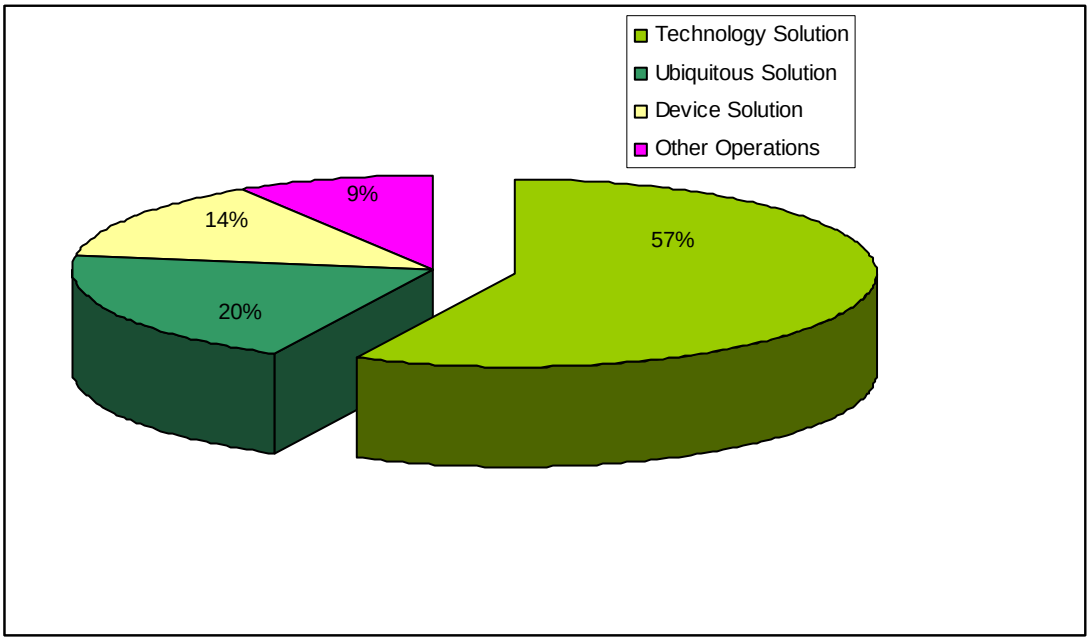


Figure 3.1: Bravo World Net Sales by Business Segment

Bravo World is divided into geographically defined regional business subsidiaries: Asia Pacific and China, Japan, United States and Europe. The Asia Pacific unit is further divided into Australian and New Zealand groups. The Australian region, henceforth referred to as Bravo Australia as shown in Figure 3.2, has a variety of businesses in its portfolio, including products and services, consulting, IT services, software solutions and managed services. This study focuses on Bravo Australia and its implementation of SAP ERP, which is referred to as the 'Bravo SAP project'.

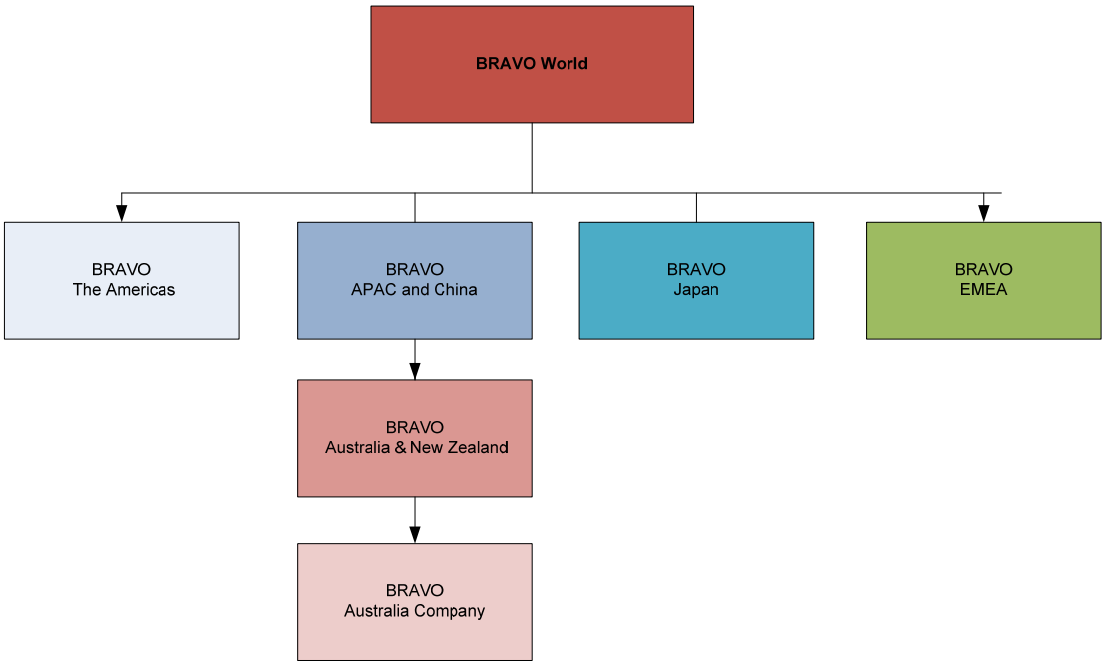


Figure 3.2: Divisional Structure

Bravo Australia is a merger of three different organisations. The first organisation was an organisation that was the original Bravo. It had heritage in infrastructure and outsourcing solutions, and product development. For this particular business, the company was using three different systems. One was a financial system called 'Masterpack'. The second system was called 'Teamwork' and was built in house to provide human resource (HR) and payroll data functionalities. The third system was called 'Cognos and was used for business intelligence. The second organisation was a consulting company that used to run a separate business before the SAP implementation. This company was using Oracle Financials. The third organisation was an enterprise applications specialist company. Because this company had a similar business and structure to the original Bravo, it worked quite well in terms of using the same system.

Bravo Australia provides comprehensive services for IT and communication solutions. They provide consulting, designing, building, operating and other business supports. These supports vary from strategic to infrastructure. Bravo Australia is regarded as one of the main suppliers for the government and leading corporations.

3.3.4 Bravo SAP Project Overview

Combining various business processes into a single version of the reality is never easy—but for Bravo Australia, it was simply impossible. The project was built around SAP ERP 6.0 and guided by SAP best practices as well as Bravo internal project management expertise. There were almost five different systems running at the same time after the merger of the three organisations. There were many issues with the legacy systems, which provided the rationale to implement new SAP systems. For example:

- Past business mergers, as explained before, had led to overlap in many business processes, which caused data duplication.
- Lack of system continuity was hindering running competency and leading duplication of effort.
- There was an emerging need to consolidate business processes around a single and efficient ES environment.
- An expandable platform for implementing additional functionality in the future was required.

In addition, the 2005 acquisition of the consulting firm further expanded Bravo's functional and IT skills capabilities, but also reinforced the growing internal problems that the newly merged organisation was facing. 'The underlying processes and systems were not unified, and it was causing a lot of grief to the organisation', explained the project manager. 'Businesses were running on spreadsheets', he continued:

> We had multiple time sheeting systems and general ledgers, and because of this everybody was talking differently. Islands of data were not talking to each other, and even when they were brought together, you would have huge inconsistencies: No two reports were the same, they all gave different results. This was causing a lot of frustration at the leadership team level. (Project report: project manager)

Following the appointment of a new CEO, Bravo Australia began a transformational review of its business and technology infrastructure that would lead to the integration of these different systems within one system. Standardising the business operations on one of the existing platforms was initially discussed, but holding onto those legacy systems would perpetuate previous, insufficient processes. 'SAP, which offered a full variety of enterprise applications supported by best practices to lead implementation, quickly became the favoured platform', explained the project manager. Bravo's consulting

partnership with SAP was another reason to choose SAP for in-house implementation. Moreover, Bravo's internal expertise due to SAP's years of experience, encapsulated within a formal best practice offering, was a major factor in Bravo's eventual decision. Following were the key emphases of the implementation:

- Implementation was to be completed in nine months.
- Rollout was supported with online training.
- Special governance structure was introduced to buy in 3,000 users.

3.3.5 Data Collection

It is worth reiterating that the focus of this case study is SAP implementation, comprising the strategies and incidents after going live with SAP. Therefore, the data collection was carried out after SAP went live. The data in this case study were collected through various techniques. The primary data comprised interviews and observations. The secondary data include documents from Bravo and the consulting firm that was responsible for Change Management (CM) activities such as communication, training and post-implementation support. As previously mentioned, I worked with some of the project team members, which helped me to obtain some background information about the SAP project in Bravo Australia. After receiving permission from Bravo to conduct an empirical study along with the ethical approval, I started the first phase of the study in November 2008 and carried out the second phase from November 2009 to January 2010. I also conducted a short visit in March 2010 to collect internal Bravo Australia data summaries and reports detailing the results of the SAP implementation. I went on to complete it in April 2010. During this time, I visited Bravo several times and this included my visit to Bravo's main office, second office and consulting firm. During these visits, I conducted interviews and informal discussions and collected various documents.

The case study comprised a retrospective data collection (2006–2007) and longitudinal work from 2008 to 2010. My prior interaction with some of the project team members within the organisation helped me enormously because it enabled me to develop a good understanding of the company and the process and to gain access to some valuable contacts within the company. These factors contributed towards this research by making it easier than it might have been otherwise. Semi-structured interviews were conducted in

Bravo with staff, from high-level managers through to employees at the clerical level, as well as the project consultants from the consulting firm.

However, my most significant source of data was the 38 interviews (one to one and focus group) conducted, as shown in Table 3.1, and transcribed, totalling 800 pages. My data collection was supported by the comprehensive support I received from the senior management, who had their assistants organise meetings and interviews with different staff members throughout Bravo Australia. I was able to collect other important documents such as a detailed project scoping analysis, training documents, problem logs, a performance indices, press releases and vendor stories about the implementation.

With an objective to interview only those interviewees who played a significant role in the ERP implementation, the judgement and snowball methodology of sampling was used. According to Marshall (1996), judgement sampling is a non-probability technique in which the researcher, in the light of his or her research objectives, chooses the sample. This technique ensures that the selection of the interviewees is aligned with their ability to answer the research question. In addition, this technique relies on referrals from initial subjects to generate additional subjects.

Table 3.1: Interviewee Details

Interviewee Job Title	Round 1	Round 2
Project manager	×	
Regional sales manager	×	×
Chief financial officer		×
Finance manager	×	×
Trainer	×	×
Project change manager	×	×
Financial analyst	×	×
System analyst	×	
Senior financial analyst		×
Contract admin—product and services group (PSG)	×	×
Financial analyst 2	×	
Business service officer 1	×	×
Business service officer 2		×
Senior financial analyst	×	×
Custom administrator	×	×
Senior system analyst	×	×
Sales representative	×	×
Sales support officer	×	×
Senior system security analyst	×	
Senior business officer	×	×
Financial manager	×	×
Service desk officer	×	
Senior infrastructure manager/PSG manager	×	×
Total	21	17

3.3.6 Analysis of Empirical Data

Following the data collection, the next phase was data analysis, which was conducted in two cycles. After the transcription of the data, they were checked with the interviewees to confirm the consistency between what they said and what was transcribed. After the confirmatory step, all the interviews, transcripts and documents were input into QSR NVivo (qualitative data analysis software provided by QSR International®). This tool supports text, images and multimedia information. NVivo is generally used in rich data analysis tasks, using either structured or unstructured data. The users are able to classify, sort, and arrange pieces of information, investigate the relationships in the data, and unite subtitle analysis with linking, shaping and modelling.

The data analysis began with the thematic analysis, which is a process of identifying themes and concepts that are in the data (Ezzy 2002). In the case study, to assist in identifying emerging themes within the dataset, the transcription and documents were

open coded as shown in Figure3.4. Strauss and Corbin (1998, p. 62) described open coding as 'the part of analysis that pertains specifically to the naming and categorizing of phenomena through close examination of data'. Statements were first coded into free nodes until, over time, diverse categories started to surface and tree codes could be constructed to which free nodes were then allocated. Thematic analysis is more inductive than content analysis because the categories into which themes are sorted are not decided prior to coding the data (Ezzy 2002). Instead, the categories are 'induced' from the data. The open coding was conducted in an inclusive manner, such that the various themes that appeared from the process were documented, regardless of their relevance to the research objective. The objective was to comprehend and highlight the trends and themes in the SAP appropriation and organisational changes, and consequently enhance theoretical understanding of SAP implementation. The open coding also enabled a general understanding of the context in which the study was situated and formed the basis for further data analysis. The data collection and analysis occurred iteratively, because project documents and interviews were transcribed when they were coded. Such early analysis was important because it helped in formulating questions for future interviews and in identifying the potential interviewees to confirm appropriate theoretical sampling.

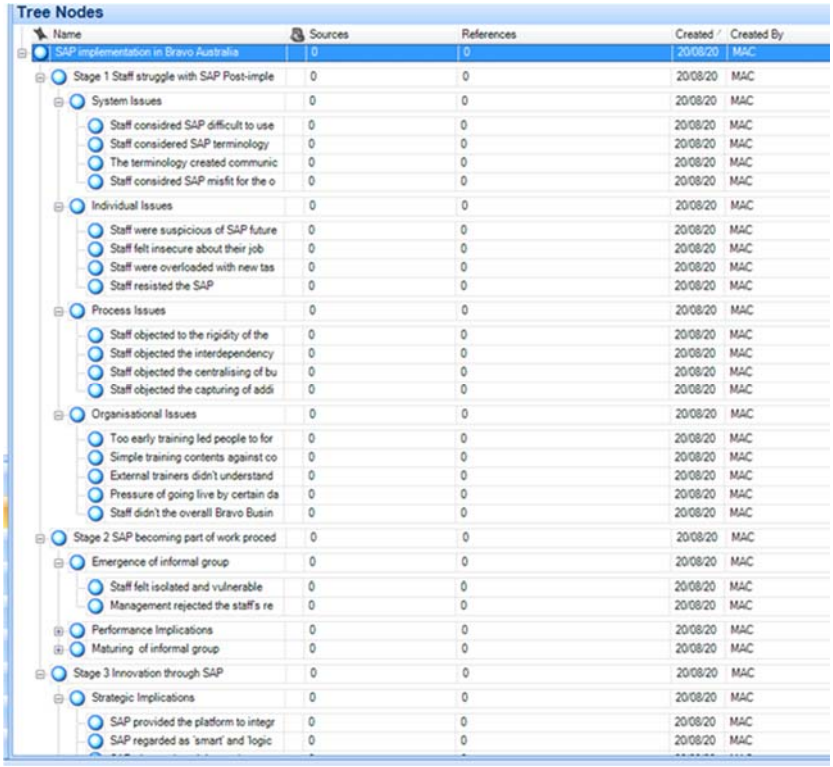
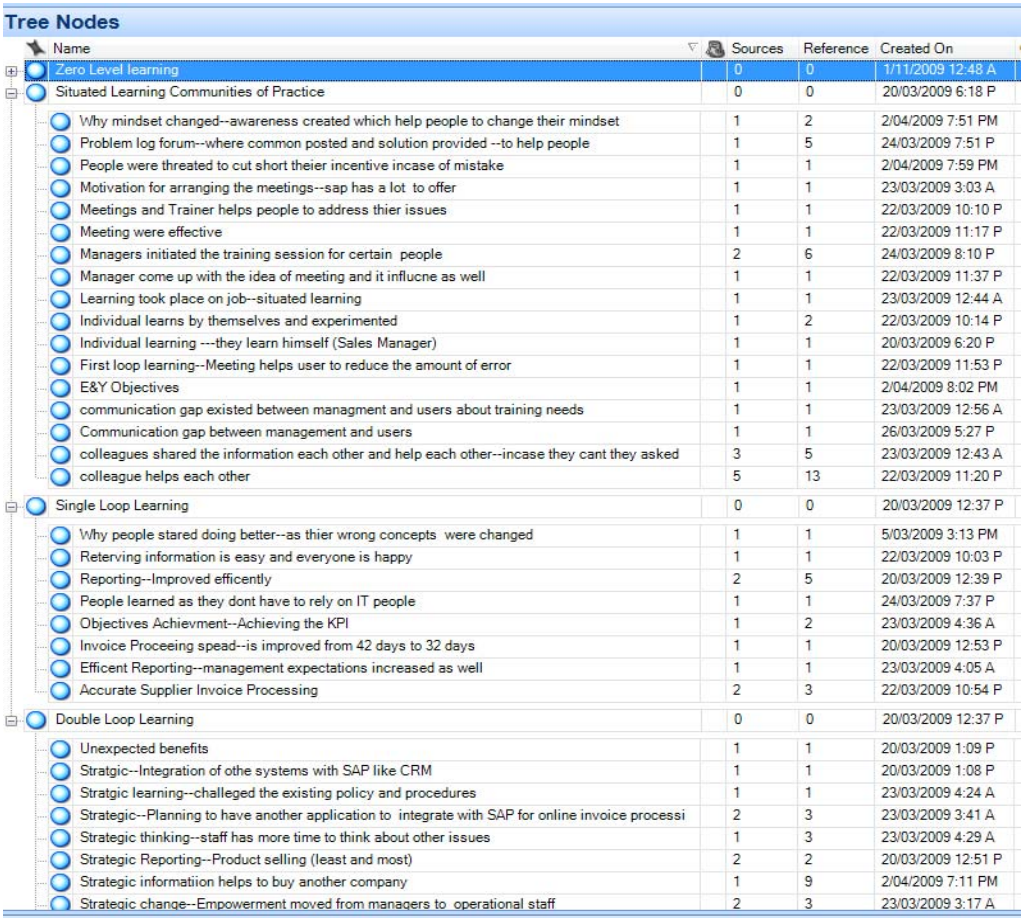


Figure 3.3: NVivo Tree Notes Snapshot on My Computer—Open Coding

The next phase of data analysis was theory-based analysis. Interpretive researchers often use an underlying theory for generating and analysing research data (Walsham 1993). In light of the first phase of coding and general comprehension of the situation, a theoretical lens of organisational learning and CoPs were used as the guide for further analysis. Under the theories of organisational leaning and CoPs, relevant themes, such as zero-level learning, single-loop learning, double-loop learning and CoPs were selected and organised. The themes that surfaced from this phase were transferred into the NVivo database through 'tree nodes'. Essentially, this allows the nodes to be linked together in a tree form, as shown in Figure 3.5.



Tree Nodes

Name	Sources	Reference	Created On
Zero Level learning	0	0	1/11/2009 12:48 A
Situated Learning Communities of Practice	0	0	20/03/2009 6:18 P
Why mindset changed--awareness created which help people to change their mindset	1	2	2/04/2009 7:51 PM
Problem log forum--where common posted and solution provided --to help people	1	5	24/03/2009 7:51 P
People were threated to cut short theier incentive incase of mistake	1	1	2/04/2009 7:59 PM
Motivation for arranging the meetings--sap has a lot to offer	1	1	23/03/2009 3:03 A
Meetings and Trainer helps people to address thier issues	1	1	22/03/2009 10:10 P
Meeting were effective	1	1	22/03/2009 11:17 P
Managers initiated the training session for certain people	2	6	24/03/2009 8:10 P
Manager come up with the idea of meeting and it influcne as well	1	1	22/03/2009 11:37 P
Learning took place on job--situated learning	1	1	23/03/2009 12:44 A
Individual learns by themselves and experimented	1	2	22/03/2009 10:14 P
Individual learning ---they learn himself (Sales Manager)	1	1	20/03/2009 6:20 P
First loop learning--Meeting helps user to reduce the amount of error	1	1	22/03/2009 11:53 P
E&Y Objectives	1	1	2/04/2009 8:02 PM
communication gap existed between managment and users about training needs	1	1	23/03/2009 12:56 A
Communication gap between management and users	1	1	26/03/2009 5:27 P
colleagues shared the information each other and help each other--incase they cant they asked	3	5	23/03/2009 12:43 A
colleague helps each other	5	13	22/03/2009 11:20 P
Single Loop Learning	0	0	20/03/2009 12:37 P
Why people stared doing better--as thier wrong concepts were changed	1	1	5/03/2009 3:13 PM
Reterving information is easy and everyone is happy	1	1	22/03/2009 10:03 P
Reporting--Improved efficently	2	5	20/03/2009 12:39 P
People learned as they dont have to rely on IT people	1	1	24/03/2009 7:37 P
Objectives Achievment--Achieving the KPI	1	2	23/03/2009 4:36 A
Invoice Proceeing spead--is improved from 42 days to 32 days	1	1	20/03/2009 12:53 P
Efficent Reporting--management expectations increased as well	1	1	23/03/2009 4:05 A
Accurate Supplier Invoice Processing	2	3	22/03/2009 10:54 P
Double Loop Learning	0	0	20/03/2009 12:37 P
Unexpected benefits	1	1	20/03/2009 1:09 P
Stratgic--Integration of othe systems with SAP like CRM	1	1	20/03/2009 1:08 P
Stratgic learning--challeged the existing policy and procedures	1	1	23/03/2009 4:24 A
Strategic--Planning to have another application to integrate with SAP for online invoice processi	2	3	23/03/2009 3:41 A
Strategic thinking--staff has more time to think about other issues	1	3	23/03/2009 4:29 A
Strategic Reporting--Product selling (least and most)	2	2	20/03/2009 12:51 P
Strategic informatiion helps to buy another company	1	9	2/04/2009 7:11 PM
Strategic change--Empowerment moved from managers to operational staff	2	3	23/03/2009 3:17 A

Figure 3.4: NVivo Tree Notes Snapshot on My Computer—Theoretical Coding

The above two cycles of data analysis can be viewed as Lee and Baskerville's (2003) two-level generalisation, which is based on Yin's (2002) two-level interference model explaining the process of generalising from data to theory. The generalisation for

interpretive case studies relates to theoretical abstractions, not statistical generalisability, as Walsham (1993, p. 78) noted:

> From an interpretive position, the validity of an extrapolation from an individual case or cases depends not on the representativeness of such cases in a statistical sense, but on the plausibility and cogency of the logical reasoning used in describing the results from the cases, and in drawing conclusions from them.

These two different cycles of analysis were explained by Lee and Baskerville (2003), who stated that 'the first-level constructs refer to the understanding held by the observed people themselves: in contrast, the second-level constructs refer to the understanding held by the observing researchers', that is, the 'interpretations of interpretations'. For the first-level generalisation, the interviews conducted in the case company were interpreted from the point of view of the interviewees, who were the key actors in the SAP implementation and use. These interviewees narrated their stories of SAP adoption and use in the organisation and then explained how the SAP changed their work patterns and how they were eventually able to use SAP effectively. For the second-level generalisation, the description of the 'story' was interpreted from the researcher's perspective through the lens of organisational learning and CoPs. It is important to note that the theory-based analysis was not straightforward; instead, it was an iterative process, following a hermeneutic circle.

According to Klein and Myers (1999, p. 71) 'the idea of the hermeneutic circle suggests that we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships'. Here, the 'parts' referred to the researcher's and participants' preliminary understanding in the study; the 'whole' is considered the shared meaning that emerged from the interaction between the researcher and the interviewees.

These two different phases of analysis led to a new theoretical comprehension of SAP implementation implying co-emergence of organisational learning and CoPs. There was a continuous dialogue between the meanings assigned by the study participants (key actors involved in ERP implementation and use) and the interpretation by the researcher. Although the initial interpretation was informed by the selected theory, a hermeneutic engagement with the practice and experience of different human actors (managers, staff, trainer) gradually led to new interpretations and reshaping of the forthcoming theoretical interpretations. Thus, the analysis followed a cyclical process (Nandhakumar, Rossi & Talvinen 2005) because the researcher was engaged with both theoretical concepts and

the empirical data in the SAP implementation and use in the Bravo case. In the light of such a hermeneutic circle, a new theoretical understanding and interpretation of the co-emergence of organisational learning and CoPs in SAP implementation emerged.

3.4 Limitations of Research Methods

Limitations are associated with all research projects and these are mainly because of the methodology selected and limited resources available to any research. Interpretation and documentation are based on individual understandings of social roles. In order to obtain a rich understanding of the implementation, I collected data from multiple sources, such as observations, interviews, document analysis and hermeneutic analysis. These techniques can contribute towards the development of concepts, generation of theory, drawing of specific implications and rich insights (Walsham 2006, 1995).

In addition, these different data source documents, interviews, reports and observations were used to confirm the findings from the other sources. This research reports on different dimensions of the research questions in the context of the field settings. Similarly, reliability cannot be presented in the quantitative context. The focus is on authenticity of the presentation of the information from the case study, and the intention is that the work will be meaningful to readers in academia and ERP practice. The findings are based on a single case study, however it can be useful for future quantitative and qualitative studies. In order to achieve this, Klein and Myers's (1999) concepts of the 'principle of abstraction and generalisation', the 'principle of dialogical reasoning', and the 'principle of multiple interpretations' were followed in this research project.

Another limitation of this case study is the retrospective analysis. This is because the earliest phases of the SAP implementation project had commenced in early 2007. At the time of the data collection, it was difficult for the participants to recall precisely previous events and actions. However, different data sources are used to support the interviewees' memories.

3.5 Ethical Issues

This study was conducted with the consent of both the organisation and the individual participants. In this regard, permission was sought from and granted by the University Human Research Ethics Committee (UHREC) prior to proceeding with the research project. Along with the interviews, access to other project-related documents was granted by the organisation and the interviewees. This research project was carried out by following the ethical principles of integrity, and respect, beneficence and justice for individuals.

Ethical approval entailed written consent from each interviewee. Before conducting the interviews, each interviewee was provided with a standard written consent form that outlined the objectives of the research project and the ethical principles concerning privacy and confidentiality, and provided a space for the interviewee's signature indicating consent and information on how they could withdraw consent if so required. All the case study materials were stored safely and rendered anonymous. All the interviewees and the organisation were given pseudonyms.

3.6 Conclusion

This chapter outlined the researcher's adopted ontological and epistemological assumptions and justification of the research design, which uses an interpretive approach, case study research method and hermeneutic data analysis. This research design was adopted with the intent of meeting the research aims and answering the research questions. The data collection and analysis processes were also discussed. Finally, the research limitations and ethical issues were explained. In the next chapter, I will present the findings (quotes and comments) and identify the key evidence that will be discussed in Chapter 5.

Chapter 4: Findings

4.1 Introduction

This chapter tells the story of SAP implementation and use through the perspective of the research participants listed in Chapter 3. It presents some pre-implementation activities and then the different phases of SAP implementation, labelled 'Phase 1: Struggling with SAP', 'Phase 2: Getting better with SAP', and 'Phase 3: Mastering SAP and What Next with SAP', as shown in Figure 4.1. The label of these categories was drawn from the comments of the research participants and Bravo Australia's documentation. Specifically, this chapter presents the above phases in narrative form, retelling the story the implementation of SAP through the perspective of the participants.

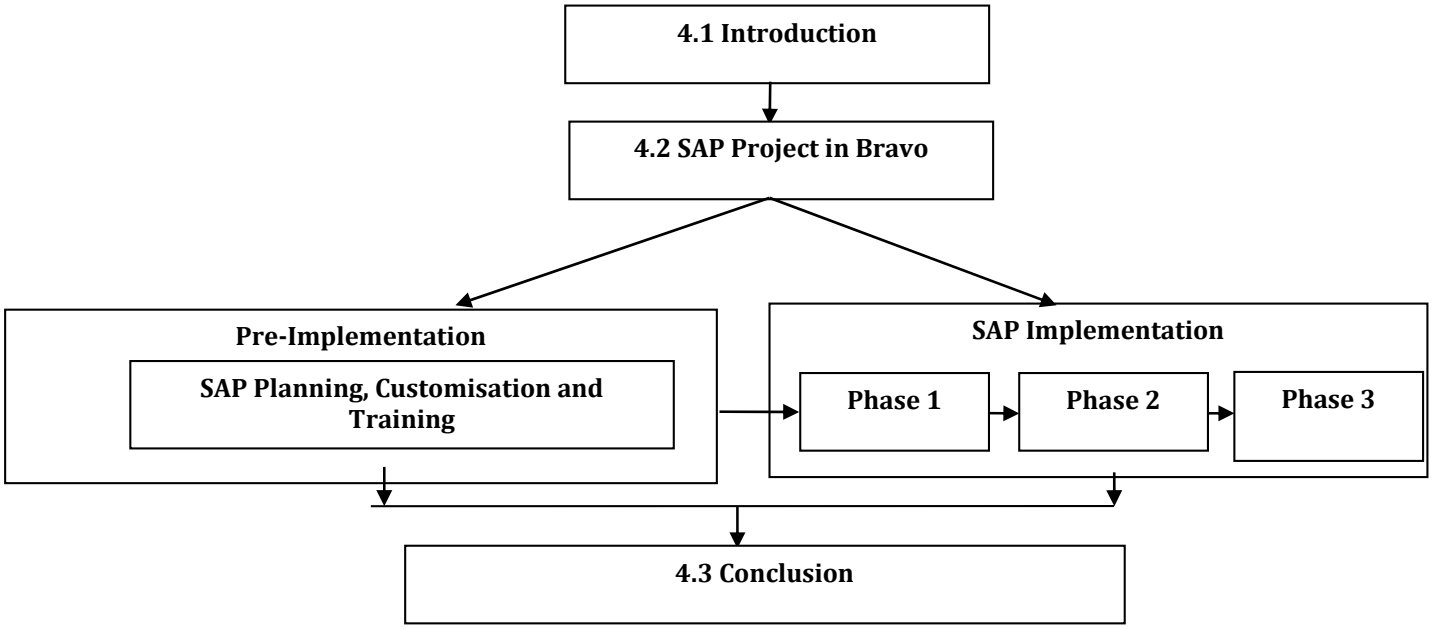


Figure 4.1: Chapter Structure

4.2. SAP Project in Bravo Australia

The process of SAP implementation in Bravo Australia was initiated with pre-implementation activities such as planning, customisation and going live with SAP. The SAP implementation was further divided into three sub-phases named as Phase 1, Phase 2 and Phase 3. These three different phases are the focus of this research.

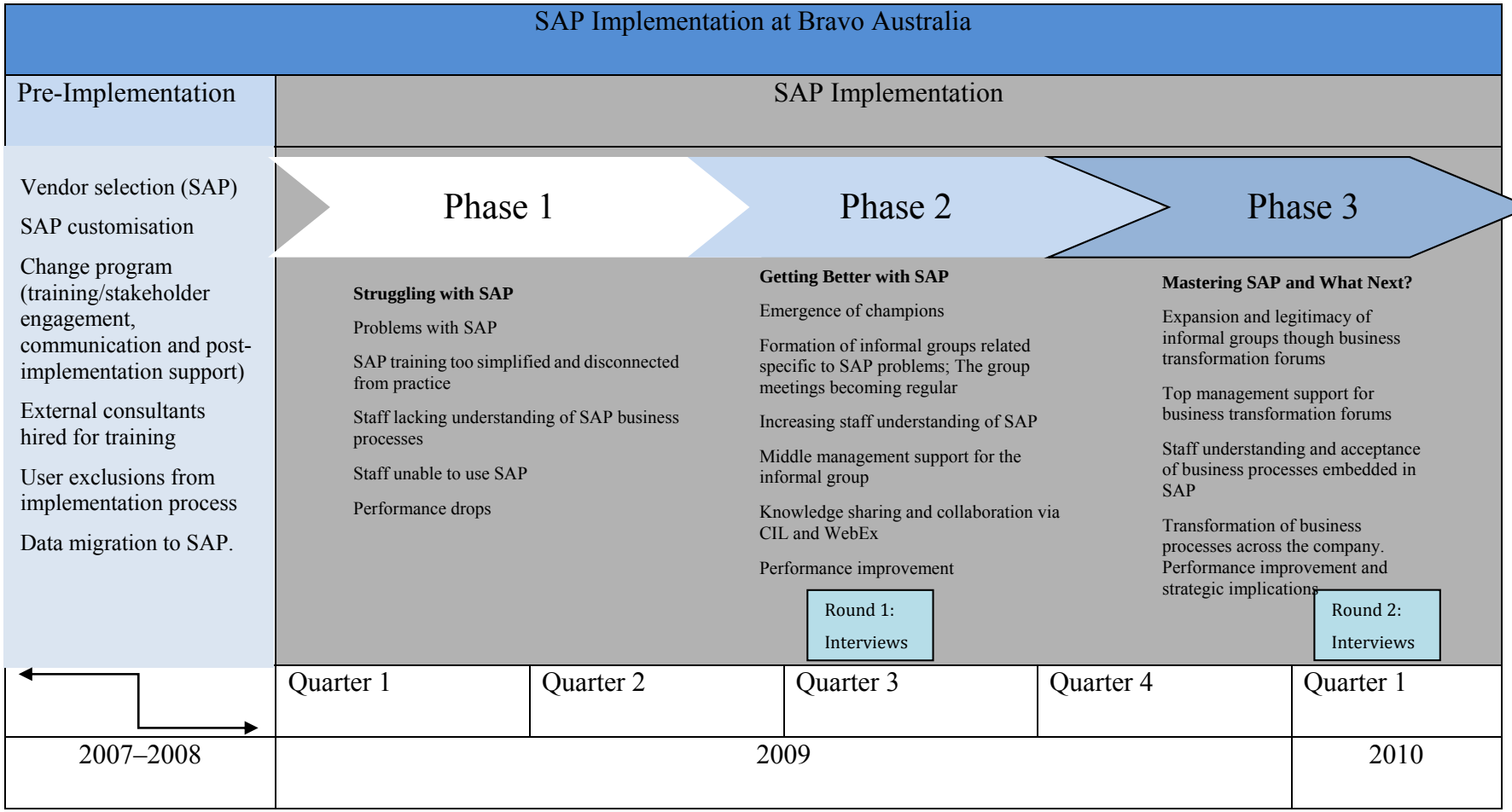


Figure 4.2: SAP Implementation at Bravo Australia

4.2.1 SAP Pre-Implementation

Bravo Australia was dealing with multiple IS to accommodate diverse business transactions. This process of managing and maintaining these miscellaneous systems was not only time consuming but exclusive as well. In addition, these systems with non-standards and dissimilar business operations, and data duplications were a matter of concern for the Bravo management, as noted by the project manager and program manager respectively:

> The underlying processes and systems were not unified, and it was causing a lot of grief to the organisation. (Report: project manager)
>
> Bravo really consisted or still consists of four major business units with diverse business processes so the thinking behind this project called Unity was to bring everyone together, to adopt common processes and common systems. (Interview: program manager)
>
> We had multiple time sheeting systems and general ledgers, and because of this everybody was talking differently. Islands of data were not talking to each other, and even when they were brought together, you would have huge inconsistencies: No two reports were the same, they all gave different results. This was causing a lot of frustration at the leadership team level. (Report: project manager)

Although there was an acknowledgement of this 'grief' in Bravo Australia's management hierarchy, the relevant solution was not explored until the appointment of the new CEO, who was known for his innovative and critical decision-making. The new CEO wanted to position Bravo Australia as an alternative to the major competitors such as IBM and, in his view, having an integrated system with best practices could help Bravo Australia to achieve the anticipated objectives. As a result, this problem was prioritised and a debate, to find the most appropriate solution, was initiated. During the debate, the characteristics of the future system were explored. These include integrated (both internally and externally), standard business processes, and a combined reporting platform with an aim to enhance business efficiency and acquisition, as mentioned by the program manager:

> Bravo has a business strategy that is a very aggressive one, to double their business in size basically; now that's going to require acquisition and there should be a system to accommodate this. We need to make sure that we have [the] right systems, people and processes in place to enable that growth to make us more efficient to service our customers. (Interview: project manager)

The debate led to a project plan to implement an integrated ES. Once the project plan was put together in early 2007, a team of 20 staff from different business units was given the responsibility of software selection. For many organisations, software

selection is a time-consuming and expensive activity, especially for tools such as ERP systems. However, for Bravo Australia, it took less than the industry average time and was completed within one month. The team initially came up with the idea to standardise the business operations on one of the existing platforms. However, after in-depth cost-benefit analysis, it was realised that containing the legacy systems would not help to achieve the desired objectives and could be more expensive. After several discussions, SAP was chosen:

> SAP, which offered a full range of enterprise applications backed by robust Best Practices to guide implementation, quickly became the favoured platform for the company's major process redesign. (Report: project manager)

The project manager supported the SAP selection over the legacy systems by saying that 'comparing SAP with the legacy systems as if we are comparing "computer"' with "typewriters"'. There were a few reasons behind this selection. First, Bravo Australia and SAP were partners because Bravo Australia was providing consulting services to implement SAP in different companies. As a result, there was strategic pressure from both SAP and customers to have a similar system at home; it would have been difficult for Bravo to convince others to use the system when they were using a different product at home:

> We were aligned with SAP as Bravo is its partner, we would go into one solution i.e. there won't be any other system other than SAP [as] we need to practice what we preach. (Report: project manager)

Second, close partnership with SAP developed internal expertise for project management of SAP implementations. It encouraged the Bravo management to prefer SAP to any other product as explained by the program manager and PSG manager respectively:

> In partnership with SAP we do a lot of SAP implementation ourselves; we got four to five fairly large customers we go and sell SAP to and install and develop with the customer. So the decision was made to (have SAP). (Interview: program manager)

> We are heading with business which does SAP implementation and the company so we have lot of SAP skills in house and we could deal with SAP and it will be good for our partners so we accept to go that way. (Interview: PSG manager)

Finally, the functionalities such as integrated business processes based on best practices and the expandable nature of SAP were another rationale for its selection, as mentioned by the program manager:

> The reason SAP was chosen apart from the fact that they are Bravo's partner, it was to try and make sure that we have a system that we could improve as

> time went on, integrate with time with other applications as needed. (Interview: project manager)

The decision to replace the legacy systems with the SAP system was communicated to the entire staff of Bravo Australia via an email. To develop staff interest in the SAP project further, staff were asked to suggest an appropriate name for the project and prize money was allocated for the best name. This idea received overwhelming appreciation and hundreds of names were proposed by the staff. After careful consideration of the proposed names, the SAP project was given the name 'Bravo SAP Project y'. The justification was that SAP was going to integrate different departments and functional areas; hence, it would unite the whole company. To announce the project officially and reveal rationale and objectives behind it, a large gathering was arranged. The gathering started with breakfast and ended after lunch. The objectives of implementing SAP, the type of support to be provided and the potential timeframe for the project's completion were all explained to Bravo staff.

The implementation of the SAP system required changes in the way business was conducted and Bravo Australia underwent a self-discovery process by examining the details of the various processes and searching for ways to improve or redesign them. It is important to note that, unlike other IT tools, SAP does not result in computerisation or a mere automation of existing business processes but brings about changes that enable radical breakthroughs in performance. Therefore, Bravo Australia decided to customise the SAP system to match the business requirements of the SAP software, as explained by the project manager:

> While we knew the SAP Best Practices might not be the perfect fit to every organisation, they provided a good starting point. (Report: project manager)
>
> Our timeframe was very aggressive, and if we could get 60 or 70 percent functionality out of the box, it would be far easier for us to focus on the rest. (Report: project manager)

Thus, to match the SAP embedded processes to Bravo's operational needs, a customisation process was initiated:

> To ensure proper governance throughout the project, the implementation team also oversaw the establishment of a three-tier governance structure that included a Program Director; Steering Committee, including four executive general managers; and a formal Governance Board including the CEO and Executive Director. (Report: project manager)

A governance board was assigned to oversee the customisation process. It comprised stakeholders from different business units, IT, external consultants and process owners. The objective of this group was to oversee each activity and ensure that all

executives agreed to the proposed changes in the business processes; then changes were reflected in the system. To assist the business process re-engineering and customisation process further, 10 different process owners were assigned to the project on a full-time basis, and their routine activities were assigned to other staff.

Along with this customisation process, to smooth the transition, external consultants were hired to assist Bravo in this process. These external consultants had extensive experience of SAP implementation across different products and industries. In addition, they had a working relationship with Bravo's consultancy staff. A comprehensive CM strategy comprising four main components was proposed. These components were communication, stakeholder engagement, training and after live support in the form of workshops.

Following the approval of this strategy, formal processes of designing these components were initiated. It is important to note that users were not involved in pre-implementation activities, and the engagement process was limited to middle management 'only', as explained by the project manager:

> If we were going to go through the traditional approach to enterprise-wide roll-outs by engaging every user in the business groups to find out their requirements, it would be like starting from the bottom-up, We realised it would take us a lot of time, energy and dollars to do the implementation. Then, we spoke with SAP. (Report: project manager)

The above comments highlight that staff participation was excluded because of the aggressive time frame and limited budget for completing Bravo SAP project by a certain date. Further, customisation and designing of this CM strategy in general and training were running in parallel. The training needs analysis included collecting business information, business process mapping (old and new business processes), understanding users with specials needs and organisational learning. Following the training needs analysis, a curriculum was designed and then mapped with specific users' roles. Finally, it was delivered. Meanwhile, based on the process owners' feedback, customisation of the new software package was completed.

Eventually, the latest version of SAP was rolled out in late 2008. Following customisation of the system, the next phase was data migrations, as shown in Figure 4.3.

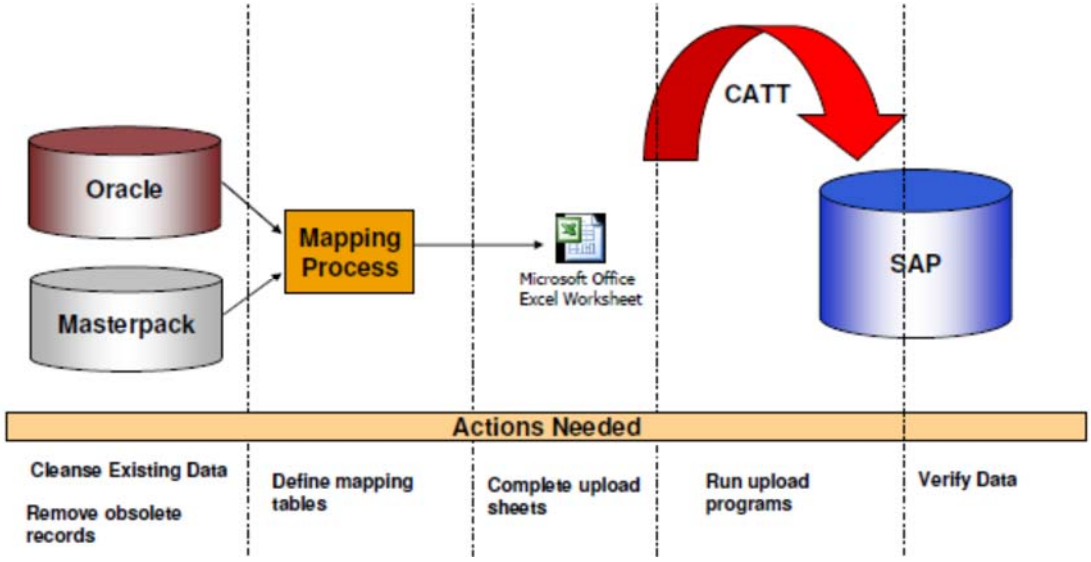


Figure 4.3: SAP Implementation: Data Migration

The data migration was completed in the phases (1) cleanse existing data, (2) define mapping tables, (3) complete upload sheets, (4) run upload programs and (5) verify data, as shown in Figure 4.3.

In summary, the pre-implementation activities comprised rationale for an ES implementation, SAP software selection, CM strategy, customisation of SAP and, finally, the data conversion. Following the customisation and data conversion process, the SAP was rolled out. The period after the rollout is referred to as 'SAP implementation' and the next section will elaborate it in detail.

4.2.2 SAP Implementation

This particular section is very important because it is the focus of this research study. It comprises the three phases 'Struggling with SAP', 'Getting Better with SAP' and 'Mastering SAP and What Next?' It is important to note that these names were derived from the interviews with the participants and the company's documentation. Each phase will now be discussed in greater depth.

4.2.2.1 Phase 1: Struggling with SAP

Phase 1 started on the go-live day and lasted over five months, as shown in Figure 4.2. First, this phase presents the staff's initial struggle to comprehend and use SAP and its embedded business processes. Second, it explains the dialectics of struggle, which were technical, business processes and training oriented. Finally, it highlights a disagreement between staff and top management about the relevancy and adequacy of the training.

Bravo staff happily left their offices on the evening of the last Friday of November 2009. This happiness was not only because of the weekend ahead but was also due to a sense of accomplishment of their work tasks. However, the following Monday morning was quite unusual in comparison with their previous ones because they were now about to start using the new SAP system to accomplish the same old activities. There was an excitement among some of the staff because of the notoriety of SAP. However, after a few hours, this excitement turned into a nightmare as some staff members who had considered themselves masters of the legacy systems operation realised that they could not even find the SAP application on their desktops. Others were able to find the SAP application but failed to input the correct logon details and, consequently, until the next afternoon, some of the staff struggled to obtain access to the SAP, as noted by a business analyst:

> Half the people couldn't log into anything. And for some people it was even more than 24 hours before they could even have access to SAP. (Interview: business analyst)

4.2.2.1.1 Technical and Process Issues

Logging on to the SAP proved to create only temporary relief for many staff. This was not the end of their struggle. They had anticipated completing their old routine tasks using SAP and, to do so, they were required to have an understanding of the system functionalities as well as its business processes. However, staff realised they had neither of these two prerequisites. For example, two business service officers showed frustration as they struggled to comprehend the functionalities of SAP as well as its business processes and called this situation a 'nightmare':

> I used to use the old system very well too and I knew it back to front or as well as I could learn it. I could do it with my eyes closed after a while. Then all of a sudden you are faced with a new system; not only do you have to learn how that system works but also the processes. (Interview: business service officer 1)

> We had too many people running around trying to set up projects and didn't have a clue what they were doing but doing the completely wrong thing. It was a complete nightmare. (Interview: business service officer 2)

This struggle of operational staff was noticed among different ranks of Bravo, and the technical staff witnessed it. For example, a system analyst explained that the staff's struggle with comprehending SAP functionality and its embedded process was due to the unfamiliar and complex terminology of SAP, which made it difficult for the technical team to address staff issues:

> The [SAP] terminology was a major barrier, it still is I think, because regardless of which system you used before, it didn't matter if you didn't work here before and if you started working once implementation came on board you still had to learn the terminology, and with the terminology it's really important to get it right because if you are talking to a developer they are just going to look at you as if you've got an egg coming out of your arm. They don't understand what you mean unless if you use their terminology. (Interview: system analyst)

The above comments show that the staff struggle was first attributed to their lack of knowledge and skills in using SAP. However, this assumption soon became invalid because knowledge of SAP was not adequate to win staff support for SAP over the legacy systems. For instance, a business system analyst considered SAP 'complicated' and declared it a misfit for Bravo's business needs. She said:

> I did SAP and I'm a certified SAP consultant myself for the logistical part of it. I see SAP as not in this industry. I would say SAP in other industries is a fantastic system but not in project services. I don't see anything that SAP has better than Oracle. There are so many validations that you need to fill in that plus the time sheet entry or the time sheet we have in SAP is far too complicated as compared to Oracle. (Interview: business system analyst)

Her comments about the 'old' system versus the 'new' system represented the common thoughts of the majority of the staff; they believed that the legacy systems were customised to Bravo's business needs but that SAP was a general and off-the-shelf system, and they failed to comprehend how an out-of-box system could match their requirements. 'Why do we need SAP?' was a common argument of the staff, and some of the SAP requirements, such as 'accounting knowledge', 'cross-functional knowledge', 'integrated process' and inflexible processes, strengthened their arguments:

> In the old system there was no link between [the] three processes: the sales document, the actual invoice of the customer, then any invoice from contractor for the outside company. There was no link between those three pieces of the information, whereas now in SAP we set up a project in the system and then in theory we get a signed sales document from the sales process and we know this is going to be our revenue in providing the services. This is going to be our cost. It's all been approved. This goes to the project administration group. They set up a project in SAP. They assign people to that project, so they can record their time. They put in a sales quotation for that project which has the revenue that we are going to bill the customer and they can raise purchase orders, get third party contractors. It's all linked to the project. (Interview: business analyst)
>
> In SAP somehow, any user, in the way we implemented it, must have a minimum accounting knowledge to be able to use it properly. (Interview: business service officer 1)
>
> It is not the particular module which [one] is working on but [one] also needs to know the other modules which are interlinked with it and that's annoying. (Interview: contract administrator)
>
> I have been told that to do certain things regarding [purchase order] which I've never done in my entire career. Even the fields in the SAP payment process were different from the other payments [in the legacy system]. The fields were asking us questions that we have never had to answer like what's the next date of your payment. It was frustrating. (Interview: business service officer 2)

Although some of the staff were unhappy with SAP, considering it 'complex', with integrated processes and new data entry requirements, management was persistent in claiming that SAP was embedded with some good features. For instance, the program manager lauded the discipline introduced by the SAP business processes, which required data to be entered by following certain sequences. He also found the process of capturing additional data useful:

> Everyone needs to understand that SAP comes up with a 'discipline'. SAP's 'discipline' means that if you don't get it right upfront the rest of the transaction is stuffed right away through to the general ledger journal and fixing it through doing a general ledger journal or through someone in AP

> [accounts payable] manipulating it is not going to work as everything is interlinked now. (Interview: program manager)
>
> SAP is very information-hungry system. There is so much data in them. Like there are screens and screens of information and in all these screens there are 40 tabs worth of information. The aim of capturing additional information is to have better reports, which can assist in decision-making eventually. (Interview: program manager)

The trainer was found to be on the side of the program manager as far as capturing of additional data was concerned. She found that such an activity could add value to Bravo's value chain and justified her argument by saying:

> There is a huge change in terms of capturing time. For example, previously the company was really only interested in your billable time, so let's say I am a consultant on a project. I have worked for 10 hours a day but we can only bill our client for a day anyway so I am only expected to enter my eight hours to make my billable day. So the change was in what we are interested now in reporting on all time because we want to see how many extra hours that people are doing et cetera, et cetera. So that was a change to the company to say all hours matter now and we are going to capture that. For some businesses they hadn't implemented time sheeting previously so it is a huge change to get people to actually enter time so we can report on the cost of our jobs accurately. So that is on the lowest level. (Interview: trainer)

From the program manager's and trainer's perspective, the logic behind capturing additional data during different activities of a process was to improve the reporting quality, which could eventually lead to better decision making at the management level. However, staff were of the opposite view because they were still comparing the 'old' versus the 'new' system and processes and asking 'why is this'? Unlike the program manager, who considered the SAP additional data-capturing tasks an 'information-hungry' characteristic, the staff conceived this activity as 'time consuming', a 'catastrophe' and 'difficult':

> Under Masterpack [the old system] it was a case of five button presses, five key presses to achieve what I am doing. Under SAP its 21. Why is this? The user would go, this is a catastrophe, why am I doing this? (Interview: business analyst)
>
> SAP is very time consuming. There is a lot of data and information in SAP so to do one thing it might take two steps in Oracle but in SAP it might take four to five steps to complete one task. (Interview: business system analyst)
>
> My experience has been it's a very difficult, I found it a very difficult system to use. … other people, my colleagues make the same observation, but certainly from my point of view it is a difficult system to use, [it is] more time consuming … to complete tasks, to raise the invoice and that sort of thing. (Interview: service desk)

4.2.2.1.2 Staff Resistance towards SAP

Staff lack of understanding of SAP terminologies, functionalities and embedded business processes had various consequences in the form of resistance and job security. First, a business analyst noted that staff lost confidence in SAP and had the impression it would soon be considered a failure and they would resume working with legacy systems. According to the project manager, the concerns added to staff worries and gave the impression that the new system would not be successful; as a result, they were not keen to learn the new system and kept on using the old methods to complete their routine work. He further elaborated that staff were used to the legacy system and completing routine tasks in a certain way, and the adoption of SAP required them to adopt new procedures and learn new systems. Hence, they resisted SAP, as explained by the business analyst finance and project manager:

> A lot of the users have realised that this isn't going to pass and we are going to be stuck with it for a good 20 years. A lot of places people have started to pick up on it. It was a lot of resistance in terms of the processing. People did not want to adapt to it. They wanted to continue creating things on Excel and sending them out. (Interview: project manager)

> They fought against it [the SAP implementation], which I think is natural. For a long time it was always that standard response. We didn't have to do this before, it wasn't like this in the old system and it was better. So there was a constant comparison of old versus new. I think a lot of people struggled with it. Struggled in terms of being able to get their work done, waiting for someone else to fix their problems. (Interview: business analyst finance)

This resistance was also evident from staff usage of applications or tools other than SAP to accomplish their routine activities, as noted by a technical business analyst:

> I mean I analyse a lot of things but I couldn't find the reports initially. I had to do a lot of analysis outside of SAP on the MS Access database. (Interview: technical business analyst)

> So for example if somebody was doing reporting [they] might carry on and hope it might get better and use MS Excel as a bypass for SAP. In reality SAP processing were two very key areas of the business where people had to adapt and had to change the way they worked. (Interview: business analyst)

> Staff used MS Excel as a bypass for SAP … people had to adapt and had to change the way they worked. [But] there was a lot of resistance in terms of the processing. People did not want to adapt to it. They wanted to continue creating things on Excel and sending them out. (Interview: program manager)

Second, the lack of comprehension of SAP and its embedded processes had a negative effect on job performance. It was evident from the failure to input correct and complete

data, which resulted in invoice duplication, invalid data entries and reporting problems, as indicated by different staff:

> At the start we had a problem with some of them. The same invoice we can process twice, thrice, four times, we pay those four times. (Interview: business analyst)

> What we did within the first week was wrong and more than 300 to 400 invoices were processed with the wrong entry. It took three months to clear that problem. (Interview: business service officer 1)

> Reports were not fully tested and not fully properly implemented. So that was a major mistake. (Interview: PSG manager)

> We didn't have proper reporting requirement, backorder reports and invoice revenues reports but basically we couldn't get anything at first so we had to develop all these reports. (Interview: sales manager)

> We could not send the SAP report to customers as they were too big the file, it just would not work so you need to extract the key information. (Interview: sales representative)

Finally, staff lost confidence and started to feel insecure about their jobs because of their inability to perform tasks as per expectations with the SAP. The change manager explained this by saying:

> Some of these people have been in their jobs for 20 years. If you suddenly put [in] a new system where its showing that perhaps they can't do their jobs effectively, the fear of losing their job and fear of losing their income, all that, so fear is the big factor. (Interview: change manager)

The business service officer attributed this insecurity to staff lack of confidence in using the SAP effectively, mainly because their existing skills were not effective enough to accomplish routine work. However, the program manager attributed this resistance to the staff's lack of understanding of overall business strategy:

> Fundamental to everything was that people didn't understand our business strategy (Interview: program manager).

4.2.2.1.3 Training Issues

The above issues are normally anticipated with any IS implementation and, as an IT consulting firm and a partner with SAP, the Bravo management was fully aware of these issues well before going live with the systems. Therefore, a CM team including an experienced trainer was hired to smooth the transitions from the old systems to the SAP system. However, the above discussions highlight that the transition was not smooth, which leads to the question of why it was not smooth.

On-the-job training was the main source of support for the staff. It was designed and delivered by external trainers who had over 10 years of experience with SAP implementation. They worked closely with the processes' owners to design the training content, and it is important to reiterate that the staff were not involved in the training needs analysis processes. The training was delivered three to four months before going live with SAP. At the same time, the customisation of SAP was also in progress. As a result, staff ended up using a different version of the system than the one on which they were trained:

> By the time they [trainers] finished training, the end product [i.e. SAP] was a totally different thing. (Interview: business service officer 1)

In addition, some of the staff found the training 'simple', 'too early' and 'irrelevant' to their routine tasks:

> We did have a very simple training session in September before we went live. It was too early and everyone forgot as soon as they left. (Interview: business support officer 1)
>
> We didn't understand the connection between the training that we were given and the actual usage of the SAP as it was irrelevant and too simple. (Interview: senior system analyst)
>
> We had two days' worth of training. The training was so simple that it was like ABC. It was too basic as compare[d] to our routine task. (Interview: business support officer 2)
>
> The first six months because I am sort of [a] purchase order expert as they see me so I would get lot of people saying how do I do this? How do I do this? and I would say didn't you go to the training? And they would say I have forgotten. (Interview: business analyst)
>
> Sometimes you tend to think that it would have better if they had given us training a lot closer when the system [SAP] went live'. (Interview: business officer PSG)

The simple training, according to a senior business analyst, was due to the simplicity of the test used in the training as compared to actual work practices. Consequently, the staff struggled to use the SAP effectively after going live:

> [Training] was fairly generic and simplistic. For example, I think that played a big role. It also meant that education and test data was very simplistic. It was always a perfect scenario so what we were actually taught was how to pay [a] new invoice, so it was all very nice but most of the invoices we get, I'd say we found out 50%, we could not process because of our purchase order was wrong or something was wrong with the invoice or it didn't match. The contractor invoices didn't match the time sheet et cetera and so forth. (Interview: senior business analyst)

Along with these reservations about training—irrelevant content, delivery timing and simple test data—some of the staff were not happy with the trainers' knowledge and

expertise. For instance, a business analyst narrated her experience about the training and trainers. She found the trainers' SAP knowledge sound; however, she was not convinced about their expertise on Bravo's business operations. She elaborated her claim by saying that the trainers were able to answer SAP-related queries but could not answer the questions about Bravo's business operations because they were not aware of Bravo's business requirements. Other staff also expressed their concerns about the trainer:

> I sort of felt they [trainers] weren't aware of what we needed. They just said and taught in the classroom that this is how you do it. I don't think they were aware of our needs. (Interview: business service officer 1)
>
> They [trainers] don't understand accounting; they aren't accountants. They are consultants in projects, so yeah the screen can do this and that but I have asked many times, show me everything you do with an accounting entry behind it, but they could not answer it. (Interview: business service officer 2)
>
> The people who came to train us were people who had used SAP so they had a general knowledge of SAP but again their ability to answer the question would have depended upon the question that we put to them. For example, so if people ask them general questions yes they will get a laugh and give you the answer, but potentially when you asked so okay in this business situation how would you do this? And a lot of time the trainers didn't know. (Interview: business analyst)

To rectify the issue of users' lack of understanding and usage of the new system, formal workshops were arranged for the staff, but staff still believed that support designers did not understand their processes and thus they did not find the support completely helpful:

> I think we have had some post-implementation workshops but again the people who were conducting the workshops didn't understand the business and its always coming down to that and as a result most of the training or in-house training we do now is business unit related. We no longer feel comfortable with an outsider coming in to train us. (Interview: Senior business analyst)

Staff reservations about the quality and depth of support were also supported by the PSG manager; he felt 'guilty' for not being able to provide the required support:

> I am as guilty as the businesses in the sense that the amount of support provided in education has been limited and when the system was first rolled out the education was done on tools, and how you use the tools and not on the business processes. (Interview: PSG manager)

This was merely one side of the story, which was expressed especially by the operational staff and the PSG manager. However, the project manager and chief information officer (CIO) considered the training program comprehensive and delivered by experienced consultants:

> We actually did a fairly extensive training exercise, which I think is something which we have done very well. We had expert trainers with extensive knowledge of SAP and they designed detailed material to handle business operations using SAP. (Interview: project manager).
>
> We were aware of the importance of training and that's why we hired [the] best training consultants with extensive SAP training experience. I think they have done a great job. (Project Report: CIO)

The program manager regarded staff reservations as their 'laziness' preventing them from learning the system:

> Hard to say if a guy, I am not so sure, what tends to happen is those people sleep during the training anyhow and they probably wake up when we go-live. (Interview: program manager)

This disagreement about the adequacy and relevancy of the training among the staff management led to staff feeling frustrated and isolated:

> Frustration was all over us ... as some of the staff were under stressed due to fear of job loss. We did not know where to go and how to solve problem. We felt like that's enough and that was the case for the first few months. It wasn't the case with me only but everyone was in the same boat. So whenever we met, we shared [our] problems and didn't know what to do about them and we felt isolated like no one was understanding our pain. (Interview: business analyst)
>
> That time was very vulnerable for the majority of us as we were clueless about jobs and more importantly we did not know where to find help (Interview: business system analyst).

First, this phase highlights how the staff struggled to understand and use SAP and its embedded business processes. Second, it explains the reasons for this struggle: (1) the staff found the SAP terminology and functionalities to be unfamiliar and complicated; (2) the SAP business processes were noted to be 'interlinked' and 'disciplined', and staff considered that their comprehension required 'accounting knowledge' and 'cross-functional knowledge'; 3) the staff considered the training 'too early', 'too simple', 'irrelevant' and delivered by a trainer who lacked knowledge of Bravo's business operations. Finally, it explains that the top management rejected the staff views about training inadequacy and irrelevancy, which led to staff isolation and frustration.

This next phase considers whether the staff were able to overcome this isolation and frustration.

4.2.2.2 Phase 2: Getting Better with SAP

This particular phase started after five months of going live and lasted for four and half months, as shown in Figure 4.2. First, this phase explained in detail the process of rectifying the SAP issues, led by 'SAP champions' via informal groups. Second, it explains the role of the management in facilitating these groups and the emergence of a new environment of collaboration and knowledge sharing through these informal groups, which resulted in more understanding of SAP-led business processes. Finally, different instances of performance improvement, more satisfied suppliers, timely and trustworthy reporting, and achievement of 'KPIs' and 'sales revenues' were noted in this phase.

4.2.2.2.1 The Emergence of Champions as Problem Solvers

It was noted in the previous phase that staff felt isolated and frustrated. After sharing their issues, they soon realised that a majority of them were facing the same situation but they did not have a platform to find the relevant solutions for their problems, especially after the management feedback about the formal training adequacy. However, a business system analyst noticed 'champions', who were passionate and confident about SAP and had an aspiration to overcome the struggle with SAP:

> After a few months, I saw pockets of champions so those who really see the benefit in the SAP and who want to get the most out of it and were looking to improve the way processes are run, the way that data is handled especially towards month end and the way journals are processed because they really believe that we can get some good use out of it. That's great. They are the people as soon as we identify, we rely on them to help drive our change initiatives, so if we are looking at ways to improve, we will go through them first. It's always better to have someone from within your own area say this is how we should do things better so that we can get more out of the system. (Interview: business system analyst)

> We tend to find that the people who we have identified as, what we call, champions are more like champions in our reference to them. Typically they have seen things done better at other places, especially with SAP. They have seen how it can be used, maybe in mature implementations. They have seen in time what the system can become. … they have seen how things can be done better and they would like to have that same level of quality and ease at Bravo. So they are the ones who can say that I have seen this work and if we do this right it would be great for us. (Interview: business system analyst)

The roles of these champions were informal because they were willing to support their colleagues in addition to their official duties. These champions were keen to explore

the SAP features and soon became popular among their colleagues and a first point of contact for help for their fellow colleagues, as explained by several staff members:

> I don't think there is a formal [role of champion]. They would probably not want to continue using that word champion. We would just say those people who have that sort of passion or drive to change. (Interview: business system analyst)

> I preferred to ask a champion for help rather than find my way online. [There was] a lot of built-in help but it was not what I was looking for. Therefore, I always used to take the issues to these meetings and now everything is smooth. Actually now I am helping others … I am so happy. (Interview: contract administrator)

> Even if we do get stuck now it is not an issue to get around it. All we have to do is to speak to one of the champions. We have group leaders. They are more frequent users. We go to them and they basically probably have the answers for us. (Interview: contract administrator)

4.2.2.2.2 Informal Groups Led to Knowledge Sharing and Collaboration

Because there were many outstanding issues and it was difficult for the champions to address every person's problem on a one-to-one basis, meetings were arranged for the purpose of collaboration and sharing of information between champions and staff from various business units, as noted by a staff member:

> We would have catch-up meetings every two weeks because so many things weren't working ... certainly a regular team with all the AP and treasury … we would meet for an hour and go to people and say this is not how it should be happening and this is how it should happen. (Interview: business service officer 1)

These meetings were appreciated by various staff members and soon become popular. This popularity was noted by the middle management—especially a finance manager. The finance manager not only appreciated these meetings but also decided to facilitate them, as explained by a business analyst:

> She [finance manager] is very much into meetings. Ever since she has been on board she has been very much into meetings. Having a very proactive and demanding manager meant that things happened. She just never let go. (Interview: business analyst)

As the number of issues emerged, these meetings were increased, a need for technical expertise was realised and a decision to engage the SAP trainer was made, as explained by a business service officer:

> We had sort of meetings and [at] those meetings we [invited] a trainer to come and help us with our problem and that's how we learnt—by having problems and learning to get over them. (Interview: interview business officer 2)

Using these meetings as a platform, the finance manager encouraged the participants to share their knowledge, collaborate with each other and disseminate the concept of integration:

> If they pick up the error I want them to contact the person who made the error and if for some reason or other that person cannot correct the error then we do it but we also train them. Because I keep saying that knowledge should be shared and the people who do the previous steps should have good knowledge and be comfortable with the system because otherwise we can't just fix up everyone's issues and problems. That's not our role. (Interview: finance manager)

The advice of the finance manager regarding knowledge sharing was found to be working. The business analyst helped his colleagues who had limited understanding of the SAP functions previously. He elaborated:

> Well I often help them if they are stuck on something but for a long time they didn't know what to do if they missed the training or hadn't asked and then rung up and said they didn't know what to do. It's frustrating for us and it's minimised now because a lot of them now know what to do. A lot of them when they are at a client's site can't access the system. Then they have to get someone else to do it with them. We kept trying to educate them. (Interview: business analyst)

The knowledge sharing and collaboration through these meetings helped staff to comprehend and address their issues, and as a result, staff felt they were improving, as explained by several staff members:

> Yes [meetings were quite helpful], we just kept improving. (Interview: business service officer 1)

> We don't have too many mistakes now. (Interview: business service officer 2)

> I think that we get 20 per cent of the [complaints] calls that we used to receive. It's dropped by 80 per cent. (Interview: finance manager)

The outcome of these meetings were visible and being talked about throughout the organisation. However, at this point, such meetings were limited to the finance department, but the PSG manager was convinced that the meetings had the potential to provide knowledge sharing and a collaborative platform. After a while, a similar informal environment of sharing and helping was noticed in the PSG group:

> I think because as far as my group is concerned we are a very small group, I've got about four or five people reporting to me. So still if someone says, hang on we knew that we always had a problem getting around this particular issue, suddenly they find the easy way, they will say, hang on I got there I found the easy way to do this or someone else gave me the information, here is how you do it or they just give you a screen shot of the problem and say, here we go, next time you are faced with it, this is how we did it. So people share. (Interview: customer administrator)

To keep a record of issues and relevant solutions, a database named the 'continuous improvement log' (CIL) was designed, as mentioned by staff members:

> We have got a continuous improvement log [in which] we have all our issues logged … and our business keeps that subset of our log. (Interview: PSG manager)

> We had CIL, as a big log, it was about 500 items to begin with. It's gone down now but even now we still raise CILs over any problems. I think it was the meetings that were behind it all to get things done. (Interview: business service officer)

The CIL helped the staff to store and prioritise issues and relevant solutions. This database was made available throughout the organisation with the help of WebEx, which combines file- and presentation-sharing tools with voice, high-definition (HD) video and electronic meeting spaces (the company website includes a detailed description of its use). In this case, WebEx facilitated organisational-wide knowledge sharing, as noted by a contract administrator:

> If [the] same problem would appear 10 different times, they place the answer onto a website [WebEx] where we could go and see—hang on what is the most common problem, or you just look at a raft of issues and then you say, hang on, I had the same problem, here is how they resolved it and we looked at that and we used that as another way of solving the problem. So you might have 100 calls, 20 calls might be related to one, there you go, you straightaway solve 20 of the problems. So it was things like... (Interview: administrator contractor)

4.2.2.2.3 Instances of Performance Improvements

The above findings indicate that the aspiration of staff to overcome issues led to knowledge sharing and collaboration through informal groups. These informal groups were led by the SAP champions and facilitated by the finance manager. To systemise and extend these collaborative processes, tools such as CIL and WebEx were used. These informal groups had positive implications in the finance department and were later noticed in the product and service department, as well. This section will elaborate the operational performance improvements that were noted by the staff.

There were several examples of performance improvements including a reduction in the duplication of invoices, higher supplier satisfaction, KPI achievements and better quality reporting. First, 'duplication of payment' and 'unpaid' invoices were among the main issues, as discussed in Phase 1, and consequently suppliers were not happy with Bravo Australia's service quality. The meetings helped the staff to investigate

and rectify these issues by engaging the suppliers. For instance, to make the payment process efficient, a letter was sent to the suppliers, with a request to include a purchase order (PO) on their invoices to avoid duplications. As a result of this strategy, a reduction in the duplication of payments was noted by a business service officer

> For example: As a result of our discussion, we sent a letter out to our suppliers saying that they must put a purchase order (PO) on their invoice. I think we talked about that and we got the letter together and that was posted out. I don't know if it's had a big impact. One of the impacts of that is that we have far less duplication of payments. Because if you have a PO and you get invoices to match that PO then you have less chances of a copy of that invoice coming in and being processed. (Interview: business service officer)

The reduction of errors and duplications resulted in more satisfactory responses from the vendors, which was never achieved with the legacy systems, as mentioned by the finance manager:

> Our vendors and supplier have really and truly appreciated the changes. Our vendors are quite complimentary of Bravo now. We have gained that. We didn't have that a year ago and we have reached a stage now that if there is an invoice that remains unpaid, they realise that for one or another reason the invoice has been misplaced and it's not like oh they didn't pay our bills. That's all gone, they might ring us up and say, oh you're really good payers. (Interview: finance manager)

Her claim was supported by the chief finance officer's statement that:

> I think that we get 20 per cent of the [supplies/vendors complaints] calls that we used to receive from them. It's dropped by 80 per cent. (Interview: chief finance officer)

Other instances of improvements in the form of KPIs were also noted by the finance manager:

> We would miss them on a regular basis now we meet them. I think we more than meet them, we really do. I could tighten it more but I don't because I find their quality of work very good. Now it's no longer very hard to meet KPI. (Interview: finance manager)

An improvement in the quality of reporting was another visible instance of performance enhancement. One of the main objectives of SAP implementation was to have real-time reporting; yet in the first few months [Phase 1] after implementation, this particular objective seemed impossible to achieve. However, once the staff's understanding and skills level improved, a visible improvement in reporting was also noticed. The reports became comprehensive, in real time and trustworthy, as explained by the PSG manager:

> Now the reporting is pretty much real time and in the worst case an eight hour delay. My interim reporting cycles are much more accurate. I can trust my reports all the way through the month. It's not 100 per cent I suppose but it's safe. This means that I spend a lot less time validating the report or second

> guessing it or seeing whether the report I'm sending is accurate. I get very few surprises and under the old system, it was only about four to five days after the month that I would get a report back [that] the company certified that as accurate. Now with the way reporting is done with everything being done online, all the changes, all the manual adjustments, audit changes, intercompany transfers et cetera, everything is done online. The data is real. Everything is done out of the business warehouse so that's good. (Interview: PSG manager)

The difference between the old and the SAP systems in terms of report availability, accuracy, validation, processing time, trust level and presentation to management is summarised in Table 4.1, which is derived from interviews.

Table 4.1: Reporting Quality Improvement

Reports	Legacy Systems	SAP
Availability	5 days	real time
Accuracy validation	4–5 days	real time
Processing time	6–7 hours delay	20-minute delay
Presentation to management	7 days	2–3 days
Trust level	Low	high

Finally, the implementation of the SAP system provided the business with standard business processes. The objective was to have efficient transactions throughout Bravo Australia. In addition, these transactions had to match the industry standards or else it would be difficult to obtain a competitive advantage. This type of competitive advantage was achieved by cutting short the 'payment collection' period by a good margin by inputting accurate data into the system, as explained by a regional sales manager:

> I certainly know that since we have had SAP a day's sales outstanding number has been reduced from 42 to back to 37 or in other words its average number of days to collect our cash after we have invoiced has been reduced by five. The industry average is 40 and we are well below that. It's an indication that the data we are capturing in the system is more accurate. (Interview: regional sales manager)

Further, according to the sales performance report, sales growth was also in various regions following the SAP implementation as shown in Figure 4.4.

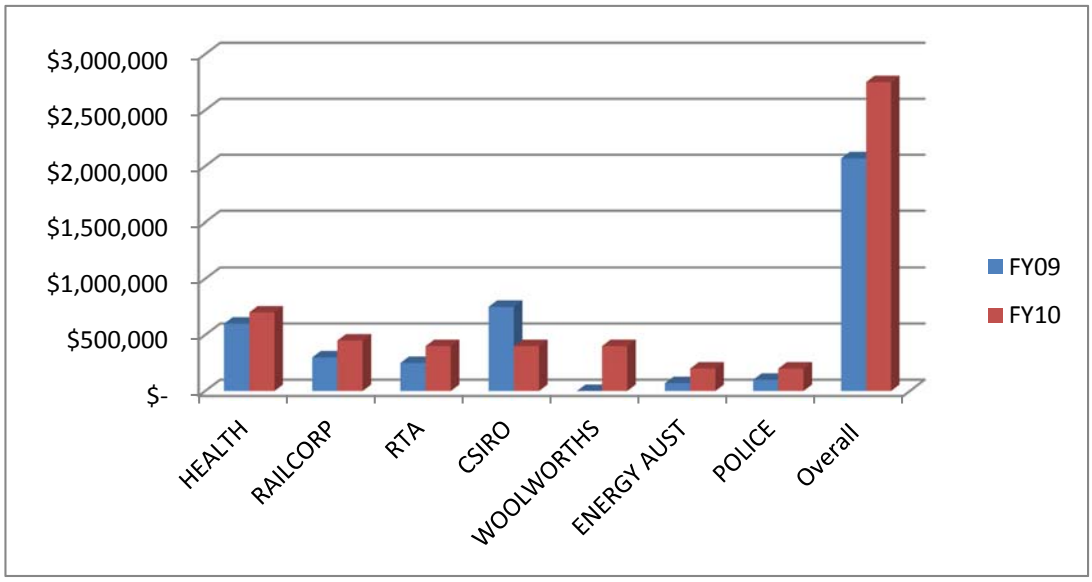


Figure 4.4: Sales Comparison by Customer

In summary, this phase highlights how the staff being inspired by the champions to address the issues listed in Phase 1 led to the emergence and development of informal groups and consequently helped to improve Bravo's operational performance. The staff struggle with SAP caused them to feel isolated and vulnerable. To counter these issues, a group of champions emerged, who were supported by the middle management through allocation of resources in the form of time, HR, infrastructure and technology. These meetings provided a platform for knowledge sharing and collaboration. The inclusion of the trainer into these meetings added technical expertise along with business process knowledge. These meetings were further supported by CIL and WebEx, which helped in organising and prioritising the issues and relevant solutions. Moreover, WebEx was used to extend this collaboration throughout the organisation. This informal group collaborative platform led to an improvement in the payment process, supplier satisfaction, real-time and trustworthy reporting, KPI achievements and sales revenues. In short, this phase highlighted that the informal group's collaboration with the middle management support led to operational performance improvement. The next phase advances our understanding on whether these groups had any strategic implications, and if they did, what these implications were.

4.2.2.3 Phase 3: Mastering SAP and What Next?

Phase 3 began after 10 months of going live and was ongoing at the time of the second round of the interviews, as shown in Figure 4.2. First, this phase highlights the expansion of informal group discussions to the organisational level and winning top management support for its activities. Second, it reflects change in the views of the staff about the new SAP system. In addition, it elaborates the strategic benefits resulting from staff mastering SAP. Finally, it pinpoints how the new SAP system along with a knowledgeable workforce set the foundations for business expansion.

4.2.2.3.1 Expansion of Informal Group Activities

In this phase, users were found to have a basic understanding of the system and had the capability to use the system to accomplish their routine work. After a while, the focus of their aspiration changed from solving the issues to exploring additional features of SAP, which staff referred to as 'What Next with SAP?'. For example, a business analyst described how he spent his spare time in searching for new ideas:

> I would spend every spare moment sitting there wondering there is something different about this, there is something different that I have to do. I have to create a payment file with a dummy name and I knew I could only go to a certain point till there was a point of no return. I would just keep playing with it and keep cancelling it until I got what I wanted. I would make notes so that next time I don't need to do that and I can just do this. That's how it would work. We created a lot of our own notes and shared them around. We just found it enormous. (Interview: business analyst).

The program manager viewed SAP as a 'smart' system in terms of efficiency, and it saved staff time, which they then spent on thinking about how to use SAP to improve business operations:

> I like actually that my staff have more time to think. It's only by doing the work that you come up with ideas. We think that SAP as a system is smart enough to give you a lot of information since it's a very logical system. We like it and there is a lot you can get out of it. In that way we are still evolving and still learning. I don't think that we would've done that in the past. (Interview: program manager)

At this time, informal meetings were limited to the departmental level. However, during interdepartmental meetings, the finance manager narrated the stories of these meetings and relevant outcomes. The change manager appreciated the idea and decided to expand it to the whole organisation by organising similar kinds of meetings across the organisation with the name of 'business transformation forum' (BTF). These

forums comprised important stakeholders from different businesses. They provided various stakeholders with a platform to discuss ongoing issues, relevant solutions and to develop a common understanding. The change manager explained this by saying

> I think one of the critical successes in our change management strategy was a concept called business transformation forums and thanks to Rita (finance manager) for suggesting it. What we did was identify key parts of the business processes or functionality that we knew we needed critical decision-making. For example, the BTF was arranged for purchasing. The BTF would get together and we have representatives from all parts of the business and everyone would sit in the room and we'd say OK today's issue is and we'd highlight it. People would talk about it and then would take positions. They'd be entrenched views, forward-looking views, lively debates. Occasionally I remember people walking out. The idea was that BTF was a forum in which we could discuss and share with the help of WebEx these things and make a decision like external audit from E&Y, about a critical point of configuration of the system or user training or process development. Whatever it was we could talk about it. (Interview: change manager)

Further, these BTFs were used to develop common understanding throughout the organisations. For example, a senior business analyst said that all configuration or process changes were communicated to everyone in the organisation via BTFs. He explained:

> Quite often the two go hand in hand. If we are changing something technically, so making changes to the way SAP will record something or account something or is configured. There it needs somebody to enter a new piece of information either at a master record time or even at a transaction time, then just by making the technical change and not educating the users on what's required from the process point of view you won't ever have hope of success and you'll have dirty data. You will have the same issues coming up at the next review. So they go very much hand in hand, if we are changing the process or changing something technically we make sure that the users are educated on that process throughout with written communication or BTF. (Interview: business analyst)

Eventfully, these BTFs involved more than 50 technical staff and 100 business-focused staff, who worked together to ensure that different project objectives were achieved. One of the managers from the Bravo project's office claimed that these BTFs had helped the members to develop a common definition of business processes. His views were supported by a business service officer explaining how she understood the new payment process and underlying meanings behind the change by using BTF. She elaborated:

> This is a real scenario because everyone was like but I used to do it like this and it worked well why I can't do that. For example the manager would say well I only want you to pay knowing that there is a huge amount of money due by a certain date but we have commitments and we don't want to pay it all on a certain day. In my old scenario was I would tell the system a range

> of dates, I want to pay vendors between a start date and end date paid on that day. Whereas with SAP at that time once we nominated a banking date SAP determined that the banking date was also the invoice date. I was kind of restricted by that kind of banking date. When I put the question in BTF, one of the business process owners said SAP was designed on the assumption that you pay whoever is entitled to their money on a due date on a given time with an objective to streamline and automate the payment process. I conveyed that to my manager. I understood SAP process the way it was designed to work. It works and it's a fantastic feature when you want to use it for other reasons as it transformed the manual processes to automatic ones. (Interview: business service officer 2)

4.2.2.3.2 Interdepartmental Knowledge Sharing

Along with developing a common definition of business processes, BTF facilitates knowledge sharing among users from different environments, which helped the staff to develop cross-functional knowledge of SAP business processes, as noted by the PSG manager. He further explained the role of communication technology WebEx:

> So it was very good to actually get to the point those people started to develop some knowledge of those other parts so they can contribute more I mean people have got the strength in an area but an understanding of the other area the people was a significant value. BTF forum have provided the idea and I encouraged my people to grasp that knowledge and we used technology [WebEx] to help us. (Interview: PSG manager)

Following the knowledge sharing through meetings, BTFs and WebEx, a positive change in the staff's views about SAP was noted. For example, SAP was regarded as 'efficient', 'effective', 'powerful' and a 'decision-making' tool by staff members:

> SAP is more efficient and effective. Comparing SAP with the old system is like comparing typewriter with a computer. (Interview: business service officer 1)

> SAP is a good thing. We know it's a very powerful system. I think generally the mood is switching in SAP's favour. (Interview: business analyst)

> So at the end of the day the whole idea of moving into a system like that was to get productive and not straight up to the person who was doing that but to other parts of the company at a very high level so that they can make decisions. It is easier for them to make decisions when they get … Or this month, here is how much we have done in sales, therefore we think next month we can forecast quite comfortably we will make X amount of sales. So they can make those projections, those decisions much quicker in a more dynamic way. [At] the back end so we don't get involved with those decisions directly, but we do get involved indirectly as we are the hands and legs that input all the data into the system. (Interview: contract administrator)

The above quotations show that staff considered SAP a useful, powerful and decision-support system. It also shows that staff considered themselves part of the decision-

making process. A sales representative not only endorsed the support capabilities of SAP, but also explained how his understanding of it changed over the period from 'time consuming' [Phase 1] to 'useful' and 'excellent' [Phase 3]:

> I think the struggle they had last time was more about how time consuming it was but now the feeling in general is that is a very good and useful system and it's got excellent capabilities to make a difference to our business like here is how much we have done in sales, therefore we think next month we can forecast quite comfortably. We will make X amount of sales. So we can make those projections, those decisions much quicker in a more dynamic way. (Interview: sales representative)

> More people are embracing it. More people are looking to get the most out of it. If you don't understand how things relate to each other in the system, what the impact of your process is on other things you may not have full appreciation of what you are doing and why you are doing it. So at the end of the day the whole idea of moving into a system like that was to get productive and not straight up to the person who was doing that but to other parts of the company at a very high level so that they can make decisions. It is easier for them to make decisions when they get... (Interview: sales manager)

These changes in the staff's view about SAP were also witnessed by several managers, who stated:

> I think they realise now that they [staff] have been using the system for a while, the old system wasn't even close to this capability. On day one when it was just put in with similar capability people felt that the old system was better in a lot of aspects. Now they are getting all this functionality they think that they can't believe that they liked the old system. There is a general recognition that the power of the new system far outweighs the old system. (Interview: regional sales manager)

> My staff are very positive about SAP and they really like it … They don't compare regularly anymore. They just say that when I think back one year ago or two years ago with the previous system, isn't it a lot better now? That's what I always get that it's a lot better now. (Interview: finance manager)

> I am talking as the product part of the business. I think most of them understand now that if you spend an extra 20 to 30 minutes doing things properly it will save a whole lot of time at the other end. (Interview: PSG manager)

The above quotations highlight a favourable change in the staff's view of SAP. This change was noted by various managers: the staff appreciated SAP because they understood its capability and cross-functional nature. These changes in the staff's view of SAP helped to alleviate the fears and eventually took away the resistance, as explained by the business analyst:

> But some of them are now saying that it is now brilliant when they have got over that hurdle but if I say did it work. It worked from the point of view that by having the strategies [meetings] in place you alleviated some of the fear and some of the resistance. Yeah. (Interview: business analyst)

The finance manager attributed the changes in staff views to the SAP implementation and collaboration among staff by saying:

> It's [change in views about SAP] ultimately an outcome of an inquisitive and better educated workforce through collaboration among staff. And we got our education because of SAP. Now that we know what we are doing we are more inquisitive and yes it all flows. It's not the only outcome; there have been other wins. There is a happy workforce, there are always people who complain but on the whole we are a lot happier and especially in my area its going well. So yes I think it evolves. (Interview: finance manager)

4.2.2.3.3 Strategic Implications of SAP

Along with these changes, the finance manager believed that SAP had helped her to manage organisational operations better. She added that this capability led to the perception that any department can contribute to company profitability, not just the sales department:

> I think the one message that is probably coming out of this is that a lot of people who had the perception that they could not influence the company's profitability now understand that you don't have to be in sales to make the company profitable. There are other things that you can do in other departments; no one is really helpless. You can influence the results of a company ... Our finance team made a good contribution last year through foreign currency management. We had quite a nice foreign currency gain rather than a loss, which is good because the year before I have responsibility for that because it was a loss. We can all influence the bottom line and that's a thought that seems to be quite driven in the organisation and examples are highlighted. Not only in my department, legal department as well. But I think with us I have to link it to improved system use and therefore improved knowledge and a happier workforce. A workforce that is no longer doing things by rote. They now think!' (Interview: finance manager)

A business service officer also felt differently; she now believes her routine tasks contribute to the overall performance:

> We don't operate as we used to be. We think before we do anything [now] as our routine tasks eventually make a difference in overall performance. (Interview: business service officer 2)

Along with the above implications, the strategic benefits of Bravo SAP project started to become apparent after 10 months of going live. First, access to better and detailed data enabled benefits such as improved order scheduling, better forecasting of business markets and a single view of the partners, both customers and suppliers, which consequently made it easier to identify opportunities or issues in Bravo's everyday operations. For example, a regional sales manager explained how the diversity of data had improved his understanding of the business and could help to improve his dealing

with suppliers. Moreover, his views about the business operation appeared to be changing:

> Before we had SAP I just got a report once a month and that's how I ran my business. Now I have online reporting and I can look at so many different flavours with the data and I can search on from customers to purchase orders to suppliers, to brand to services to hardware, to servers et cetera. I can even look at sales rep by customer, by brand, all that type of thing you know. It's just an immensely powerful reporting tool. I, in my role, have to manage a number of customer relationships. It absolutely allows me to be looking at my customer base and determining what I've traditionally sold into my customer base. What you've sold in the past doesn't mean you'll necessary sell that in the future but it's still something that you can look at and use that information with your suppliers as well. Talk about how you might like to treat customers moving forwards based on their expenditure based on yesterday's sales. (Interview: regional sales manager)

Similar views were expressed by a sales manager:

> As far as any other data being captured or trapped into there, certainly from our suppliers we are getting a lot of good information. I don't want to say good information, just specific information about the brand and the model numbers so that we can actually break it down like for instance one supplier has multiple categories of product. Before it would be just a whole bunch of part numbers, now we can break it down by the categories of product that are in there based on what the supplier sells us. It just gives us a lot more power and information to see out of all those networking products what categories are we selling the most of and what category we are selling the least of. That's a fairly recent capability. (Interview: sales manager)

Second, the SAP platform enabled the building of new business processes on top of its best practices by integrating with other applications or tools. For example, the finance manager saw the potential of integration of SAP with CRM:

> I think so because it seems that there are so many good products out there on the market and they are 100% compatible with SAP because SAP has a very good name. We as Bravo Australia do implement SAP as well; we are partners. So we are very much involved and we love the product. It is a product and is now very well-known and has gained a lot of market share. (Interview: finance manager)

According to the project report, such integration had the potential to enhance contract management with key partners and would also reduce the data management complexity and enhance Bravo's capability to design effective strategies for a dynamic market. Moreover, with the successful implementation of SAP, Bravo subsequently implemented a variety of other functionalities, including employee self-service (ESS), manager self-service (MSS), payroll and HR capabilities. 'Self-service has been great, and a very smooth implementation', stated the project manager. He further explained:

> SAP got the usability of ESS and MSS right, so people just took to them. There is so much information at their fingertips, and earlier they didn't have

> that option. When you don't hear about any issues, you know people can use the system without any pain.

Moreover, there were talks within the top management ranks to implement an 'SAP freight tracking and build to order' functionality with the objective to enhance Bravo's server business and reduce its inventory cost.

The benefits of the Unity Project became apparent in the second round of data collection. It was evident that SAP had delivered significant improvements to Bravo Australia. Many of the SAP benefits were 'qualitative', for example:

> The implementation of common processes across the company has enabled the strategic alignment of the company's business units, automating payment processes and warehouse infrastructure, eliminated internal trading, improved the ability to manage the company's leave liability, and provided on-demand training as well as better business process documentation. (Project report)

The project manager believed that, despite the complex nature of Bravo SAP project, the success of the project reflected the staff and top management's commitment to transforming Bravo to 'Bravo for the Future' with the help of SAP. When asked whether that would be possible without SAP, he replied:

> If we didn't have those best practices as a guide, we might have just gone and replicated what we were used to doing. (Interview: Project manager)

Similarly, the CIO believed that the experience of SAP has helped them to change the company's overall business strategy:

> Using the guidelines of SAP Best Practice, the company has been able to both change its operations, and lay down a flexible framework to support ongoing business process improvements in the long term. (Report: CIO)

> The greatest benefits will come in the long term as Bravo continues to build new business processes on top of its new best practices driven by the SAP framework. SAP has allowed us to be positioned well for future growth. (Report: CIO)

In summary, this phase described the expansion and legitimacy of informal groups in the form of BTFs. These BTFs, facilitated by WebEx, provided a collaborative platform throughout the organisation and, as a result, staff understood the overall business strategies of implementing SAP. This led them to change their views about SAP and also alleviated the fears they had in the early days (Phase 1). This phase further shed light on strategic implications in the form of SAP integration with other applications, changing perceptions about business dealings and, eventually, change in the overall Bravo business policies and strategies.

4.3 Conclusion

The findings presented in this chapter have provided a contextual overview and detailed progression of the SAP implementation from the point of view of business service officers, business & system analysts, trainers, the change manager, the program manager and the project manager. In order to convey their authentic experiences and their uncensored and often contradictory views, they were allowed to tell their own stories. The implementation of SAP was a complex change process that triggered individual and collective learning, which ultimately produced evidence of organisational learning. In the light of the rich evidence from the field and the first-level analysis of SAP implementation process presented in this chapter, I will now present my own interpretation informed and guided by the learning theory of Argyris and Schön (1978, 1996) and the CoP concept of Lave & Wenger (1991). This study aims to develop a rich understanding and explanation of how and why the implementation and use of SAP first prevented and ultimately stimulated learning within Bravo Australia.

Chapter 5: SAP Implementation, Organisational Learning and Communities of Practice: Analysis and Discussion

5.1 Introduction

The findings from the study of SAP implementation in Bravo Australia described in the previous chapter indicated that the SAP implementation introduced considerable organisational changes. For example, the introduction of SAP produced a discrepancy between the staff's existing knowledge and skills related to IT support and business processes, and the knowledge and skills they were expected to have to adopt and use SAP effectively. Due to such discrepancies, the staff perceived that their regular engagement in work practices and actions in the work environment had become inappropriate. Both the organisational environment and their work practices became different from what they had known and expected. Further, the management was not aware of the degree of change of the business processes that would occur in SAP implementation. As a result, staff struggled with SAP during Phase 1, as documented in Chapter 4. However, at the end of Phase 1, CoPs started to emerge, which enabled actors to resolve their initial problems and improve their understanding of SAP, leading to single-loop learning during Phase 2. As CoPs became an integral part of the organisational work process, involving also top management, in Phase 3, the appropriation of SAP led to a more radical innovation of business processes across the organisation and a change in mental models, resulting in double-loop learning. This suggests that the emergence and expansion of CoPs throughout these three phases of SAP implementation enabled organisational learning, which was the key to the successful SAP adoption and achievement of organisational objectives by the end of Phase 3. This chapter provides an in-depth interpretation of these changes and answers the research questions:

1. How does organisational learning emerge and assist the actors in an ERP implementation?
2. How do CoPs facilitate organisational learning during an ERP implementation?

5.2 Struggling with SAP and Not Learning

Phase 1 started on the go-live day and lasted over five months. During this phase, staff could not understand the new ideas and business processes imposed by SAP. They could not even comprehend the objectives of SAP implementation. 'Why do we need this SAP system?' was a typical question. Functionalities of the legacy systems and the way they supported business processes were considered superior to the new SAP and its embedded business processes. Importantly, they could not establish a link between their prior experiences and the new processes. After going live, SAP was not used and performance dropped when compared with the previous period. The question arises: Why did this happen? What prevented staff from appropriating and using SAP given that they all underwent the training? The analysis of empirical material revealed three main reasons: (1) a lack of understanding of SAP and its embedded business processes, (2) a disconnect between the actual work practices and the training, and (3) misunderstanding between staff and top management about the completeness and usefulness of the provided training.

5.2.1 Lack of Understanding of SAP and Its Embedded Business Process

Initially, the main obstacle for the staff in adopting SAP was the inappropriateness of their existing knowledge and skills for the new circumstances. Specific business processes embedded in SAP were imposed upon the organisation. This enforcement led to a considerable organisational change: role and responsibility redistribution, cross-functional interconnectivity and new knowledge requirements for the staff involved throughout the process. As a result of these changes, staff were expected to complete the same old tasks using unusual steps, which required different types of skills and knowledge than their existing ones.

Staff struggled to understand SAP and its requirements. They were used to accomplishing their tasks in certain ways and were quite comfortable in doing so. However, all of sudden, they were required to abandon their old practices and learn new ways to accomplish the same old activities, as business service officer 1 explained:

> I used to use the old system very well too and I knew it back to front or as well as I could learn it. I could do it with my eyes closed after a while. Then

> all of a sudden you are faced with a new system, not only do you have to learn how that system works but also the processes. (Interview: business service officer 1)

After going live with SAP, staff in the accounts payable and requisition department began to feel helpless and that their jobs were deprived of meaning and responsibilities. This dispossession emerged because of the unexpected addition of IT-related tasks in their routine workload. For example, a business service officer was expected to raise PO which she never done with the legacy system. This caused frustration, as illustrated by a business service officer responsible for raising a PO:

> I have been told t to do certain things regarding purchase orders which I've never done in my entire career. Even the fields in the SAP payment process were different from the other payments [in the legacy system]. The fields were asking us questions that we have never had to answer like what's the next date of your payment? It was frustrating. (Interview: business service officer 2)

The completion of this task required both understanding of the new process and relevant IT expertise. Staff were not familiar with their new responsibilities and could not comprehend the imposed changes.

Further, the new knowledge requirements emerged because of cross-functional interconnectivity, that is, an integrated operation of all business processes. Therefore, staff had to understand not only the SAP module relevant to their particular business process but other interconnected modules:

> It is not the particular module which [one] is working on but [one] also needs to know the other modules which are interlinked with it and that's annoying. (Interview: contract administrator)

The cross-functional interconnectivity of SAP business processes imposed a particular 'discipline', which was the main source of frustration, as noted by the program manager:

> Everyone needs to understand that SAP comes up with a 'discipline'. SAP's 'discipline' means that if you don't get it right upfront the rest of the transaction is stuffed right away through to the general ledger journal and fixing it through doing a general ledger journal or through someone in AP manipulating it is not going to work as everything is interlinked now. (Interview: program manager)

Given that all staff had undergone SAP training, management expected them to have adequate knowledge of the SAP business process models across business functions. The 'discipline' thus imposed on their operation was the source of frustration.

An understanding of SAP's distinct terminology was another obstacle in its adoption. The understanding of this terminology was a prerequisite for staff comprehension and communication with the various stakeholders of SAP. However, staff struggled to understand this new terminology:

> The [SAP] terminology was a major barrier. It still is I think, because regardless of which system you used before, it didn't matter if you didn't work here before and if you started working once implementation came on board you still had to learn the terminology … [W]ith the terminology it's really important to get it right because if you are talking to a developer they are just going to look at you as if you've got an egg coming out of your arm. They don't understand what you mean unless you use their terminology (Interview: system analyst)

Another issue was the lack of understanding of SAP's strategic importance and especially its reporting power. Although the top management understood the importance of SAP as an 'information rich system' that is capable of producing a huge range of reports for decision-making, staff failed to appreciate this. The program manager explained the SAP benefits:

> SAP is very information-hungry system. There is so much data in them. Like there are screen and screens of information and in all these screens there are 40 tabs worth of information. The aim of capturing additional information is to have better reports which can assist in decision-making eventually. (Interview: program manager)

However, staff did not realise that entering accurate and complete data had an additional important implication: the production of high-quality reports. Lacking knowledge of SAP, staff could not see beyond their own business processes and perceived the complex data entry as a 'complicated', 'difficult' and 'time-consuming' process:

> SAP is very time consuming. There is a lot of data and information in SAP so to do one thing it might take two steps in Oracle but in SAP it might take four to five steps to complete one task. (Interview: business system analyst)

> My experience has been it's a very difficult, I found it a very difficult system to use. … other people, my colleagues make the same observation, but certainly from my point of view it is a difficult system to use, [it is] more time consuming … to complete tasks, to raise the invoice and that sort of thing. (Interview: service desk)

Staff failed to recognise SAP's role in decision-making and its strategic importance. As a result, staff struggled to perform their duties, even several months after implementation. It came as no surprise that the lack of understanding of SAP and its role and the everyday frustration with its use resulted in staff resistance. Although not always overt, resistance could be detected in different guises:

> They fought against it [the SAP implementation], which I think is natural. For a long time it was always that standard response. We didn't have to do this before, it wasn't like this in the old system and it was better. So there was a constant comparison of old versus new. I think a lot of people struggled with it. Struggled in terms of being able to get their work done, waiting for someone else to fix their problems. (Interview: business analyst finance)

> [T]here were some very precious personalities who took the approach of 'I am too busy, I am too important, I have trouble connecting'—[while] you know, there's no trouble connecting at all. They are on the remote sites, some of these people but they make the excuse of having trouble connecting. Or 'I don't have enough resources to do this'. Whatever excuse you could think of, they came up with it and the resistance was really quite strong. (Interview: program manager)

Some staff resisted the use of SAP for reporting and kept on using the old applications. They:

> used Excel as a bypass for SAP … people had to adapt and had to change the way they worked. [But] there was a lot of resistance in terms of the processing. People did not want to adapt to it. They wanted to continue creating things on Excel and sending them out. (Interview: program manager)

Resistance was more passive than active, which can be viewed as an implication of staff feeling threatened by downskilling and upskilling at the same time. On the one hand, they had to give away their expertise of legacy systems and existing business processes and, on the other hand, work with an unknown system, SAP, which they considered inferior to the legacy systems. Further, this new system required learning new IT skills and acquiring new business process expertise. Above all, there was a fear of a job loss :

> Some of these people have been in their jobs for 20 years. If you suddenly put a new system where its showing up that perhaps they can't do their jobs effectively, the fear of losing their job and fear of losing their income, all that—so fear is the big factor. (Interview: change manager)

In summary, the above analysis reveals that the lack of understanding of SAP and new business processes that persisted during Phase 1 had a complex genesis and underlying mechanisms. Changes introduced by SAP and its embedded business processes were overwhelming, affecting work practices, roles and responsibilities, cross-functional interconnectivity, and even terminology. The existing skills and knowledge of staff became irrelevant and inappropriate, creating a sense of incapability and insecurity and fear of job losses. Staff thus questioned SAP implementation, saying 'SAP is misfit for our business needs' and resisted its use. As a consequence, staff were demotivated to engage in learning.

5.2.2 Disconnect between the Training and Actual Work Practices

To achieve a smooth transition from the old to the new system, a comprehensive CM strategy in general and training in particular were carried out. However, the SAP training that was provided was inadequate and, consequently, staff failed to link the training with work environment. A few factors contributed towards this inadequacy and disconnect.

Because the training was organised before the implementation and independently of the SAP configuration, which was conducted in parallel, staff ended up using a different version of SAP than the one on which they were trained:

> We did have a very simple training session in September before we went live. It was too early and everyone forgot as soon as they left. (Interview: business support officer 1)

> We didn't understand the connection between the training that we were given and the actual usage of the SAP as it was irrelevant and too simple. (Interview: senior system analyst)

> We had two days' worth of training. The training was so simple that it was like ABC. It was too basic as compared to our routine task. (Interview: business support officer 2)

Actual work practices were more complicated, and the training content was 'generic' and 'simple'. Although the training had provided the staff with some basic understanding of the SAP procedures, it had failed to provide work-related knowledge. One of the reasons for this was the nature of the 'test data' used in training contents. The test data supported 'perfect scenarios' only and, consequently, staff struggled to use SAP efficiently and effectively, as explained by a senior business analyst:

> [Training] was fairly generic and simplistic. As it was always a perfect scenario so what we were actually taught was how to pay a new invoice, so it was all very nice but most of the invoices we get, I'd say we found out 50 per cent, we could not process because of our purchase order was wrong or something else was wrong with the invoice or it didn't match, the contractor invoices didn't match the time sheet et cetera and so forth. (Interview: senior business analyst)

The external trainers' knowledge about Bravo's business processes was very limited and, therefore, they failed to design and deliver useful training. It was evident from their inability to answer complicated questions, as expressed by several interviewees:

> The people who came to train us were the people who had used SAP so they had a general knowledge of SAP but again their ability to answer the question would have depended upon the question that we put to them. For example, so if people ask them general questions yes they will get a laugh and give

> you the answer, but potentially when you asked so okay in this business situation how would you do this and a lot of time the trainers didn't know' (Interview: business analyst)
>
> I sort of felt they [trainers] weren't aware of what we needed. They just said and taught in the classroom that this is how you do it. I don't think they were aware of our needs. (Interview: business service officer 1)
>
> They [trainers] don't understand accounting. They aren't accountants. They are consultants in projects, so yeah the screen can do this and that but I have asked many times show me everything you do with an accounting entry behind it, but they could not answer it. (Interview: business service officer 2)

The above analysis highlights that the disconnect between the training and actual work practices was mainly because the training was too simplistic and basic, was organised too early and was not related to actual processes and work practices. The actual practices were more complicated than the examples practised in training and were not relevant. This disconnect between the training content and actual work practices was an additional factor inhibiting staff learning of SAP.

5.2.3 Misunderstanding between Top Management and Staff

One of the important aspects of Phase 1 was the misunderstanding about training adequacy between the top management and staff. While staff felt the training provided was too simple and disconnected from actual work practices (as discussed above), the top management had an implicit presumption that training was 'extensive', 'detailed' and designed by experienced trainers with extensive SAP knowledge. The project manager expressed the management's view:

> We actually did a fairly extensive training exercise which I think is something which we have done very well. We had the expert trainers with extensive knowledge of SAP and they designed the detailed material to handle business operations using SAP. (Interview: project manager)

The CIO supported the project manager's view:

> We were aware of the importance of training and that's why we hired [the] best training consultants with extensive SAP training experience. I think they have done a great job. (Project report: CIO)

When asked about why staff perceived the training simple, too limited and inadequate, the program manager responded:

> Hard to say … what tends to happen is those people who sleep during the training [later complain] and they probably wake up when we go-live. (Interview: program manager)

However, from the perspective of staff, formal training did not fully address their learning needs, was too general and ultimately unhelpful. As a result, the gap widened

between users and management about the adequacy of the training. The management assumed that the staff were 'lazy', whereas the users viewed the simplicity of the training program as management's underestimation of their needs. This belief added to their reservations about management and their careless approach towards SAP training.

Management ignored staff reservations about the inadequacy of the training and questioned the staff's attitude by calling it 'lazy'. This misunderstanding left staff disappointed and disoriented:

> We did not know where to go and how to solve the problem. We felt like that's enough and that was the case for the first few months. It wasn't the case with me only but everyone was in the same boat. So whenever we met, we shared [our] problems and didn't know what to do about them and we felt like no one was understanding our pain. (Interview: business analyst)

Misunderstanding between the management and staff began before the SAP implementation. The management did not involve staff early on in the planning and customisation process. Pressed by the time constraint of going live by a predetermined date, management excluded staff from this process. However, staff felt their inclusion could have prevented their helpless situation.

The above analysis illustrates that misunderstanding between the top management and staff about the training adequacy and importance of the staff involvement contributed to staff frustration and dissatisfaction with the SAP implementation, and consequently contributed to the staff's failure to learn to use SAP efficiently and effectively.

5.2.4 Discussion

As the analysis above demonstrates, there were three major reasons why the SAP implementation failed in Phase 1: (1) a lack of understanding of SAP and its interconnected business processes, (2) a disconnect between the training provided and actual work practices, and (3) misunderstanding between the management and staff about the inadequacy of the training and staff involvement in the early phase of the implementation. In such circumstances, in which learning and working were disconnected, staff felt that their regular involvement in the work processes and their actions had become inappropriate. The work and organisational environment had become different from what they knew and expected. In addition, they could not see

obvious ways to engage with the new systems and make productive use of them. These reasons for the failure can be explained through the lens of situated learning theory (Lave & Wenger 1991).

According to situated learning theory, learning and working are integrated activities, mutually enabling each other. According to Lave and Wenger (1991, p. 31) 'learning is an integral and inseparable aspect of social practice'. Brown and Duguid (1991) further claimed that, to understand a newly introduced system, a group of workers will develop an informal practice of 'learning by doing'. The members of these groups socially construct their world based on the context in which they work, binding themselves together by the context of the situation and creating the social fabric of the organisation in an emergent manner.

Learning within a working environment enables people to learn in the context, in situ. In such a way, new concepts, tools and processes make sense as part of everyday practices, allowing people to relate the new with the familiar. This is precisely what did not happen in Bravo during Phase 1: learning and working were disconnected. Staff were supposed to have learnt about SAP during the training sessions that took place long before the implementation. However, they did not. SAP training was generic and not related to the particular work and business processes in Bravo. During the SAP implementation in Phase 1, this generic, abstract view of SAP was not helpful.

Benders, Schouteten and el Kadi (2009) presented a similar case of an ERP systems implementation. Their study found that the ERP systems implementation was initially unsuccessful because of increased job demands: the jobs became 'more complicated and therefore more challenging than before' (p. 650). In another case of SAP implementation, Klaus and Blanton (2010) found that system complexity and adversity led to user resistance. They attributed this resistance to the users' physiological contract: 'users who have been employed by the organisation for multiple years may assume that they have been at the job long enough to figure out how things are done and thus low complexity is part of their psychological contract'. Similarly, Vandaie (2008, p 922) argued that staff expertise about the legacy system was an obstacle to acquiring the knowledge of the new systems. They elaborated:

> As the view changes from task-focused to the process-focused by implementing ES, employees need to know how their task fits into the overall

process and how that process contributes to the achievement of organisational objectives. However, employees' expertise about the 'task-focused' approach hinders to adopt 'process-oriented approach'.

Similarly to these cases, the situation in Bravo demonstrated that staff was confident and familiar with the legacy system's operations and characteristics, and could not understand the terminology and operations of the new SAP system. The SAP processes were complex, unfamiliar and required new skill sets. Moreover, staff preserved their old mindsets about system operations and related technology, while trying to use SAP after going live. Engaging with the new system—SAP and its embedded business processes—using the old mindsets prevented the learning processes. As Snell and Chak (1997) argued, this is a typical situation: when learning is obstructed, neither individuals nor the organisation learn.

In addition, the formal training did not relate to the staff's work problems and practices because it was simple, generic, too early and conducted by external trainers who had limited knowledge about Bravo's business processes. Nicolaou (2004a) argued that simple and early ERP systems training creates a gap between the training provided and the knowledge required by the staff to use SAP effectively. Similarly, Yi and Davis (2003) observed that the complexity of ERP systems limits the amount of knowledge that staff can absorb before they actually use the ERP systems. Therefore, Chang and Chou (2011) recommended that staff must engage in learning during the implementation process to acquire the knowledge and skills required for effective use of ERP systems. A lack of training in a work context may result in organisations not achieving the anticipated objectives when they adopt ERP systems (Hayes, Hunter & Reck 2001). Formalised training, as Brown and Duguid (1991) explained, actually encourages 'downskilling', which is generally unhelpful for learning. This is because formal training is based on the assumptions that employees are untrained, uncooperative and unskilled, thus requiring an overly simplistic version of the training program.

The SAP training in Bravo was about 'know that' (about the explicit facts, rules, procedures) and failed to address 'know how' and 'know why' (Davenport 1998; Ho, Wu & Tai 2004; Yu 2005; Markus, Tanis & Van Fenema 2000). The findings from Bravo are quite consistent with the results of Robey, Ross and Boudreau's (2002) study, which indicated that simple and generic training can create knowledge barriers and inhibit learning.

In addition, there was a misunderstanding between staff and the top management about the usefulness and completeness of the formal training. This reliance on the formal training program simply blinded management and the trainers, preventing them from appreciating the actual complexity of business operations and staff expertise. It isolated the learners (staff), who were unable to understand the implicit assumptions about business processes and practices in SAP. Unable to find ways to understand and learn SAP and its embedded business processes, staff felt helpless and frustrated (Brown & Duguid 1991).

Among the key contributors to the staff's failure to learn in Phase 1 was their exclusion from initial planning, customisation and training processes. This exclusion barred staff from interacting with SAP consultants and trainers, and thus prevented them from offering their input into SAP implementation processes related to existing business processes and operation. At the same time, staff were not able to receive any detailed information and feedback regarding the dynamic of the new SAP system. In other words, the decision to exclude staff denied them the opportunity of becoming legitimate peripheral participants and eventually prevented them from learning (Brown & Duguid 1991). 'If training is designed so that learners cannot observe the activity of practitioners, learning is inevitably impoverished' (Brown & Duguid 1991, p 43).

5.3 Getting Better with SAP (Single-Loop Learning), Emergence and Maturing Communities of Practice

Phase 2 started five and a half months after going live and lasted for four and a half months. During this phase, staff attempted to overcome the issues from Phase 1, and this led to the emergence of CoPs. By forming CoPs, staff started to redefine their problems and explore appropriate solutions. In addition, CoPs assisted staff to develop more systematic ways of learning by mapping out what they already knew and what they needed to learn. Learning that emerged at this phase was characterised by changing practices and achieving desired outcomes (e.g. real-time information, efficient and effective reporting, and faster invoice processing) but without changing the mindsets. This indicates that staff were engaged in 'single-loop learning' because this type of learning involves the achievement of the desired objectives without altering mindsets (Argyris 2001). Single-loop learning results in becoming better at doing what one already does. Users did learn to use SAP; however, they were not fully convinced that SAP was a better system than the previous system. Nevertheless, they adopted the system not only because it was mandatory; they also recognised the efficiency of the processes embedded in it. The analysis and discussion of empirical data from Phase 2 presented in this subsection provides initial answers to the research questions: How does organisational learning emerge and assist the actors in an ERP implementation? and How do CoPs facilitate organisational learning during an ERP implementation?

5.3.1 Staff Attempt to Overcome Their Problems through Collaboration and Building Communities of Practice

As discussed, in the previous phase, staff felt that their regular involvement in the work processes and their actions had become inappropriate. The work and organisational environment had become different from what they knew and expected. In addition, they could not see obvious ways to engage with the new systems and make productive use of them. This situation prompted a search for meaning to reduce equivocality and find plausible explanations to guide future actions. A few staff rose above the rest and

played the role of 'SAP champions'. Typically having prior experience with SAP and professional SAP qualifications, they demonstrated significant knowledge and skills to apply it in the specific Bravo context. They were passionate about SAP and were confident of its benefits. They thus became advocates of SAP and the main contact for other staff. One of the business system analysts explained the role of the champions:

> We tend to find that the people who we have identified as, what we call, champions are more like champions in our reference to them. Typically they have seen things done better at other places, especially with SAP they have seen how it can be used, maybe in mature implementations, they have seen in time what the system can become … they have seen how things can be done better and they would like to have that same level of quality and ease at Bravo. So they are the ones who can say that I have seen this work and if we do this right it would be great for us. (Interview: business system analyst)

When asked if they were officially assigned these roles, he replied:

> I don't think there is a formal [role of champion]. They would probably not want to continue using that word 'champion'. We would just say those people who have that sort of passion or drive to change. (Interview: business system analyst)

The SAP champion emerged as an informal role, not related to management. The champions were well aware of their colleagues' concerns about SAP and they attempted to help them:

> Well, I do. I often help them if they are stuck on something but for a long time they didn't know what to do. (Interview: financial analyst)

They were self-driven with the passion to change the current situation by helping their colleagues to understand and use SAP to achieve the implementation objectives. Staff struggling with SAP needed help. Face-to-face informal meetings were arranged to address the issues through mutual collaboration with and around champions.

> I preferred to ask a champion for help rather than find my way online. [There was] a lot of built-in help but it was not what I was looking for. Therefore, I always used to take the issues to these meetings and now everything is smooth. Actually now I am helping others … I am so happy. (Interview: contract administrator)

As a result, CoPs started to form around the champions, enabling staff to share both their problems and their knowledge. A business service office explained:

> We would have catch-up meetings every two weeks because so many things weren't working ... certainly a regular team with all the AP and treasury ... we would meet for an hour and go to people and say this is not how it should be happening and this is how it should happen. (Interview: business service officer 1)

Unlike more formal types of organising, it was not clearly evident when exactly CoPs became established. The existence of a CoP may not be evident to its members

because, as Wenger (1998, p. 125) noted, 'a community of practice need not be reified as such in the discourse of its participants'. The emergence of CoPs in Bravo could be identified in retrospect as staff continued their informal meetings with champions, which became the focal activities of SAP use.

As these meetings became ongoing, they had to be organised and facilitated. The finance manager undertook these tasks because she sensed that the meetings could have an important role in enabling learning and help Bravo to achieve the desired objectives of implementing the SAP system. The gradual involvement of managers in CoPs in other departments is in line with Wenger, McDermott and Snyder's (2002) proposition that management is likely to support a community of workers when they focus on important business issues. The role of the finance manager was similar to what Wenger, McDermott and Snyder called 'community coordinator' because she helped to build common knowledge and practices by facilitating regular meetings and encouraging all the community members to share their knowledge and practices about the SAP and its embedded business processes.

The CoPs were established halfway through Phase 2. They consisted mostly of Bravo's staff, champions and some middle managers (some of whom played the role of community coordinators). Although they were familiar with Bravo's business needs and had significant SAP knowledge, they lacked deeper technical SAP expertise. This is why the SAP experts were invited to their meetings:

> We had sort of meetings and [at] those meetings we [invited] a trainer [to] come and help us with our problem and that's how we learnt by having problems and learning to get over them. (Interview: business service officer 2)

CoPs formed a common base for knowledge sharing among staff, which allowed the participants to coordinate their searches for solutions to the technological and organisational problems that they confronted. Staff were mainly motivated by the champions and community leaders (e.g. the finance manager), who helped them recognise the benefits regarding their work tasks and achieve their performance goals. It was also encouraging that management provided infrastructure and resources.

A particular problem with the SAP-enabled business processes was the interconnectedness of all the processes, which had an important implication for error detection and correction. The finance manager encouraged staff to understand how an

error in one process proliferates into other processes in which it may cause inconsistency. It was important to recognise that errors had to be corrected at the place where they were made:

> If they pick up the error I want them to contact the person who made the error and if for some reason or the other that person cannot correct the error then we do it but we also train them. Because I keep saying that knowledge should be shared and the people who do the previous steps should have good knowledge and be comfortable with how the system [works]. (Interview: finance manager)

During Phase 2, the error rate decreased because staff learnt to deal with errors and correct them on time and eventually ceased to make them:

> We don't have too many mistakes now. (Interview: business service officer 2)

> I think that we get 20 per cent of the [complaints] calls that we used to receive. It's dropped by 80 per cent. (Interview: finance manager)

Learning in Phase 2 was enabled and assisted by emerging CoPs, which became more and more organised. This analysis illustrates how CoPs enabled situated learning to occur as staff shared their issues and their knowledge and engaged in cooperative searches for solutions while using SAP in their everyday activities. As a result, business processes became more efficient. CoPs were instrumental in enabling staff to learn from their peers (co-workers) by drawing on previous skills and knowledge about processes (Brown & Duguid 1991). They mastered the use of SAP and learnt to improve their business processes without changing their mindsets. In other words, they engaged in single-loop learning.

5.3.2 Continuous Improvement Log Assisted in Staff Learning

Improved organising of CoPs in Phase 2 was assisted by the introduction of a CIL, as explained by several staff members:

> We have got a continuous improvement log [in which] we have all our issues logged … and our business keeps that subset of our log. (Interview: PSG manager)

> [For example] if the same problem would appear 10 different times. What their answer to it was, they put it onto a website where we could go and see—hang on what is the most common problem; or you just look at a raft of issues and then you say, hang on, I had the same problem, here is how they resolved it and we looked at that and we used that as another way of solving the problem. So you might have 100 calls, 20 calls might be related to one, there you go, you straightaway solve 20 of the problems. (Interview: administrator contractor)

> We had continuous improvement log, as a big log, it had about 500 items to begin with. It's gone down now but even now we still raise USDs [US dollars] over any problems. I think it was the meetings that were behind it all to get things done. (Interview: business service officer 2)

The CIL was made available to a broader audience with the help a technology called 'WebEx'. Any staff member could access the CIL, search previous information and add something new. WebEx enabled collaboration between colleagues across the organisation, or halfway across the planet. It facilitated staff meeting online and sharing files, information and expertise. It made it easy for everyone in the organisation to meet, share ideas and information, and stay connected.

This particular activity worked well because it helped the community to identify and prioritise the areas where they needed to develop more knowledge and expertise. The introduction of the CIL helped the community to track ongoing improvement areas and progressively focus on community meetings. This approach helped the community to develop a systemic way of learning because it mapped out what they already knew and what they needed to know. The CIL assisted by WebEx-enabled single-loop learning by providing easy access to and sharing of various business and technical issues of SAP implementation, thus motivating staff to participate in discussions to highlight and rectify their issues. These developments suggest that the community matured in this phase (Wenger, McDermott & Snyder 2002).

5.3.3 Communities of Practice and Single-Loop Learning

The first indication of performance improvement appeared in the April–June quarter of 2009, and significant improvement was shown in the July–September quarter of 2009. Although Bravo Australia did not publish any documents explaining each and every improvement with respect to any particular period, it did report overall success within nine months in terms of SAP implementation and improvements in processes and reporting. Further, the key staff reported some major improvements in their routine work. These improvements included efficient and accurate data entry, accurate and real-time reporting, cutting short unnecessary expenditure, strengthening responsibility and accountability, and achieving sales targets. Although the process of SAP implementation was slow and many staff, supervisors and managers were depending on their old practices (such as using Excel or Oracle in parallel), empirical

evidence shows improved understanding and performance, indicating learning at individual and department levels.

Improved reporting was evident during Phase 2. After a few months of struggle, reporting became real time and trustworthy and the delay time was reduced:

> Reporting is good and it's fairly real time. In fact the worst case reports [are] about six or seven hours delayed but most of the reporting is only 20 minutes delayed so it's very efficient. (Interview: sales manager)

> Now the reporting is pretty much real time and in worst case an eight hour delay. My interim reporting cycles are much more accurate. I can trust my reports all the way through the month. It's not 100% I suppose but it's safe. This means that I spend a lot less time validating the report or second guessing it or seeing whether the report I'm sending is accurate. I get very few surprises and under the old system, it was only about four to five days after the month that I would get a report back that was certified as accurate by the company. (Interview: PSG manager)

Similar kinds of improvement were found in all departments. A summary of reporting improvements based on the collected evidence is provided in Table 4.1 that highlights the improvements in terms of availability, accuracy, processing time, presentation to management and trust level.

These findings provide additional evidence that staff learnt at both individual and collective (departmental) levels. While during the first four months of going live, staff struggled to get reports out of the system, after nine months of going live, staff succeeded in creating accurate and comprehensive reports with high levels of trust. Such improvements exemplify single-loop learning because staff were getting better at what they were doing already, without changing their mindsets.

5.3.4 Discussion

Phase 2 of SAP implementation demonstrated that the key staff—users, champions and managers—from different departments not only mastered the use of SAP but also succeeded in improving their individual performance as well as the performance of Bravo's business processes. That they engaged in error corrections and managed to improve performance of individual business processes and achieve the desired objectives indicates that single-loop learning took place. The transition from not learning to single-loop learning was evident in Phase 2. As noted previously, there was no precise, single moment when this transition happened. Rather, single-loop learning

emerged gradually as CoPs formed and provided a socially and technologically stimulating environment for learning.

The gradual development of CoPs in Phase 2 was characterised by staff shifting their focus from sharing knowledge and issues to developing a comprehensive body of their own interpretation of SAP and its embedded business processes. Interestingly, these interpretations were different from that of trainers and top management: staff interpreted SAP within their business process context based on previous experience and knowledge. In this way, they connected past knowledge and understanding of work processes with the new business processes implied by SAP. Knowledge thus acquired was situated and hands on, both explicit and tacit. This explains why the 'transfer' of knowledge during the general SAP training prior to implementation did not work and why learning in Phase 1 failed. However, the question arises: what was different in Phase 2 that enabled the learning process?

The key difference is the emergence of CoPs during Phase 2. Although they emerged spontaneously, the effective organisation of the CoPs resulted from several conscious actions by staff and management. CoPs initially emerged around SAP champions who were enthusiastic about SAP implementation and willing and capable of sharing knowledge and assisting staff in problem solving in their particular contexts. Staff engagement and learning as a situated activity within CoPs can be described using the concept of LPP (Lave & Wenger 1991). LPP, as Lave and Wenger (1999, p. 83) explained, 'provides a way to speak about the relations between newcomers and old-timers, and about activities, identities, artefacts, and communities of knowledge and practice'. Although they all were de facto old-timers at Bravo, staff perceived themselves as newcomers in the world of SAP. They sought help from the champions, perceived as experts and old-timers in relation to SAP. Therefore, the climate was collegial and friendly, allowing staff to express their frustrations, resistance and dissatisfaction and to raise issues and ask questions. During the meetings, first informal and then more formal, champions helped them to seek and share solutions, enabling them to learn in an apprenticeship mode, as part of their everyday practice. In such a way, staff mastered the knowledge and skills required to apply and use SAP in their business processes and gradually moved towards full participation in their sociocultural CoP.

These processes exemplify the 'situated learning' that takes place within sociocultural practices of a community. Staff did not learn through SAP training that focused on generic knowledge—'knowing that'—about the explicit facts, rules, and procedures, implying given and fixed meanings, disconnected from sociocultural practice. Neither did they learn during Phase 1 when they struggled to apply what they were taught in the SAP training. It was through situated learning within a CoP in Phase 2 that staff engaged in learning. CoP-based learning is about learning 'knowing how' in a specific context. Importantly, 'knowing that' may become powerful only in a concrete context when it is made meaningful and experienced as 'knowing how' (Ryle 1949, p. 32). Learning about 'knowing how' needs to be situated in and acquired through practice.

In Phase 2, working and learning were interlinked, embedded in social practices. Situated learning was key for staff to learn because of 'the relational character of knowledge and learning … the negotiated character of meaning, and … the concerned (engaged, dilemma-driven) nature of learning activity for the people involved' (Lave & Wenger 1991, p. 85). SAP training failed because it assumed the transfer of factual generic knowledge (knowing that), disconnected from practice, and the view of staff as passive recipients or consumers of knowledge. Contrary to such a conception of learning, situated learning, in the words of Lave and Wenger (1991, p. 85), implies an 'emphasis on comprehensive understanding involving the whole person rather than "receiving" a body of factual knowledge about the world; on activity in and with the world; and on the view that agent, activity and the world mutually constitute each other'. Situated leaning in Bravo did involve the whole person; staff did not only share and co-create knowledge, they also shared values and norms and, through such practices, reconstructed their identity as well as their community. These individual and collective building processes in turn facilitated the development and maintenance of trust-based relations, which reinforced social conditions for collaboration and learning.

It is important to emphasise that the Bravo case demonstrates how situated learning is embedded in processes of community building and staff transition from peripheral to full participation in the sociocultural practices of a community. Becoming full participants meant that staff changed their identity to become competent and knowledgeable SAP users, fully in charge of their activities and business processes. This confirms prior study findings about situated learning and the ways in which it is enabled through CoPs (Machles 2010). In addition to prior findings and theorisation

of situated learning, in the case of Bravo, the effective workings of CoPs and situated learning were supported and assisted by management and technology.

As line managers recognised the value of CoPs, they engaged in facilitating their meetings and providing the relevant resources. The involvement of managers provided additional encouragement for staff to share knowledge, engage in problem solving and contribute to collective understanding of SAP-enabled business processes within a CoP. These findings are in line with Ramchand and Pan's (2012) study, which suggested that management support is instrumental in facilitating the effectiveness of CoPs. The analysis also shows how managers themselves built community membership, thus becoming legitimate participants in CoPs. This in turn helped the community to develop a stronger sense of itself and its identity as knowledgeable SAP users. While becoming confident in their understanding of SAP, CoPs were not complacent. Participants identified gaps in community knowledge and strived for more systematic problem solving enabled by technology.

Further institutionalisation of CoPs emerged when their members introduced a CIL, later supported by WebEx technology. The CIL enabled a systematic way of recording and keeping track of members' problems and difficulties as well as solutions created by or shared within CoPs. Situated learning assisted by CIL via WebEx thus became an integral constituent of the generative social practice of the SAP implementation community. Such technological support not only enabled more effective forms of collective awareness of problems and knowledge sharing, it assisted collective action and knowledge co-creation within the CoPs. Because of the technological support, situated learning became more effective, enabling the SAP implementation practices to advance to a new level of performance. Reaching performance objectives indicated that single-loop learning had been achieved.

In summary, the learning in Phase 2 was single-loop learning because it focused on achieving the given objectives of SAP use—streamlining business processes, considerable performance improvements and the production of timely and accurate reports—without changing the mindsets. During this phase, SAP implementation succeeded because of the following:

1. The emergence and formation of the CoP-enabled and -fostered situated learning, allowing learning and working to be interlinked: As legitimate peripheral participants in the CoPs, staff felt encouraged to share their concerns and questions about SAP implementation and engage in seeking answers, sharing knowledge and co-creating a situated interpretation of SAP within their business processes. Motivated by a desire to overcome the 'nightmare' situation experienced in Phase 1, staff took an active role as legitimate peripheral participants in the practices of the community. The Bravo case demonstrates how the situatedness of individual and collective learning is an integral constituent of CoPs. It was the CoP-based, situated learning that made a difference in Phase 2. As a social mode of learning, situated learning involved not only explicit, fact-based knowledge of SAP (knowing that) and its use, but also and, importantly, the sharing and co-creation of tacit knowledge of SAP (knowing how) as part of the sociocultural practice of SAP implementation. Further, situated interpretation of SAP was continuously shared by the staff as they recreated social reality in a way that was understandable in terms of their previous knowledge and experience.
2. The maturing of CoPs during Phase 2 is evidenced by the staff transition from LPP to full participation. This transition explains how the 'struggling staff' became knowledgeable and competent SAP users. Staff engagement and participation in situated learning gradually enacted new identity and increased levels of trust among members of the community. It was not only the building of shared knowledge but also a shared system of values that affected staff identity reconstruction. All of this was important and played a role in successful SAP implementation in Phase 2.
3. Situated learning within the SAP implementation community was further supported by WebEx technology. Through the systematic process of a CIL (implemented on WebEx), staff shared their problems and cooperatively searched for solutions. Such technological support was essential for more effective forms of knowledge sharing, collective action and knowledge co-creation within the CoPs. Situated learning thus became more effective and led to achievement of the SAP implementation objectives. Reaching performance objectives indicated that single-loop learning had taken place.

4. The situated learning resulted in improved and shared understanding of SAP business processes and the necessary changes to existing processes, thus enabling staff to link their experiences and knowledge with new ways of working within new SAP-enabled and integrated business processes. The learning led to better mutual coordination among staff in different business processes and improved individual and collective performance. These advancements had been achieved without changing the staff mindset.

5.4 Mastering SAP and What Next? Advancement and Institutionalisation of Communities of Practice and Double-Loop Learning

The previous phase highlighted how the CoPs helped the staff to identify, understand and rectify issues without expending effort or time in reflecting on the processes that had previously been used in particular situations and thus not changing the mindsets. Phase 3 started 10 months after going live and was ongoing at the time of the second round of interviews. During this phase, CoPs became established and institutionalised as BTFs, denoting systematic organisational processes in which staff and top management engaged in continuous processes of exploration and innovation related to important business aspects of SAP use. The BTFs further developed into working practices and led staff to engage further in exploring new ideas, challenging the traditional ways of doing things, and reshaping or reframing the underlying patterns of thinking. As a result, a shared vision and new mental maps were created across the organisation, indicating double-loop learning processes. As Hargrove (2008) found, double-loop learning involves reshaping and reframing the underlying patterns of thinking and development of shared tacit knowledge that in turn results in an organisation-wide change in behaviour. The findings from this research confirm the original claims by Snell and Chak (1998) that double-loop learning involves changing a firm's knowledge and competency, thus enabling the collective reframing of situations and problems and seeking new answers and innovative solutions.

Now the questions arise: How did double-loop learning emerge and assist the actors in an ERP implementation? How do CoPs facilitate organisational learning during an ERP implementation?

5.4.1 Communities of Practice Become Institutionalised as Systematic Organisational Processes

In the previous phase, it was shown how the emergence of CoPs enabled the organisation to achieve the desired objectives without changing the staff's mindsets. The CoPs' contribution was well acknowledged; the finance manager claimed that 'the top management appreciates it [CoP] now. At first they did not bother to mention, [but] now the CEO is impressed'. Following this appreciation, the top management decided to use this approach as a part of their CM strategy in the form of BTFs. This was explained by the change manager:

> I think one of the critical successes in our change management strategy was a concept called 'business transformation forums'. Thanks to our finance manager for the idea! What we did was to identify key parts of the business processes or functionality that we knew we needed to involve in critical decision-making. For example, the BTF was arranged for purchasing. The BTF would get together and we have representatives from all parts of the business and everyone would sit in the room and we'd say OK today's issue is and we'd highlight it. People would talk about it and then would take positions. They'd be entrenched views, forward-looking views, and lively debates. Occasionally I remember people walking out. The idea was that BTF was a forum in which we could discuss these things and make a decision about a critical point of configuration of the system or user training or process development. Whatever it was we could talk about it. (Interview: change manager)

BTFs can be perceived as formalisation or canonisation of CoPs (Brown & Duguid 1991). They became a regular form of work and collaboration purposefully designed to engage all relevant parties in specific problem solving and decision-making. Importantly, the composition of the BTFs included not only staff and middle management, as had previously been the case, but top management as well, as shown in Figure 5.1.

BTFs were organised to assist staff to ask questions and seek answers related to any issue they experienced in practice. Although the nature of the BTFs was not the same as that of the non-canonical CoPs in Phase 2, the style of cooperative interaction based on mutual trust persisted. The operation of BTFs was planned and designed to address specific problems systematically and produce clear and agreed solutions.

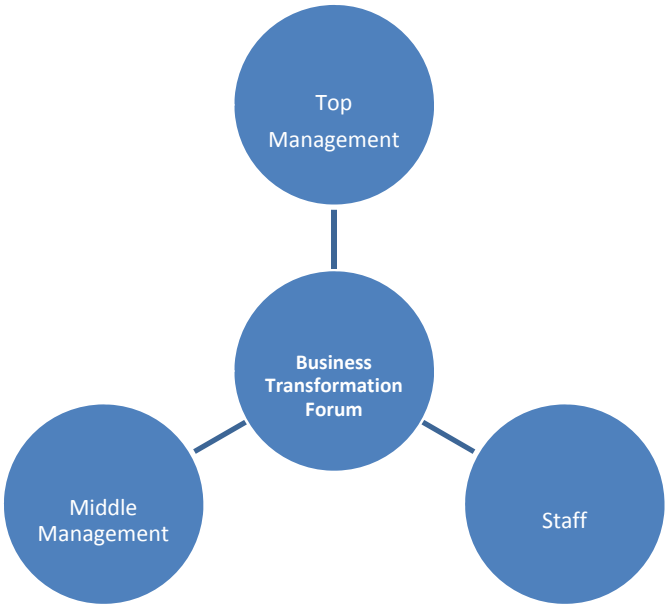


Figure 5.1: The Composition of a Business Transformation Forum

The participation in BTFs gradually led to close interaction among staff and management that was the key to sharing experiences and knowledge, examining problems and seeking shared solutions for SAP-enabled practices and future developments. Through the BTF experience, top management learnt about staff views and concerns about the SAP's functioning and transformation of business processes. Conversely, engagement in the BTFs helped staff to appreciate the views and goals of top management. This suggests that the institutionalisation of CoPs in the form of BTFs provided a company-wide environment for knowledge sharing and co-creation that enabled both staff and management to change their views on SAP implementation and their understanding of what SAP-induced change implied in practice. In other words, BTFs supported and stimulated a collective change of mindsets, reframing problems and developing shared solutions, which means that they engaged in double-loop learning.

5.4.2 Institutionalisation of Communities of Practice and Double-Loop Learning

The BTFs were further extended to all Bravo staff across the company through the wider adoption of the WebEx technology. As explained earlier, WebEx combines file- and presentation-sharing tools with voice, HD video and electronic meeting spaces (the company website includes a detailed description of its use). It was used by the company to share resources and knowledge and to establish and support collaborative

processes among CoPs (located in departments) and from a distance. It allowed staff communication throughout the company that ranged from asking questions and seeking answers, to finding experts and those experienced in a particular problem domain, to establishing contact with people outside of their immediate department. Moreover, staff and management contributed their knowledge to an easy-to-access library and were able to search and use its dynamic content. WebEx also enabled knowledge sharing throughout the company by assisting debates and expressions of views on any specific problem. During the observed period, the majority of topics were related to the use of SAP, its specific features, opportunities and limitations and its role and effect on business operations and the company as a whole.

Through interaction and debate across departments, staff developed a better understanding of other departments and their business processes, enabling them to comprehend how these different processes were interlinked and integrated through SAP, as the PSG manager commented:

> So it was very good … that people started to develop some knowledge of other parts of the business so they can contribute [to broader knowledge creation]. I mean people have got the strength in an area but an understanding of the other area was a significant value. (Interview: PSG manager)

In the view of the PSG manager, WebEx 'empowered staff' not only as actors within their department but also as actors in the company, which in his view was among the key contributors to the successful implementation of SAP in Phase 3. Further, regular engagement via WebEx provided staff with the confidence that management was taking their views and suggestions seriously.

The new work practices and collaboration through BTFs made staff change their views on SAP: not only did they understand and become confident with their own business processes enacted by SAP, they also learnt and appreciated how SAP enabled a new, integrated management of the company's business processes. Staff's active engagement in experimenting with and exploiting SAP-embedded business processes and the new ways of doing things during Phase 3 deepened their understanding of SAP and what they could and could not do with its existing installation. In addition, their experience from the engagement with staff from other departments (across CoPs) opened a new and broader perspective on SAP's role in managing the overall structure of business processes. Such a collective perspective and newly acquired competencies and knowledge of interconnections among specific business processes allowed them

to appreciate the broader benefits of SAP beyond their specific business processes and their own work. The completely new working environment created new learning opportunities for staff, motivating them to become involved in exploration and innovation processes across the organisation.

The interaction among BTFs supported by WebEx established and enacted new workgroup practices that exemplify what Brown and Duguid (1991) call the 'community of communities of practice'. The company can thus be seen as a community of CoPs that embraced and embodied SAP into the fabric of its business processes and also transformed its communication practices through WebEx. Such a dramatic transformation was enabled and recursively intertwined with double-loop learning at all levels—individual, group and the company (Janson, Cecez-Kecmanovic & Zupančič 2007). As the evidence from Phase 3 demonstrates, Bravo staff explicitly referred to and questioned their assumptions and beliefs about their business processes, challenged the traditional ways of doing things, assessed the new SAP-embedded processes and gradually appreciated new opportunities for executing their processes differently and more efficiently. Such a change of mindsets was not imposed. On the contrary, it emerged gradually. It bubbled from the bottom up, through intense exchanges first within individual CoPs (located in departments). Upon the establishment of BTFs and WebEx-enabled communication and debate, the change of mindsets extended across the CoPs (that is, across departments). All involved, staff, middle management and top management, learnt through discussions and dealing with concrete, practical SAP-related matters and, on the way, questioned the old views, beliefs and assumptions. They co-created and shared new views and beliefs, and new competencies and knowledge. In effect, through these intense processes they changed their mindsets. Such a change of mindsets was not limited to a particular BTF (CoP) but took place across the BTFs (CoPs), or in other words, was shared in the community of CoPs.

For instance, although initially staff talked about SAP as 'complex', 'time consuming', 'unnecessary' and 'inferior to legacy systems', in Phase 3 their language changed: they referred to SAP as 'brilliant', 'smart' , efficient', 'powerful 'and 'logical', as illustrated by several staff members:

> Staff are now saying that [SAP] is brilliant when they have got over that hurdle ... It worked from the point of view that by having the strategies

> [meetings] in place you alleviated some of the fear and some of the resistance. Yeah. (Interview: business analyst)
>
> We think that SAP is smart enough to give you a lot of information since it's a very logical system. (Interview: finance manager)
>
> SAP is more efficient and effective. Comparing SAP with the old system is like comparing typewriter with a computer. (Interview: business service officer1)
>
> SAP is a good thing. We know it's a very powerful system. I think generally the mood is switching in SAP's favour. (Interview: business analyst)

Further, CoPs were not only instrumental in changing the staff mindset but also helped to alleviate their fear and resistance. These changes could be seen within the broad context of situated learning or learning by doing in concrete practices, which enabled staff to become legitimate contributors to change. Staff understanding of SAP-embedded business processes helped them to appreciate the improvement as well as their new role in these processes. For example, staff understood the strategic implications of capturing additional information and comprehended their roles, as expressed by staff members:

> I think the struggle we had last time [Phase 1] was more about how time consuming it was [to put all the data into SAP] but now the feeling in general is very good … [SAP is a] useful system and it's got excellent capabilities to make a difference to our business. For instance, I can find out how much we have done in sales, therefore [when] we think for next month, we can forecast quite comfortably, we will make X amount of sales. So we can make those projections, those decisions much quicker in a more dynamic way. (Interview: sales representative)
>
> It is easier for them [top management] to make decisions when they get all the information. At the back ends, we don't get involved with those decisions, but we are the hands and legs that input all the data into the system. (Interview: contractor PSG)
>
> We don't operate as we used to ... we think before we do anything [now] as our routine tasks eventually make a difference in (the) overall performance. (Interview: business service officer 2)

This analysis suggests that the institutionalisation of CoPs and the emergence of the community of CoPs enabled and was iteratively intertwined with double-loop learning. The change of mindsets and the development of new competences and knowledge within individual CoPs triggered further changes across the CoPs, leading towards changing organisational mental models and the development of shared paradigms and objectives.

5.4.3 Exploring New Ideas, New Ways of Working and Further Business Changes

Mastering of SAP across the company triggered the exploration of new ideas, challenging the habitual ways of working and discovery of diverse opportunities for innovation and performance improvement. For instance, SAP reports provided the sales department with rich information about the customers and facilitated analysis of data from different perspectives. It helped the department to understand their dealings with customers in detail and to forecast future sales. It further assisted in developing better customer-oriented policies:

> Before we had SAP I just got a report once a month and that's how I ran my business. Now I have online reporting and I can look at so many different flavours with the data and I can search on from customers to purchase orders to suppliers … et cetera. I can even look at sales rep by customer, by brand, all that type of thing you know. It's just an immensely powerful reporting [facility]. I, in my role, have to manage a number of customer relationships. It absolutely allows me to be looking at my customer base and determine what I've traditionally sold to my customer base. What you've sold in the past doesn't mean you'll necessary sell that in the future but it's still something that you can look at and use that information with your suppliers as well. Talk about how you might like to treat customers moving forwards based on their [past] expenditure. (Interview: sales manager)

Similarly, SAP reporting helped to understand the status and monitor the business in more details

> I can look at my sales reps and I can look at what they are selling and what they aren't selling. I can look at their pipeline and then I can go and tell them that they are traditionally working on one aspect of your business you are therefore ignoring other aspects of your business. Then I can put in place 'get well' plans for my sales reps to take them either into new markets or territories or to invest more time in expanding their business footprint into either existing customers or into new customers to try and spread the risk and load where our business is going to come from. It's always very interesting to be able to analyse your business and it's amazing what little intricacies you pick up that aren't really there. (Interview: senior sale manager)

The above extract indicates that the new system allowed managers to understand the business transactions in detail but also more comparatively. Having this understanding highlighted the ignored areas of business or the areas with less business. These findings provided management with the opportunity to redesign policies for such areas and in turn assisted the development of new mindsets about the business.

A new opportunity for improving business performance was envisaged by integrating SAP financials with CRM. The regional manager viewed this as the potential to provide rich and useful information about business intelligence:

> [By integrating] the CRM system … we could actually track our customer by the financial situation ... where they are at right now versus our forecast for them. We would track a sales rep by where they are right now versus their pipeline. It would be a really powerful tool if I could have a backward-facing system, which is the SAP financials, and a forward-facing system, which is the CRM system, integrated together so that I could get a single set of reports out, giving me a snapshot of where my business stands today and what the future looks like. (Interview: regional sale manager)

SAP integrated with CRM would help them to understand their customers' requirements better and ultimately support the assessment of the current organisation strategies and exploration of alternative strategies. This also would mean potentially changing perceptions (or mental maps) about the customers and markets and ultimately result in changing strategies.

The above analysis indicates that organisational learning in Phase 3 opened a new vision for the company's future, as expressed by the CIO in his report (2010):

> Using the guidelines of SAP Best Practice, the company has been able to both change its operations, and lay down a flexible framework to support ongoing business process improvements in the long term. (Report: CIO)
>
> The greatest benefits will come in the long term as Bravo continues to build new business processes on top of its new best practices driven by the SAP framework. SAP has allowed us to be positioned well for future growth. (Report: CIO)

This is recognition that Bravo not only successfully implemented SAP and radically changed its operations but that it created a foundation—a flexible framework for future improvements and growth. In a sense, double-loop learning in Phase 3 marked the beginning of a new and qualitatively different future for Bravo.

5.4.4 Discussion

SAP implementation in Phase 3 succeeded in radically transforming business processes across the company, leading to a new vision of business processes at the operational level as well as higher management levels, including reshaping of strategic objectives and stimulating further innovation. The evidence shows not only the mastering of SAP and transformation of business processes at the operational level, but also significant changes in managing the whole structure of business processes and decision-making at other levels. As the above analysis indicates, the institutionalisation of CoPs across the organisation enabled and became mutually intertwined with double-loop learning, which helps explain the successful

implementation and SAP-enabled transformation. The lessons learnt from Phase 3 can be summarised as follows:

1. The transition from informal and non-canonical CoPs (that formed in Phase 2) to more formal, canonical CoPs (called BTFs) in Phase 3 was important for the establishment of systematic forms of communication across the organisation. Importantly, in this phase, CoPs (BTFs) were recognised and supported by top management, who provided resources for their operation. The institutionalisation of the CoPs extended a cooperative environment that supported learning across departments: it fostered the open exchange of ideas, sharing of problems and seeking solutions from others beyond a local CoP. It also extended and enabled knowledge sharing and engagement in the creation of new knowledge to middle and top management. Such learning conditions provided staff and management with enough confidence to deal with the new SAP-enacted business processes and experiment with different ways of performing and managing. This exploration required an effective challenging of the dominant ways of seeing and interpreting internal situations or external conditions (Argyris & Schön 1978). To open up for exploration, organisational staff typically need to unlearn old behaviours and change their mindset (Snell & Chak 1998).
2. Involvement of both staff and management (of all levels) gave rise to a mixed bottom-up/top-down approach in dealing with numerous SAP implementation issues, which in this phase were more advanced and sophisticated. Significant know-how and experience with SAP-enacted business processes led staff to explore ever-new issues and instigate debate with other knowledgeable employees beyond their local CoP in a bottom-up fashion. At the same time, management appreciated the new reality emerging with SAP-enacted transformations, and gradually changed their preconceptions of SAP and adjusted the implementation objectives. These changes also stimulated them to reshape policies and strategic objectives. Revised policies and objectives in turn led staff to revise their views of specific processes and their performance objectives. In this sense, the Phase 3 SAP implementation can be seen as an ongoing flow of the bottom-up and top-down processes of articulating and reframing problems, knowledge sharing, proposing and discussing solutions and coordinating actions at all levels.

3. Closer collaboration among management and staff within the CoPs helped the development of mutual trust and the building of collective knowledge, which in turn increased the opportunities and motivation to acquire new competencies in SAP adoption/adaptation continuously and also stimulated further exploration of changes in managing business processes. These processes indicate that learning in this phase was closely embedded in working processes and facilitated by CoPs similarly to Phase 2; however, in Phase 3, the change was more radical and company-wide because it involved iterative bottom-up and top-down sharing and adjustment of views, ideas, values and objectives related to SAP-enabled transformation. These iterative processes led to the abandoning of old views and the adoption of new mindsets (mental maps), new knowledge and competencies, shared among staff across the company (Snell & Chak 1998). An important lesson from this phase is that the changing of individual mindsets about the nature of transformation induced by the SAP implementation—enactment of new business processes and management practices—was enabled and supported by institutionalised CoPs across the company.
4. Further institutionalisation of CoPs (BTFs) through the adoption of WebEx technology for knowledge sharing and problem solving across departments (CoPs) led to the formation of the 'community of CoPs' (Fox 2000; Lave & Wenger 1991). This presented an important development that yet again changed the learning processes. Although experiences, stories and problems had been shared face to face by staff working together as a CoP, through WebEx, the sharing went beyond and across various CoPs. As members of Bravo, they recognised that they were participating in shared practices of the company that were only artificially divided into departments. By sharing their understanding of key issues in practice, problems arising with intensified use of SAP, and the ongoing adaptation of business processes across CoPs, they gradually extended the sense of community to members of other CoPs. Through SAP implementation, Bravo was transformed into a community of CoPs (BTFs), in such a way that working and situated learning practices matched the SAP-enacted functional integration of business processes. This transformation was consequential for changing mindsets and convergence of views about SAP and SAP-enacted business processes throughout the company.

It is of note here that the key role of management in the processes of situated learning and formation of CoPs during ERP systems implementation has been recognised in the literature (Schenkel & Teigland 2008). However, the findings of the current study on SAP implementation suggest a more nuanced understanding of the emergence and institutionalisation of CoPs and the formation of the community of CoPs, which involved both staff and management in various roles. Further, this study links situated learning and CoPs with single- and double-loop learning as vital mechanisms for ERP systems implementation as organisational learning.

5. The above discussion indicates that the learning in Phase 3 can be characterised as double-loop learning: continued situated learning within and beyond CoPs led to the gradual change of mindsets, reshaping and reframing of the underlying patterns of thinking and also rebuilding of knowledge and competency base by individuals and groups across the company (Lawler & Sillitoe 2013).

   The unpacking of double-loop learning reveals that SAP implementation was enabled by and recursively intertwined with the institutionalisation of CoPs (in the form of BTFs) and their further expansion to collaboration among CoPs across departments through WebEx. Double-loop learning was individual, group and organisational at the same time (Snell & Chak 1998; Janson, Cecez-Kecmanovic & Zupančič 2007) . Double-loop learning by an individual, a group or the organisation cannot be understood separately because they are mutually enacting and co-producing each other.

   The analysis highlights how double-loop learning was instrumental in transforming business processes and the whole organisation through SAP implementation and in achieving Bravo objectives. It is fair to claim that double-loop learning was critical for unlearning old practices (including assumptions, beliefs and values) and for appropriating and enacting new SAP-based practices, which integrated business processes company-wide and transformed their management and governing policies.

6. An additional finding from this study is the enabling role of IT infrastructure (namely, WebEx technology) in affiliating the CoPs and supporting organisational learning. Although this was not a major focus, the use of WebEx in Phase 3 was examined as an important technological platform for staff and management collaboration and knowledge sharing across CoPs. This is an

example of an IT platform that enhances and intensifies organisational learning and CoPs, as revealed by findings from other studies (Janson, Cecez-Kecmanovic & Zupančič 2007; Wang & Ramiller 2009; Schenkel & Teigland 2008). The current study further extended this argument by explaining how different types of IT support each other. The learning processes involved in the SAP implementation instigated the need for collaboration and cross-functional knowledge sharing, which was the rationale for the adoption of WebEx, and it supported this rationale by allowing the staff to share their expertise and skills.

7. The successful implementation of the SAP system brought fundamental changes to Bravo Australia, which included efficient SAP-enabled business processes, rich and accurate reporting, and a flexible technological platform that could be integrated with external software. This laid the foundation for expansion and acquisition of new software packages such as a CRM system. The successful implementation of SAP and the intense learning and acquisition of new competencies and skill made staff and management confident that they could master new systems and link them productively with SAP.

5.5 Enterprise Resource Planning Implementation Success through the Co-emergence of Communities of Practice and Organisational Learning

The above discussion demonstrates how the emergence, maturing and institutionalisation of CoPs made a difference in practices by creating a work environment that stimulated learning during the application and use of SAP across the organisation. Importantly, this chapter shows how the emergence, maturing and institutionalisation of CoPs were the key mechanisms by which the SAP implementation process advanced from failure (characterised by not learning) to a successful SAP-enabled transformation of business processes: first at the operational level (through single-loop) and then by deeper SAP penetration and organisation-wide transformation (through double-loop learning). As a result, by the end of the first of quarter of 2010, SAP was successfully working, fully embedded in the transformed business processes, and becoming an integral part of organising and decision-making in Bravo.

The transition from an early struggle to a successful SAP implementation in Bravo followed a unique path. However, the experience gained and lessons learnt might be valuable to other organisations, especially those who struggle or fail to implement an ERP systems after going live. In particular, by drawing on in-depth analysis and insights from the SAP implementation in Bravo, this study proposes a processual model that describes and explains SAP implementation in Bravo, and thus synthesises the lessons learnt. The model contributes to deeper understanding of complex underlying organisational learning processes in SAP implementation and organisational transformation.

At one level, a lesson to be drawn from Bravo's case is that staff exclusion from the configuration and initial consultations about SAP adoption and implementation as well as staff training focused on SAP features (know what) and disconnected from work processes were detrimental to staff learning. Isolated and struggling with SAP, staff failed to connect SAP to their business context and thus continued with the use of legacy systems. The lack of learning and staff inability to interpret SAP in their work context led to SAP implementation failure, as illustrated in Figure 5.2. Situated learning, within work practices, or what Brown and Duguid (1991) called 'learning-in-working' was shown to be necessary for comprehending and implementing new and complex systems such as SAP within an organisational context. As an integral part of an ERP systems implementation, such learning has to be in situ, to be nurtured by a community of learners that share concern, interest or passion for resolving problems and inventing new and better ways of working and doing things. As discussed in Section 5.3, situated learning within a CoP in Phase 2 made a key difference in the SAP implementation: it enabled staff to be active and simultaneously engage with technology in practice, which was necessary for acquiring and co-creating knowing how. Such situated learning emerging in the CoPs led to a gradual change of both staff practices (business processes) and their understanding of technology (illustrated in Figure 5.3). These changes in turn resulted in more efficient and effective processes and achievement of operational objectives. The learning within CoPs thus enabled single-loop learning, which in turn further stimulated the learning and knowledge sharing.

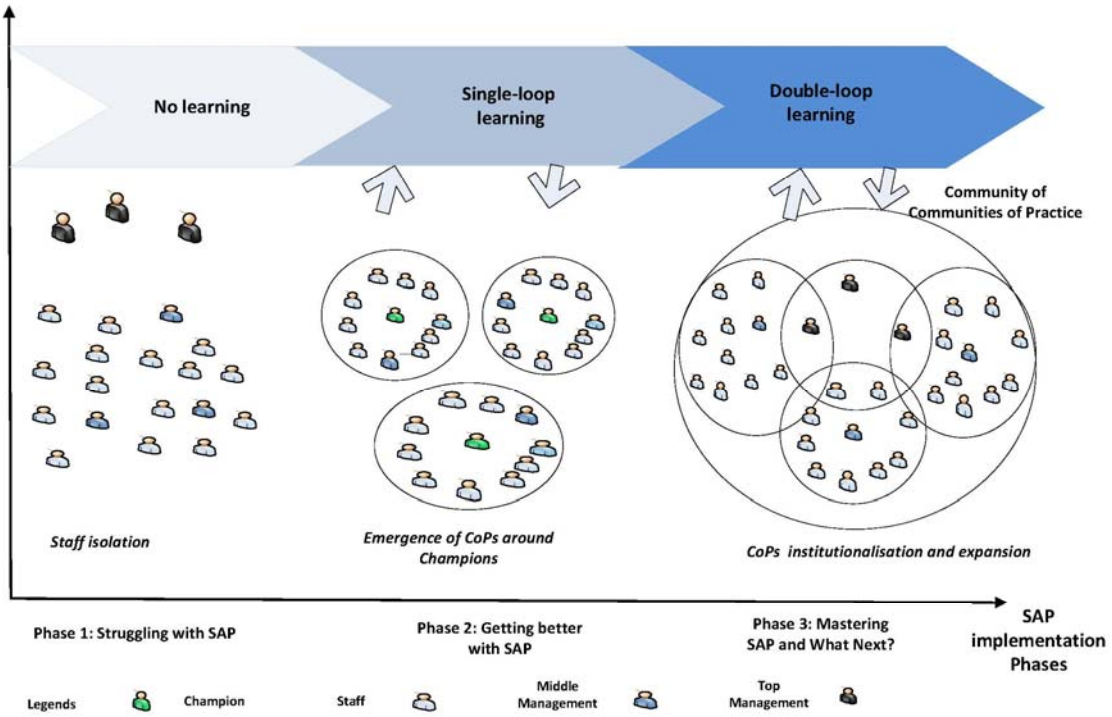


Figure 5.2: Co-emergence of Communities of Practice and Organisational Learning in SAP Implementation

Further, as the CoPs became more formalised and institutionalised within the organisation (as discussed in Section 5.4), the cooperation and learning crossed the boundaries of the departments. Effectively supported by technology (WebEx), the CoPs tended to overlap to become a community of CoPs that sustained shared practices across departments and gradually established shared mindsets of the new model of seamless SAP-enabled business processes. The shared mindsets include norms of how SAP should function and be used effectively. This learning was practice focused but socially legitimised at the organisational level. The transformation involved was more profound than previously had been expected: not only did individual business processes change, they became fused into an integrative SAP model of business processes. As a result, the company improved the performance and opened new prospects for development. This process of organisational learning exemplifies double-loop learning (Snell & Chak 1998). In this sense, this study confirms situated learning theory (Brown & Duguid 1991, 2001; Lave & Wenger 1991; Snyder & Wenger 2010; Wenger 1998) and extends it with organisational learning by Snell and Chak (1998) in the context of ERP systems implementation.

At another level, this study proposes a relation between the achievements in SAP implementation, that is, a degree of SAP assimilation and transformation of an organisation, and organisational learning. Organisational learning here is taken broadly to assume two mutually enabling aspects: evolving situated learning in practice (the emergence, maturing and institutionalisation of CoPs) and processes of not learning, single-loop learning and double-loop learning. The proposed relation is complex and processual:

- Staff SAP training disconnected from work practices, staff working in isolation trying to make sense of the relevant parts of SAP in their specific business processes, and the lack of management understanding of SAP implementation and support for staff all contributed to the absence of learning and consequently SAP implementation failure.
- The emergence of CoPs around champions focused on SAP adoption in specific business processes enabled and was enabled by single-loop learning; the emergence of CoPs mutually intertwined with single-loop learning achieved operational-level ERP systems transformation with improvements of ERP systems-enabled business processes.
- The advancement and institutionalisation of CoPs engaged in SAP implementation across the organisation enabled and were enabled by double-loop learning; the advancement and institutionalisation of CoPs mutually intertwined with double-loop learning achieved organisation-wide ERP systems transformation and improvements.

This is described by the complex, processual model of SAP implementation and organisational learning, presented in Figure 5.3, as a substantive theoretical model that explains the empirical findings from the Bravo case study. The model provides a concise and yet rich answer to the research questions: How does organisational learning emerge and assist the actors in an ERP implementation? How do CoPs facilitate organisational learning during an ERP implementation?

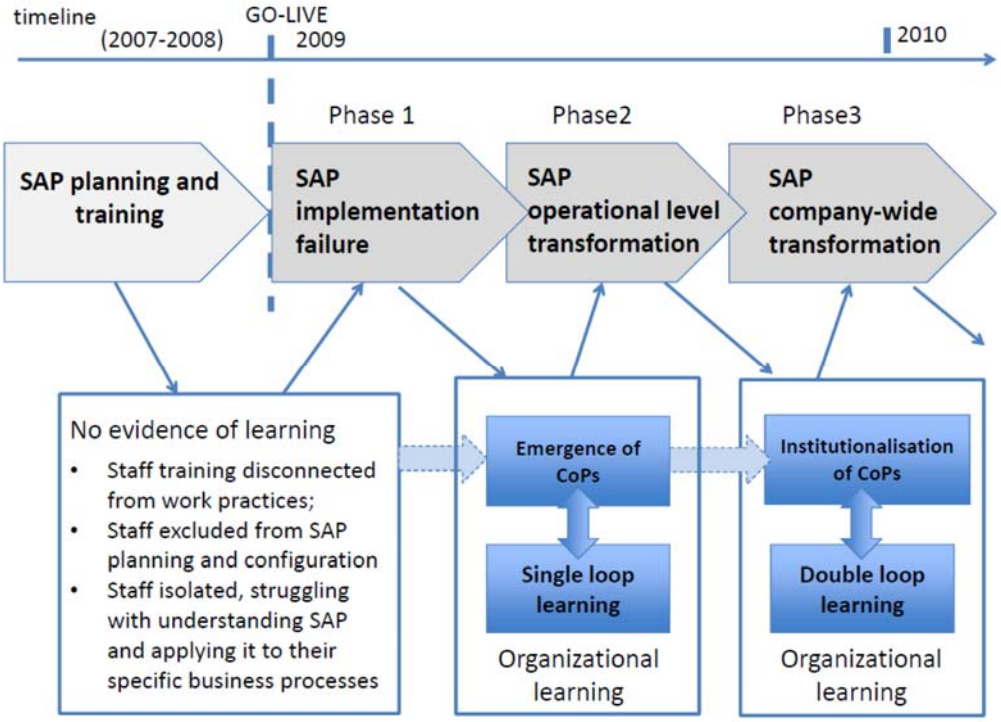


Figure 5.3: The Processual Model of SAP Implementation and Organisational Learning

As a substantive theoretical model, it generalises knowledge derived from the case but remains applicable to the case. However, its generalised form enables knowledge transfer to researchers and practitioners not involved in the case study. The model together with rich descriptions of the processes of SAP implementation and organisational transformation and their mutual relations with organisational learning discussed in this chapter enable in-depth understanding that can transcend the concrete case and pertain to other organisations implementing SAP or other ERP systems. However, it is important to emphasise that the processual model proposed here is only a first step in developing a more general model of ERP systems implementation and organisational learning. New studies are called for to examine this processual relation further by investigating other ERP systems implementation processes in different contexts.

Another important consideration related to the proposed model is the nature of an approach towards SAP implementation. From Phase 1 to Phase 3, the approach changed considerably (see Table 5.1). In Phase 1, the top management adopted a top-down approach and planned SAP implementation as a linear, mostly technical process,

assigning staff a passive role as recipients of the knowledge necessary to apply the technology (knowing that). Top management did not understand the complex nature of the SAP system and the ways such a system becomes embedded into the fabric of the organisation. Nor did they appreciate the sensitivities of the impending radical transformation of business processes. Staff were excluded from the initial customisation and planning process, and top management relied on external consultants and trainers for the installation, training and rollout of the technology. The top-down approach to SAP implementation did not lead to learning. It led to staff frustration and resistance to change, and created misunderstanding between staff and management. This phase ended with an admission of implementation failure.

The transition from not learning to single-loop learning in Phase 2 was marked by a change of approach from top down to bottom up. This was a spontaneous process that emerged as staff started to interact with and ask questions of their fellow workers, especially those more knowledgeable about SAP—they called them champions. In other words, the bottom-up approach was not designed or managed by anybody. It spontaneously emerged and helped form CoPs, scattered across different departments. Individual staff members (and a few middle managers) started to change their roles from ‘passive’ to ‘active’ learners, helping each other, sharing stories, knowledge and experiences, and collectively engaging in problem solving. Early on in Phase 2, this was neither known nor recognised by top management. This was important because staff felt free from coercion and pressure as well as encouraged to explore and experiment with SAP.

Table 5.1: Approaches to SAP Implementation throughout the Three Phases

	Phase 1	Phase 2	Phase 3
Level of Learning	**Not learning**	**Single-loop learning**	**Double-loop learning**
Communities of Practice (CoPs)		**Emergence of CoP**	**Institutionalisation of CoP**
Approach to SAP Implementation	**Top-down approach**	**Bottom-up approach (excluding top management)**	**Hybrid bottom-up/top-down approach**
	• Management planned SAP implementation as a linear, mostly technical process, seeing staff as passive recipients or consumers of knowledge. • Staff were excluded from the initial implementation processes: information gathering, SAP customisation and configuration. • Training provided well in advance disconnected from actual work practices implied the transfer of SAP factual generic knowledge (knowing that) to practical, concrete situations. • Management underestimated the complex nature of the SAP implementation process and the degree of organisational change involved. • During this phase company performance dropped.	• SAP champions attracted staff and some middle managers to share knowledge and cooperatively explore problems, which led to the bottom-up emergence of CoPs. • Staff and middle managers felt they were peripheral legitimate members of CoPs that assisted learning by working and interpretation of SAP in concrete business processes. • A CoP typically focused on solving problems in business processes was located in their department. • Towards the end of Phase 2, staff became familiar with SAP, moving from peripheral to central members of CoPs. • Improvements of business processes performance were recorded.	• Top management recognised the importance of CoPs in SAP implementation and provided resources for their effective work. • CoPs matured and became legitimised and extended across the organisation, leading to increasing interdepartmental communication largely via WebEx. • The dynamics of intradepartmental and interdepartmental interaction and collaboration resulted in changing mindsets and radical transformation of SAP-enabled business processes. • The SAP implementation process was at the same time bottom up and top down—exemplifying a hybrid approach • The company recorded significant performance improvements and also stated they were revisiting their business strategy.

The emerging learning environment in the departments enabled staff to explore the use of SAP and construct a new vision of both their business processes and their jobs as a reflection of their understanding of SAP. As discussed earlier, they 'collectively develop[ed] an outlook on work and the world' (Brown & Duguid 2001) that reflected the business process model, norms and rules embedded in SAP. The bottom-up approach led to learning that was situated and social (Brown & Duguid 1991, 2001; Lave & Wenger 1991; Snyder & Wenger 2010), located in individual departments where CoPs formed. The result was single-loop learning and operational transformation of business processes limited to these departments. SAP implementation succeeded in achieving the given objectives of SAP-enabled business processes, albeit not properly integrated.

In Phase 3, the bottom-up approach continued. However, because top management recognised the importance of CoPs in SAP implementation, they provided resources for their effective work and supported their extension across the organisation as systematic learning processes with the help of WebEx. They also engaged in knowledge sharing and debate within CoPs. The approach then became hybrid as a combination of bottom-up and the top-down approaches. Such organisation-wide interaction and collaboration led to changing mindsets and the assimilation of the new integrated system with a central database and standard business processes, demonstrating double-loop learning. The analysis shows that both approaches to SAP implementation played important roles in Phase 3. It suggests that double-loop learning could not have been achieved without the collective exploration and situated learning enabled by the bottom-up approach as well as by top management strategic steering. However, it is of note that bottom-up and top-down approaches coexisted without conflict or tension, which may be another interesting lesson from this case.

5.6 Concluding Remarks

This chapter discussed and explained the process of SAP implementation in Bravo by focusing on individual and collective learning processes. It answered the two key questions: How did organisational learning emerge and assist the actors in an ERP implementation? How do CoPs facilitate organisational learning during an ERP implementation? The chapter first provided a discussion of the three phases and explained the transition from not learning to single-loop learning and to double-loop learning. This was followed by an integral view of SAP implementation mutually intertwined with organisational learning. The processual model of ERP systems implementation (see Figure 5.3) was proposed as a substantive theoretical model that explains the Bravo case and also answers the research questions. The model as a major contribution of this thesis presents the learning from the case in a generalised form, thus enabling knowledge transfer to other researchers and practitioners who did not participate in this case study (Klein & Myers 1999).

Chapter 6: Conclusion

6.1 Introduction

This chapter provides a brief summary of the thesis and outlines its major theoretical and practical contributions to the field of IS in general and ERP systems literature in particular. It further elaborates the major contribution of the thesis: understanding the relationship between the dynamics of ERP systems implementation and the emergence of CoPs and levels of organisational learning. Moreover, it describes research limitations and suggests future research directions.

6.2 Summary of the Thesis

This thesis set out to examine the phenomenon of ERP systems implementation and enactment of radical ERP system-enabled organisational transformation with the aim to achieve desired benefits. ES is a key topic in IS research, primarily because of their profound implications for organisations, and the very high investment and implementation costs, high risk of failure, and considerable problems involved in system adoption and organisational change (Klaus, Rosemann & Gable 2000; Lee, Siau & Hong 2003; Plaza & Rohlf 2008). The importance of ERP systems has been enhanced by increasing globalisation, company mergers, e-commerce and inter-organisational integration of business processes (Calisir & Calisir 2004; Deloitte Consulting 1998). The major objective of ERP systems implementation is seamless integration and standardisation of business processes and information flows throughout an organisation. ERP systems enable fast, accurate and real-time information, which is required for timely responses to dynamic changes in the environment and effective decision-making. However, the many promises of ERP systems implementation—that it would reduce costs and cycle times, and improve production quality, job performance and customer service—have often failed to materialise (Connolly 1999; Deloitte Consulting 1998; Holsapple & Sena 2005; Utecht, Hayes & Okonkwo 2004; Kennerley & Neely 2001; Shang & Seddon 2002; Themistocleous et al. 2001; Xu et al. 2002).

The extensive literature review presented in Chapter 2 suggests that ERP systems implementation processes are typically uncertain, complex and risky, requiring detailed and thorough investigation (Ruivo, Oliveira & Neto 2012; Sudzina, Pucihar & Lenart 2011; Wang & Ramiller 2009; Tomblin 2010). Many ERP systems projects failed and most could not deliver the desired objectives (Ram, Corkindale & Wu 2013a; Kanaracus 2012; Kimberling 2011). Some studies have estimated that ERP systems failure rates are up to 80 per cent (Devadoss, Van Daalen & Chiasson 2008). The high failure rate of ERP systems implementation is mainly due to system complexity (Liang et al. 2010) and its profound effect on organisational structure and culture, and individual job performance (Soh & Sia 2004; Robey, Ross & Boudreau 2002). Although the literature on ERP systems implementation identifies numerous factors that affect organisational change and achievement of objectives (e.g. staff training, active user participation, top management support, knowledge co-creation and sharing), the high failure rate persists.

Much of the literature on ERP systems implementation focuses on factor-based research (Chang & Chou 2011) that is rather limited, and by definition, not concerned with the emergent nature of the implementation process and organisational change. To overcome these issues, many studies have focused on the specific ERP systems implementation processes, the way they are planned, managed, coordinated and executed (Tomblin 2010; Tsai & Hung 2008; Zboralski 2009). Learning about ERP systems and how to adopt them and enact organisational change has been a key issue in implementation processes (Teo, Singh & Cooper 2010; Zboralski 2009). Although companies allocate considerable resources to user training, learning does not necessarily take place. For ERP systems implementation processes to be successful, it is not only necessary that individuals learn, organisations have to learn as well (Scott & Vessey 2000; Ke & Wei 2006; Tsai & Hung 2008). The ability of organisations to learn and assimilate complex systems such as ERP systems is considered essential for the successful implementation and achievement of their objectives (Teo, Singh & Cooper 2010). Although organisational learning has been adopted as a theoretical lens for examining ERP systems implementation (e.g. Scott & Vessey 2000), there is a paucity of research that approaches ERP systems implementation and the implied organisational change integratively as emerging organisational learning processes.

The objective of this study was to advance understanding of the nature and dynamics of ERP systems implementation and organisational change processes by revealing the underlying emergence of organisational learning mechanisms and the ways they enable and assist complex organisational changes. By integrating situated learning and CoP theory with organisational learning theory, this study explored the nature and dynamics of learning involved in SAP implementation in the complex organisational setting of an IT company in order to answer the following research questions:

1. How does organisational learning emerge and assist the actors in an ERP implementation?
2. How do CoPs facilitate organisational learning during an ERP implementation?

These research questions were investigated through an interpretive, longitudinal case study of the SAP implementation and use in Bravo, an IT company in Australia (over 14 months, 2009–2010). Data were collected through a variety of methods. The primary data collection method was interviews: 38 interviews with 24 individuals, including staff from different departments, middle and top managers, IT staff members, trainers and consultants. Secondary data included documents such as project scoping analysis, training documents, problem logs, performance indices, WebEx records and press releases (over 400 pages in total).

Through in-depth analysis of empirical evidence, I developed a deeper understanding of the Bravo SAP implementation project and created a narrative that described and explained its dynamic organisational change process and its underlying learning processes. During the period 2007 to 2010 of the SAP implementation, I observed the initial gradual and contentious transformation of Bravo business processes—initially supported by legacy systems—into a new SAP-enabled business process structure operating across the company. By the first quarter of 2010, Bravo had achieved a radical transformation, improved performance and attained its strategic objectives.

The findings generated by this study include a process view of SAP implementation that describes the phases that evolved: from Phase 1, characterised by staff struggling with SAP, to Phase 2, in which SAP implementation took off and succeeded at the operational level, to Phase 3, in which the company as a whole mastered SAP and achieved an organisation-wide transformation. The in-depth study revealed underlying co-evolving organisational learning processes: the emerging CoPs assisted situated, informal learning

by doing—first within and then across departments and throughout the organisation in a more formalised form. These CoP-enabled learning processes gave rise to single- and double-loop learning respectively. The process model of SAP implementation derived from the findings explains the mutual co-emergence of CoPs and organisational learning (not learning, single-loop learning and double-loop learning) as underlying mechanisms of SAP gradual implementation and organisational transformation.

In Phase 1, SAP implementation was considered a failure. The reasons for failure were mainly a lack of understanding of SAP and its interconnected business processes; a disconnect between the training provided earlier and actual work practices; misunderstanding between the management and staff about the inadequacy of the training; and staff exclusion from the initial customisation of SAP prior to the implementation. The approach to SAP implementation in this phase was top down with no appreciation of the complexity of the process and the extent of organisational change. As staff struggled with SAP, they resisted the use of SAP and continued to use legacy systems, and thus failed to learn.

In Phase 2, CoPs spontaneously emerged around champions, enabling staff to become legitimate peripheral participants and engage in situated learning. In this way, the approach to SAP implementation changed from top down to bottom up, as 'struggling staff' became active learners, engaged in problem and knowledge sharing within each department. As a result, staff managed to make sense of and succeeded in reinterpreting SAP in their concrete business processes and Bravo context. This led to the gradual adoption of SAP and achievement of the desired performance of the business processes. Although staff learning was limited to their CoPs and change primarily envisaged in individual processes within departments, operational improvements were achieved, indicating single-loop learning.

In the final stage, Phase 3, CoPs continued to expand and became institutionalised organisational processes that also included top management. In particular, BTFs and information-sharing technology WebEx helped in advancing interaction among CoPs and in creating a community of CoPs in Bravo. Such a learning and working environment encouraged Bravo staff to share and explore new ideas, challenge the traditional ways of doing things and change their mindsets. The ensuing change was radical: new SAP-

enabled business processes integrated throughout the company were fully functioning, business policies changed, and significant performance improvements were achieved. SAP implementation in this phase was enacted as double-loop learning as staff mindsets across the company demonstrably changed and the company achieved new performance levels and embarked on setting new objectives and strategies. The approach in this phase became hybrid, that is, a combination of top-down and bottom-up change processes.

The next section details the contribution of this thesis to the IS field, ERP systems and organisational learning literature, as well as its limitations and implications for future research.

6.3 Theoretical Contribution

Although several researchers have pointed to the urgent need for qualitative insights into the phenomenon of organisational learning during ERP systems implementation (Grabski, Leech & Schmidt 2011; Chang & Chou 2011), few studies have addressed how organisational learning emerges and enables ERP systems implementation. As Chang and Chou (2011) pointed out, there is very limited literature on how organisations engage in learning and how learning transforms during ERP systems appropriation. Recent reviews (Grabski, Leech & Schmidt 2011; Moon 2007; Esteves & Pastor 2001; Esteves & Bohorquez 2007; Botta-Genoulaz, Millet & Grabot 2005; Jacobs & Bendoly 2003) indicate that a majority of ERP systems research focuses on ERP systems selection and implementation success factors, but seldom on the learning involved in implementation processes. Furthermore, in-depth studies are called for to illuminate underlying organizational learning processes deemed necessary for successful ERP implementation.

The proposed model of SAP implementation and organisational learning addresses some key weaknesses and suggestions mentioned in the literature and presents a foundation for developing a guideline for dealing with failed ERP systems implementation and transitioning to a successful implementation.

Building on the theories of situated learning and communities of practice as well as single- and double-loop learning, this study contributes to the understanding of ERP

systems implementation and resulting organisational transformation processes. Based on empirical findings, the thesis proposes a processual model of SAP implementation that posits a relation between a gradual SAP-enabled organisational transformation and ongoing practice-based learning by doing in emerging CoPs mutually intertwined with single- and double-loop organisational learning. More specifically, the processual model, illustrated in Figure 5.5, describes the co-emergence of CoPs and organisational learning as key learning mechanisms underlying SAP implementation and organisational transformation.

The proposed model contributes to the ERP systems literature by addressing the key challenges that companies face when deploying and implementing ERP systems. These include lack of knowledge about ERP systems and, in particular, lack of understanding of its implications for business processes; underestimation of the degree and complexity of organisational change involved; and consequent inability to envisage the degree of organisational learning required for a successful implementation (e.g. Ke & Wei 2006; Scott & Vessey 2000; Tsai & Hung 2008; Wang & Ramiller 2009). By contributing to practice-based and more refined understanding of organisational learning mechanisms, and their complex and co-emergent nature, the proposed model advances the organisational learning perspective of ERP systems implementation.

This model describes the intertwining of SAP implementation and organisational learning during three phases: from SAP implementation failure to SAP transformation at the operational level to SAP transformation at the organisational level. The outcomes of these three phases resulted from no learning, single-loop learning and double-loop learning, respectively. Importantly the learning processes were triggered and mutually enabled by CoPs. The emergence of CoPs enabled single-loop learning, which in turn strengthened these CoPs; further advancement and institutionalisation of CoPs across the company enabled and supported double-loop learning, which in turn helped their institutionalisation. In other words, CoPs and organisational learning (single- and double-loop learning) built upon one another as they enabled a spiral process of SAP implementation/use, business process transformation and organisational transformation.

This model can be generalised to ERP systems implementation which often face significant difficulties and resistance (whether called 'failure' or not) before becoming accepted, understood and applied at operational level (involving single-loop learning) and then being fully integrated into a radically transformed organisation processes (involving double-loop learning) (Argyris & Schön 1996; Snell & Chak 1998; Janson, Cecez-Kecmanovic & Zupančič 2007). As a processual model, it describes mutual intertwining of ERP-instigated and enabled transformation of organizational processes and organisational learning. Organisational learning here assumes two co-evolving and mutually enabling processes: situated learning in practice (the emergence, maturing and institutionalisation of CoPs; Brown & Duguid 1991, 2001) and processes of not learning, single-loop learning and double-loop learning (Snell & Chak 1998). This dynamic relationship is complex and contingent. While progression from resistance to ERP implementation to a fully integrated ERP and radically transformed business processes may in any concrete case be paced differently, it is likely that the key dynamics and mutual intertwining of learning, ERP assimilation and organisational change described by the model would emerge. This claim of course needs further examination in different contexts and ERP implementation conditions. While this study proposes a substantive theoretical model of ERP implementation and organisational learning that allowed a limited theoretical generalisation, new empirical studies are called for to further test the proposed relationships and extend and deepen the understanding of ERP implementation.

In addition to its major contribution to the ERP systems literature, this thesis contributes to the body of knowledge of organisational learning and CoPs by developing a subtle understanding of the dynamics of various learning processes involved in staff and management engagement with new ERP systems, organisational transformation and assimilation of ERP systems. The proposed theoretical view of mutually co-emerging CoPs and organisational learning (single- and double-loop learning) as key mechanisms of ERP systems implementation and use provides a contribution to the organisational learning literature (Brown & Duguid 1991; Lave 1991; Lave & Wenger 1991; Snell & Chak 1998; Snyder & Wenger 2010; Wenger 1998)

An additional contribution of this study is the linkage between organisational learning and ERP systems benefits. Shang and Seddon (2007) argued that organisational learning

is significant and necessary for successful ES implementation and achievement of anticipated benefits. Although identifying the benefits of SAP implementation was not the objective of this research, the findings suggest that, when the emergence and maturing of CoPs led to single-loop learning, operational benefits in the form of customer service improvement, cycle time reduction and cost reduction were evident (Shang & Seddon 2002). Similarly, when the CoPs were legitimised and institutionalised and mutually enabled by double-loop learning, different kinds of benefits were reported, such as company performance improvement, better resource management, improved decision-making and strategic planning, and support for business growth. These findings indicate that an exploration of a possible link between the level of learning and the types of benefit achieved might be interesting.

6.4 Practical Contribution

This research study makes a practical contribution, first, to the organisation studied and, second, to other organisations and practitioners involved in ERP systems implementation. Although this case study's findings are not empirically generalisable (Lee & Baskerville 2003), the lessons learnt and the proposed theoretical model grounded in the empirical study have potentially value for practice, especially for companies planning ERP systems implementation and ERP systems consultants. The rich and deep description of the SAP implementation process and the theoretical explanation of this process provide novel insights and knowledge that are relevant for all those involved in implementing ERP systems.

6.4.1 Implications for the Organisation Studied

There are several implications of this research for the organisation studied, that is, for Bravo Australia. The first is the realisation by top management that the lack of staff involvement in the early pre-implementation phase was a key contributing factor to the company's failure to implement SAP in Phase 1. Bravo management learnt from this research that staff exclusion from the SAP customisation phase that preceded implementation prevented timely learning by staff about SAP functionality and about the overall business strategy behind SAP implementation. They also learnt that this exclusion

was also not helpful to the external consultants (i.e. trainers) because they failed to establish an appropriate interaction with staff, which was needed to understand the business operations of the organisation.

The second, and perhaps more consequential, implication for Bravo was the recognition of the CoPs that emerged during Phase 2 of the SAP implementation. Middle management were the first to recognise the formation of CoPs around the champions located in the departments. They initially facilitated CoPs by providing them with resources. Later on, the top management learnt about the role CoPs played in overcoming the failure and stimulating staff learning, and then they themselves participated in the debates. Top management learnt to appreciate the importance of CoPs within and across the departments and ultimately supported and legitimised them.

Finally, Bravo's top management reflected on the proposed model of SAP implementation as mutually intertwined with co-emerging organisational learning and CoPs and recognised its benefits to organisations embarking on and planning an ERP systems implementation. They believe many of the mistakes they made could have been avoided had they learnt from a similar model built from the study of another company.

6.4.2 Implications for Enterprise Resource Planning Project Consultants

The thesis also has important implications for ERP systems project consultants. The findings from the Bravo case study and, in particular, the model of SAP implementation and organisational learning provide some lessons for consultants regarding the role of CoPs in fostering and building upon single- and double-loop learning as underlying mechanisms of SAP implementation. The findings of this research and the model can help consultants to diagnose problems and their causes during ERP systems implementation. The model can also help ERP systems consultants to design an appropriate implementation strategy for an organisation that depends on its existing practices and ability to learn. ERP systems project consultants may devise context-specific incentives to facilitate CoPs while implementing an ERP systems In such cases, ERP systems consultants may focus on co-evolving processes of organisational learning and CoPs as key underlying mechanisms of ERP systems implementation.

This further indicates that the role of consultants in ERP systems implementation does not need to be limited to their engagement with top management and process owners. As the Bravo case illustrates, successful ERP systems implementation and adoption requires active staff engagement. First, learning from this study may help consultants recognise the importance staff engagement from early analysis and planning phase and throughout the implementation process. This might include involvement of the trainers and staff early on, during the information-gathering phase. In this way, trainers can learn about and understand the organisation's existing business processes fully and then design training content that is more relevant to actual work practices. At the same time, interaction between trainers and staff (systems users) will be beneficial for the later phases, helping staff to comprehend both the functionalities of ERP systems and its embedded business processes. A further lesson regarding training delivery is that it is more beneficial to staff when it is provided in a timely manner (as close to going live as practicable) as well as on demand, when it is needed.

6.4.3 Implications for Organisations Implementing Enterprise Resource Planning Systems

An important lesson from this thesis for organisations planning an ERP systems implementation relates to the nature of the approach, typically articulated as a dilemma between a top-down, management-controlled approach and a bottom-up, staff-initiated approach. This research demonstrated that the mere reliance on the often-practiced top-down approach to ERP systems implementation is as risky as it is unproductive (Markus, Tanis & Van Fenema 2000; Chen, Law & Yang 2009; Huq & Martin 2006; Al-Mashari, Zairi & Okazawa 2006). This is illustrated by the Bravo case of SAP implementation that failed in its first attempt using a top-down approach to implementation. This approach rarely works because it deprives an organisation of the opportunity to utilise the talents and considerable knowledge and experience distributed throughout the organisation. As shown in this research, an alternative bottom-up approach that spontaneously emerged in the individual departments of Bravo enabled and stimulated learning by doing and thus led to single-loop learning. Although this approach was successful, it was limited in terms of the degree of learning because top management were excluded. Of particular interest to other organisations is Bravo's experience with the combined bottom-up and top-down approach that included staff, middle management and top management, which eventually

enabled double-loop learning, the company's transformation and a radical change of business processes across the organisation. A take-home lesson here is that the combined approach is beneficial, but the appropriate combination of top-down and bottom-up approaches to ERP systems implementation depends on the specific circumstances and practices in the adopting organisation.

One aspect of the bottom-up approach is staff participation. As indicated by different IS researchers, staff participation is one of the main critical factors for IS success in general (Ives & Olson 1984; Doll & Torkzadeh 1989; Baroudi, Olson & Ives 1986; Mandal & Gunasekaran 2003) and ERP systems implementation in particular (Al-Mashari & Zairi 2000; Zhang et al. 2005; Amoako-Gyampah 2004a; Rodecker & Hess 2001; Hainess & Goodhue 2003). ERP systems implementation often suffers because staff participation is lacking or insufficient.

The Bravo case provides some lessons regarding the importance of staff participation. The lack of staff involvement in the early period of SAP customisation led to staff struggling with SAP and not learning in Phase 1. These were the main reasons for the SAP implementation failure in this phase. The emergence of CoPs in Phase 2 and the staff's gradual participation in local community learning and knowledge sharing led to single-loop learning, and staff communication and cooperation across CoPs contributed to double-loop learning. Although this pattern will not occur inevitably, the example illustrates the critical importance of staff involvement and participation in ERP systems implementation.

6.5 Limitations of the Study

One of the main limitations of this study is the amount of time that I was able to spend in Bravo to conduct the case study. Given that the SAP implementation started before my data collection, part of the data collection had to be retrospective in nature. Although the collection of past events, actions and decisions obtained via interviews and documents were highly reliable and valuable, I acknowledge that my direct involvement in the field at the time of these events, actions and decisions would have facilitated better understanding and comprehension.

The second limitation, which is typical of most interpretive research, concerns my ability to participate in and observe business processes and the working of diverse groups and committees. I was not able to attend all of these during my case study; I therefore relied on interviews and discussions with key actors in Bravo. Furthermore, during my time spent in the field, not all relevant actors were available for discussion or interview. Despite this limitation, I was able to collect sufficient empirical material to develop a comprehensive view of the entire process, from the decision to implement SAP to the successful completion of implementation.

Another limitation, also common in interpretive studies, involves my ability to acquire interpretive insights on the people studied. Although I have considerable knowledge of Bravo, its working processes and its culture, I have to recognise that interpretations of individual actors and their actions demanded an iterative process of interpretations and reinterpretation. One can never come to a final or best understanding. One can only hope to develop significant insights and produce a plausible story, which, when presented to the actors in the field, makes sense to them.

6.6 Future Research

By proposing a theoretical model of SAP implementation and organisational learning, this research opens up some new avenues for further exploration of practice-based learning and ERP systems-enabled organisational change processes. First, the model

needs to be tested further in other cases of ERP systems implementation in complex dynamic environments with different types of ERP systems (e.g. Oracle or PeopleSoft). In using it to analyse and interpret ERP systems implementation in other cases, the model will be subjected to questioning and criticism, and potentially be developed further and refined.

Second, further empirical research on the learning processes during ERP systems implementation in different organisations is needed in order to explore some additional nuances of ERP systems implementation approaches, staff participation and engagement with ERP systems, the formation of CoPs and the nature of learning. Further exploration of learning processes would benefit from the inclusion of the types of knowledge involved (e.g. knowing what, knowing why and knowing how) in different phases of ERP systems implementation (Wang & Ramiller 2009). It would be interesting to explore whether and how the nature of learning processes and the nature of knowledge are related to ERP systems implementation and use.

Although this study did not specifically explore the linkage between organisational learning and ERP systems benefits, it provided some evidence that further exploration is warranted. In other words, the findings suggest that an exploration of a possible link between the level of learning and the types of benefits achieved might be interesting and useful.

6.7 Chapter Conclusion

The research study presented in this thesis examined an SAP implementation process and the related organisational transformation from the organisational learning perspective. The study addressed critical research problems persisting in the ERP systems literature and practice related to high failure rates of ERP systems implementation and a lack of understanding of underlying mechanisms affecting the implementation process.

This chapter first summarised the research conducted and its findings. Based on a longitudinal case study and through an in-depth analysis of a SAP implementation in a IT company, the thesis proposed a processual model of SAP implementation and

organisational learning. The model posits the relationship between the degree of SAP implementation (failure to implement, SAP-enabled transformation of individual business processes and SAP-enabled organisational transformation) and the mutually co-emerging process of CoPs and organisational learning (no learning, single-loop learning and double-loop learning). These learning processes are understood as underlying mechanisms that explain ERP systems implementation and organisational transformation. This model thus provides a valuable theoretical contribution to the existing body of knowledge on ERP systems implementation and organisational implications. Apart from its theoretical importance, the model can help practitioners to plan, conduct and manage ERP systems implementation and organisational change better. Finally, interesting research problems have been suggested and future research directions proposed.

References

Abernathy, D. 1999, 'A chat with Chris Argyris', *Training and Development*, vol. 53, pp. 80–4.

Akhgar, B., Siddiqi, J. & Al-Khayatt, S. 2002, 'Strategic exploitation of ERP for e-business', in *International Conference on Information Technology: Coding and Technology*, Sydney, Australia, pp.498-513.

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*, vol. 11, pp. 35–46.

Al-Mashari, M. & Al-Mudimigh, A. 2003, 'ERP implementation: lessons from a case study', *Information Technology & People*, vol. 16, pp. 21–33.

Al-Mashari, M. & Zairi, M. 2000, 'Information and business process equality: the case of SAP R/3 implementation', *The Electronic Journal of Information Systems in Developing Countries*, vol. 2.pp.1-15

Al-Mashari, M., Zairi, M. & Okazawa, K. 2006, 'Enterprise resource planning (ERP) implementation: a useful road map', *International Journal of Management and Enterprise Development*, vol. 3, pp. 169–80.

Amoako-Gyampah, K. 2004a, 'A comparison of managerial and end-user perspectives', *Business Process Management Journal*, vol. 10, pp. 171–83.

Amoako-Gyampah, K. 2004b, 'ERP implementation factors: a comparison of managerial and end-user perspectives', *Business Process Management Journal*, vol. 10, pp. 171–83.

Argote, L. 2011, 'Organizational learning research: past, present and future', *Management Learning*, vol. 42, pp. 439–46.

Argote, L. & Miron-Spektor, E. 2011, 'Organizational learning: from experience to knowledge', *Organization Science*, vol. 22, pp. 1123–37.

Argyris, C. & Schön, D. 1978, *Organizational Learning: A Theory of Action Perspective*, Addison Wesley, New York.

Argyris, C. & Schön, D. A. 1996, *Organizational Learning. 2. Theory, Method, And Practice*, Addison-Wesley, New York.

Argyris, C. 2001. *On organizational learning* . Malden, MA. Blackwell Publishers, In

Bagozzi, R. P. 2007, 'The legacy of the technology acceptance model and a proposal for a paradigm shift', *Journal of the Association for Information Systems*, vol. 8.pp. 244-254

Baki, B. & Çakar, K. 2005, 'Determining the ERP package-selecting criteria: the case of Turkish manufacturing companies', *Business Process Management Journal*, vol. 11, pp. 75–86.

Barker, T. & Frolick, M. N. 2003, 'ERP implementation failure: a case study', *Information Systems Management*, vol. 20, pp. 43–9.

Barki, H. & Pinsonneault, A. 2005, 'A model of organizational integration, implementation effort, and performance', *Organization Science*, vol. 16, pp. 165–179.

Baroudi, J. J., Olson, M. H. & Ives, B. 1986, 'An empirical study of the impact of user involvement on system usage and information satisfaction', *Communications of the ACM*, vol. 29, pp. 232–248.

Benbasat, I., Goldstein, D. K. & Mead, M. 1987, 'The case research strategy in studies of information systems', *MIS Quarterly*, vol. 11, pp.369-386

Benchmarking Partners, Inc. (1998) 'ERP's Second Wave: Maximizing the Value of ERP-Enabled Processes '. *Deloitte Consulting Study*

Benders, J., Schouteten, R. & el Kadi, M. A. 2009, 'ERP-systems and job content: a case study of HR-assistants', *Personnel Review*, vol. 38, pp. 641–54.

Bingi, P., Sharma, M. K. & Godla, J. K. 1999, 'Critical issues affecting an ERP implementation', *Information Systems Management*, vol. 16, pp. 7-15.

Borzillo, S. 2009, 'Top management sponsorship to guide communities of practice', *Journal of Knowledge Management*, vol. 13, pp. 60–72.

Botta-Genoulaz, V., Millet, P. A. & Grabot, B. 2005, 'A survey on the recent research literature on ERP systems', *Computers in Industry*, vol. 56**,** pp. 510–22.

Boudreau, M.-C. & Robey, D. 2005, 'Enacting integrated information technology: a human agency perspective', *Organization Science*, vol. 16, pp. 3–18.

Broendsted, J. & Elkjaer, B. 2001, 'Information technology as a fellow player in organizational learning', *ECIS*, Bled, Slovenia, June 27-29. pp. 687–95.

Brown, J. S. & Duguid, P. 1991, 'Organizational learning and communities-of-practice: toward a unified view of working, learning, and innovation', *Organization Science*, vol. 2, pp. 40–57.

Brown, J. S. & Duguid, P. 2001, 'Knowledge and Organisation: A Social-Practice Perspective', *Organization Science*, vol. *12*, pp. 198-213.

Brown, J. S. & Duguid, P. 2002, *The Social Life of Information*, Harvard Business Press, Boston.

Calisir, F. & Calisir, F. 2004, 'The relation of interface usability characteristics, perceived usefulness, and received ease of use to end-user satisfaction with enterprise resource planning (ERP) systems', *Computers in Human Behavior*, vol. 20, pp. 505–15.

Chang, H. H. & Chou, H. W. 2011, 'Drivers and effects of enterprise resource planning post-implementation learning', *Behaviour & Information Technology*, vol. 30, pp. 251–9.

Chang, S.-I. & Gable, G. G. 2000, 'Major issues with SAP financials in Queensland Government', *Proceedings of the 6th Americas Conference on Information Systems*, Long Beach, California, 10-13 August pp. 972–976.

Chen, C. C., Law, C. & Yang, S. C. 2009, 'Managing ERP implementation failure: a project management perspective', *IEEE Transactions on Engineering Management*, vol. 56, pp. 157–70.

Cheek , J. 2004. 'At the margins? Discourse analysis and qualitative research. Qualitative Health Research', vol. 14, pp. 1140-1150.

Chung, S. H. & Snyder, C. A. 2000, 'ERP adoption: a technological evolution approach', *International Journal of Agile Management Systems*, vol. 2, pp. 24–32.

Ciborra, C. 2000, *From Control to Drift: The Dynamics of Corporate Information Infrastructures*, Oxford University Press. Oxford

Cohen, M. D. & Sproull, L. 1995, *Organizational Learning*, Thousands Oaks, CA : Sage Publications.

Compeau, D. R, Olfman, L., Sein, M. K. & Webster, J. 1995, 'End-user training and learning', *Communication of ACM*, vol. 38, pp. 24–6.

Connolly, J. 1999, 'ERP's real benefits', *Cable News Network*, 9 March, viewed 25 October 2005, <http://www.cnn.com/TECH/computing/9903/09/erp.ent.idg/>.

Considine, B., Olesen, A. P. K., Speer, D. & Lee, M. 2010, *Accounting Information Systems: Understanding the Business Processes*, John Wiley and Sons Australia, Milton.

Cooke, J. & Paterson, W. 1998, *SAP Implementation: Strategies and Results*, The Conference Board, New York.

Cooper, R. B. & Zmud, R. W. Z. 1990, 'Information technology implementation research: a technological diffusion approach', *Management Science*, vol. 36, pp. 123–38.

Crotty, M. 1998. The foundations of social research: Meaning and perspective in the research process, Sage.

Darke, P., Shanks, G. & Broadbent, M. 1998, 'Successfully completing case study research: combining rigour, relevance and pragmatism', *Information Systems Journal*, vol. 8, pp. 273–89.

Davenport, T. H. 1998, 'Putting the enterprise into the enterprise system', *Harvard Business Review*, vol. 76, pp. 122–31.

Davenport, T. H. 2000, *Mission Critical: Realizing the Promise of Enterprise System*, Harvard Business School Press, Cambridge, MA.

Davis, B. & Wilder, C. 1998, 'False starts, strong finishes—companies are saving troubled IT projects by admitting their mistakes, stepping back, scaling back, and moving on', Information Week, vol. 30, pp. 41–3.

Day, G. (1994), 'Continuous learning about markets', *California Management Review*, vol. 36, pp. 9-31.

Deloitte Consulting 1998, *ERP's Second Wave: Maximising the Value of ERP-Enabled Processes*, 'Viewed [10th April 2014] http://www.ctiforum.com/technology/CRM/wp01/download/erp2w.pdf>.

Denzin, N. K. & Lincoln, Y. 2000, *Qualitative Research*, Thousand Oaks, Sage CA.

Devadoss, P. & Pan, S. L. 2007, 'Enterprise systems use: towards a structurational analysis of enterprise systems induced organizational transformation', *Communications of the Association for Information Systems*, vol. 19, pp. 352-385

Devadoss, P., Van Daalen, R. & Chiasson, M. 2008, 'Knowing a few rules doesn't mean you can play the game: the limits of "best practice" in enter prise systems. *AMCIS Conference,* Toronto, Ontario, Canada, August 14-17, pp.1-17.

Dezdar, S. & Sulaiman, A. 2009, 'Successful enterprise resource planning implementation: taxonomy of critical factors', *Industrial Management & Data Systems*, vol. 109, pp. 1037–52.

Dodgson, M. 1993, 'Organizational learning: a review of some literatures', *Organization Studies*, vol. 14, pp. 375–94.

Doll, W. J. & Torkzadeh, G. 1989, 'A discrepancy model of end-user computing involvement', *Management Science*, vol. 35, pp.1151-1171

Daft, R. L., & Weick, K. L. 1984. 'Toward a model of organizations as interpretation systems. *Academy of Management Review*', vol. 9, pp 284–295

Easterby-Smith, M. 1997, 'Disciplines of organizational learning: contributions and critiques', *Human Relations*, vol. 50, pp. 1085–113.

Eisenhardt, K. M. 1989, 'Agency theory: an assessment and review', *Academy of Management Review*, vol. 14, pp. 57–74.

Emory, C. & Cooper, D. 1991, *Business Research Methods*, Irwin, Homewood, IL.

Esteves, J. 2009, 'A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises', *Journal of Enterprise Information Management*, vol. 22, pp. 25–35.

Esteves, J. & Bohorquez, V. 2007, 'An updated ERP systems annotated bibliography: 2001–2005', *Communications of the Association for Information Systems*, pp. 386–446.

Esteves, J. & Pastor, J. 2001, 'Enterprise resource planning systems: an annotated bibliography', *Communications of the Association for Information Systems*, vol. 19, pp. 1–52.

Everdingen, Y. M. V. & Waarts, E. 2003, 'The effect of national culture on the adoption of innovations', *Marketing Letters*, vol. 14, pp. 217.-232

Ezzy, D. 2002, 'Coding data and interpreting text: methods of analysis', *Qualitative Analysis*, pp. 80–110.

Finney, S. & Corbett, M. 2007, 'ERP implementation: a compilation and analysis of critical success factors', *Business Process Management Journal*, vol. 13, pp. 329–47.

Fiol, C.M. and Lyles, M.A. (1985), "Organizational learning", Academy of Management Review, vol. 10 No. 4, pp. 803-13.

Fontaine, M. A. & Millen, D. R. 2004. Understanding the benefits and impact of communities of practice. In: HILDRETH, P. & KIMBLE, C. (eds.) Knowledge networks: Innovation through communities of practice. IDEA Group Publications.

Fox, S. 2000, 'Communities of practice, Foucault and actor-network theory', *Journal of Management Studies*, vol. 37, pp. 853–68.

Fulmer, R. M. & Keys, J. B. 1998, 'A conversation with Chris Argyris: the father of organizational learning', *Organizational Dynamics*, vol. 27, pp. 21–32.

Garvin, D. A., Edmondson, A. C. & Gino, F. 2008, 'Is yours a learning organization?', *Harvard Business Review*, vol. 86, pp. 109-116.

Gattiker, T. F. & Goodhue, D. L. 2000, 'Understanding the plant level costs and benefits of ERP: will the ugly duckling always turn into a swan?', *Proceedings of the 33rd Hawaii International Conference on System Science*, IEEE, Hawii, pp.1-10

Gattiker, T. F. & Goodhue, D. L. 2004, 'Understanding the local-level costs and benefits of ERP through organizational information processing theory', *Information and Management*, vol. 41, pp. 431–43.

George, J. F., Iacono, S. & Kling, R. 1995, 'Learning in context: extensively computerized work groups as communities-of-practice', *Accounting, Management and Information Technologies*, vol. 5, pp. 185–202.

Glover, S. M., Prawitt, D. F. & Romney, M. B. 1999, 'Implementing ERP: internal auditing can help eliminate mistakes that commonly derail organizations' ERP initiatives', *Internal Auditor*, vol. 56, pp. 40–7.

Grabski, S. V., Leech, S. A. & Schmidt, P. J. 2011, 'A review of ERP research: a future agenda for accounting information systems', *Journal of Information Systems*, vol. 25, pp. 37–78.

Grossman, T. & Walsh, J. 2004, 'Avoiding the pitfalls of ERP system implementation', *Information Systems Management*, vol. 21, pp. 38–42.

Gupta, A. 2000, 'Enterprise resource planning: the emerging organizational value systems', *Industrial Management and Data Systems*, vol. 100, pp. 114.

Gupta, S., Bostrom, R. P. & Huber, M. 2010, 'End-user training methods: what we know, need to know', *ACM SIGMIS Database*, vol. 41, pp. 9–39.

Haag, S., Cummings, M. & Phillips, A. 2007, *Management Information Systems: For the Information Age*, McGraw-Hill Irwin.

Hainess, M. N. & Goodhue, D. L. 2003, 'Implementation partner involvement and knowledge transfer in the context of ERP implementations', *International Journal of Human-Computer Interaction*, vol. 16, pp. 23–38.

Hargrove, R. 2008, *Masterful Coaching*, John Wiley & Sons.

Hawkins, P. 1991, 'The spiritual dimension of the learning organisation', *Management Education & Development*.vol. 22, pp. 172-187

Hawkins, P. 1994, 'Organizational learning taking stock and facing the challenge', *Management Learning*, vol. 25, pp. 71–82.

Hayes, D., Hunter, J. & Reck, J. 2001, 'Market reaction to ERP implementation announcement', *Journal of Information Systems*, vol. 15, pp. 3–18.

Haymen, L. 2000, 'ERP in the Internet economy', *Information System Frontiers*, vol. 2, pp. 137–9.

Heiskanen, A., Assinen, P., 2003. 'Learning cycles, organisational back talk, and the persistence of theories in use: lessons of information systems development in a university administration context'. *Knowledge and Process Management,* vol. 10, pp. 183–193.

Hildreth, P., Kimble, C. & Wright, P. 2000, 'Communities of practice in the distributed international environment', *Journal of Knowledge Management*, vol. 4**,** pp. 27–38.

Ho, C.-F., Wu, W.-H. & Tai, Y.-M. 2004, 'Strategies for the adaptation of ERP systems', *Industrial Management & Data Systems*, vol. 104, pp. 234–51.

Holland, C. & Light, B. 1999, 'Global enterprise implementation planning implementation', *32nd Hawaii International Conference on System Scienc*e, Hawaii, IEEE Computer Soc. Press, Los Alamitos, Calif.,

Holland, C. P. & Light, B. 2001, 'A stage maturity model for enterprise resource planning systems use', *ACM SIGMIS Database*, vol. 32, pp. 34–45.

Holsapple, C. W. & Sena, M. P. 2005, 'ERP plans and decision-support benefits', *Decision Support Systems*, vol. 38, pp. 1-16.

Hsu, K., Sylvestre, J. & Sayed, E. N. 2006, 'Avoiding ERP pitfalls', *Journal of Corporate Accounting & Finance*, vol. 17, pp. 67–74.

Huber, G. (1991), 'Organizational learning: contributing processes and the literatures', *Organizational Science*, vol. 2, pp. 88-115.

Huq, Z. & Martin, T. N. 2006, 'The recovery of BPR implementation through an ERP approach: a hospital case study', *Business Process Management Journal*, vol. 12, pp. 576–87.

Hustad, E. & Olsen, D. H. 2011, *ERP post-implementation issues in small-and-medium-sized enterprises*, in Enterprise Information Systems*, Pt 1*, eds M. M. Cruzcunha, J. Varajao, P. Powell & R. Martinho, Springer, New York.

Ives, B. & Olson, M. H. 1984, 'User involvement and MIS success: a review of research', *Management Science*, vol. 30, pp. 586–603.

Jacobs, F. R. & Bendoly, E. 2003, 'Enterprise resource planning: developments and directions for operations management research', *European Journal of Operational Research*, vol. 146, pp. 233–40.

Jakubik, M. 2008, 'Experiencing collaborative knowledge creation processes', *The Learning Organization*, vol. 15, pp. 5–25.

Janesick, V. J. 1999, 'A journal about journal writing as a qualitative research technique: history, issues, and reflections', *Qualitative Inquiry*, vol. 5, pp. 505–24.

Janson, M., Cecez-Kecmanovic, D. & Zupančič, J. 2007, 'Prospering in a transition economy through information technology-supported organizational learning', *Information Systems Journal*, vol. 17, pp. 10-32

Jap, T.-B. 2008, Organisational learning and information systems: an exploration from a sensemaking perspective, PhD thesis, University of New South Wales.

Kajeepeta, S. 2011, 'Strategy: ERP in 2012 and beyond', *InformationWeek.*'Viewed [10th April 2013] http://reports.informationweek.com/abstract/7/8609/Enterprise-Software/strategy-erp-in-2012-and-beyond*.html.

Kallinikos, J. 2004, 'Deconstructing information packages: organizational and behavioural implications of ERP systems', *Information Technology & People*, vol. 17, pp. 8–30.

Kanaracus, C. 2012, 'The scariest software project horror stories of 2012: billions of dollars were wasted and tempers ran hot as multiple projects hit the skids this year', *Computer World.* 'Viewed [10th March 2012] http://www.computerworld.com/s/article/9234581/The_scariest_software_project_horror_stories_of_2012'

Ke, W. & Wei, K. K. 2006, 'Organizational learning process: its antecedents and consequences in enterprise system implementation', *Journal of Global Information Management*, vol. 14, pp. 1–22.

Kelly, S., Holland, C. & Light, B. 1999, 'Enterprise Resource Planning. A business approach to system development', Proceedings of the 5th Conference on Information System, August 13-15, Milwaukee, WI, pp. 785–87.

Kennerley, M. & Neely, A. 2001, 'Enterprise resource planning: analyzing the impact', *Integrated Manufacturing Systems*, vol. 12**,** pp. 103–13.

Kerr, D., Burgess, K. J., Houghton, L. & Murray, P. A. 2012, 'Improving training in enterprise resource planning systems implementation through communities of practice', *International Journal of Learning and Change*, vol. 6, pp. 207–22.

Kim, D. & Senge, P. 1994, 'Putting systems thinking into practice', *Systems Dynamics Review*.vol. 10, pp. 277-290

Kimberling, E. 2011, 'ERP failures and lawsuits: it's not just for the tier I ERP vendors', *Panorama Consulting Solutions*, 12 January, viewed 20th March 2014, <http://panorama-consulting.com/erp-failures-and-lawsuits-its-not-just-for-the-tier-i-erp-vendors/>.

King, S. F. & Burgess, T. F. 2006, 'Beyond critical success factors: a dynamic model of enterprise system innovation', *International Journal of Information Management*, vol. 26, pp. 59–69.

Klaus, T. & Blanton, J. E. 2010. 'User resistance determinants and the psychological contract in enterprise system implementations'. *European Journal of Information Systems*, vol. 19, pp. 625-636.

Klaus, H., Rosemann, M. & Gable, G. G. 2000, 'What is ERP?', *Information System Frontiers*, vol. 2, pp. 141–62.

Klein, H. K. & Myers, M. D. 1999, 'A set of principles for conducting and evaluating interpretive field studies in information systems', *MIS Quarterly*, vol. 23 pp. 67–93.

Kremers M, Van Dissel H. 'ERP system migrations' *Communication ACM* 2000;43(4):53 – 6.

Krishnaveni, R. & Sujatha, R. 2012, 'Communities of practice: an influencing factor for effective knowledge transfer in organizations', *IUP Journal of Knowledge Management*, vol. 10, pp. 26-40

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*, vol. 59**,** 266–77.

Langenwalter, G. A. 1999, *Enterprise Resources Planning and Beyond: Integrating Your Entire Organization*, CRC Press.

Lave, J. 1991, 'Situating learning in communities of practice', *Perspectives on Socially Shared Cognition*, vol. 2, pp. 63–82.

Lave, J. 1993, 'The practice of learning', *Contemporary Theories of Learning*, pp. 200.

Lave, J. & Wenger, E. 1991, *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press, London, United Kingdom.

Lawler, A. & Sillitoe, J. 2013, 'Facilitating "organisational learning" in a "learning institution', *Journal of Higher Education Policy and Management*, vol 35 pp. 495-500.

Lee, A. S. 2001. *Challenges to qualitative researchers in information systems.* In: TRAUTH, E. (ed.) Qualitative research in IS: Issues and trends. IDEA Group Publishing, London.

Lee, A. S. & Baskerville, R. L. 2003, 'Generalizing generalizability in information systems research', *Information Systems Research*, vol. 14, pp. 221–43.

Lee, J., Siau, K. & Hong, S. 2003, 'Enterprise integration with ERP and EAI', *Communication of the ACM*, vol. 46, pp. 54-60

Lee, S. M., Lee, Z. & Lee, J. 2007, 'Knowledge transfer in work practice: adoption and use of integrated information systems', *Industrial Management & Data Systems*, vol. 107, pp. 501–18.

Lee, S., Courtney, J.F.& O'Keefe, R.M. 1992, 'A system for organisational learning using cognitive maps', *Omega,*vol. 20, pp. 23-36.

Leithwood, K., Jantzi, D. & Steinbach, R. 1995, 'An organisational learning perspective on school responses to central policy initiatives', *School Organisation*, vol. 15, pp. 229–52.

Leithwood, K., Leonard, L. & Sharratt, L. 1998, 'Conditions fostering organizational learning in schools', *Educational Administration Quarterly*, vol. 34, pp. 243–76.

Levitt, B. & March, J. 1988, 'Organisational learning', *Annual Review Sociology*, vol. 14, pp. 319–40.

Liang, H., Saraf, N., Hu, Q. & Xue, Y. 2007, 'Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management', *MIS Quarterly*, vol. 31, pp. 59–87.

Liang, P., Zhong, N., Lu, S. & Liu, J. 2010, 'ERP characteristics of sentential inductive reasoning in time and frequency domains', *Cognitive Systems Research*, vol. 11, pp. 67–73.

Light, B., Holland, C. P. & Wills, K. 2001, 'ERP and best of breed: a comparative analysis', *Business Process Management Journal*, vol. 7, pp. 216–24.

Lipshitz, R. 2000, 'Chic, mystique, and misconception: Argyris and Schön and the rhetoric of organizational learning', *The Journal of Applied Behavioral Science*, vol. 36, pp. 456–73.

Liu, A. Z. & Seddon, P. B. 2009, 'Understanding how project critical success factors affect organizational benefits from enterprise systems', *Business Process Management Journal*, vol. 15, pp. 716–43.

Lonzinsky, S. 1998, *Enterprise-Wide Software Solutions: Integration Strategies and Practices*. Addison-Wesley Longman Ltd. Essex, UK

Lyytinen, K. & Rose, G. M. 2003, 'The disruptive nature of information technology innovations: the case of internet computing in systems development organizations', *MIS Quarterly*, vol. 27 pp. 557–596.

Machles, D. 2010, 'Community of practice', *Professional Safety*, vol. 55, pp. 46–51.

Magal, S. & Word, J. 2012, *Integrated Business Processes with ERP Systems*, John Wiley.

Maguire, S., Ojiako, U. & Said, A. 2010, 'ERP implementation in Omantel: a case study', *Industrial Management & Data Systems*, vol. 110, pp. 78–92.

Mandal, P. & Gunasekaran, A. 2003, 'Issues in implementing ERP: a case study', *European Journal of Operational Research*, vol. 146, pp. 274–83.

Marabelli, M. & Newell, S. 2009, 'Organizational learning and absorptive capacity in managing ERP implementation projects' *International Conference on Information Systems*, AIS, pp.1-19

Marabelli, M. & Newell, S. 2013, 'Knowledge creation and ES implementation: the absorptive capacity lens' *Thirty Fourth International Conference on Information Systems,* 2013 Milan. AIS Electronic Library.

Marabelli, M., Rajola, F., Frigerio, C. & Newell, S. 2013, 'Managing knowledge in large-scale virtual projects: a community-based approach', *International Journal of Managing Projects in Business*, vol. 6, pp. 310–31.

Marcus, A. & Gould, E. W. 2000, 'Crosscurrents: cultural dimensions and global web user-interface design', *Interaction,* July–August.

Markus, M. L. 1983, 'Power, politics, and MIS implementation', *Communications of the ACM*, vol. 26, pp. 430–44.

Markus, M. L., Petrie, D. & Axline, S. 2000, 'Bucking the trends:what the future may hold for ERP packages', *Information System Frontiers*, vol. 2, pp. 181–93.

Markus, M. L. & Tanis, C. 2000, *The enterprise systems experience—from adoption to success,* in Framing the Domains of IT Management: Projecting the Future through the Past, ed. R. W. Zmud, Pinnaflex Educational Resources, Cincinnati, OH.

Markus, M. L., Tanis, C. & Van Fenema, P. C. 2000, 'Enterprise resource planning: multisite ERP implementations', *Communications of the ACM*, vol. 43, pp. 42–106.

Marshall, M. N. (1996). 'Sampling for qualitative research'. *Family practice*, vol.13, pp. 522-526.

McDermott, R. 1999, 'Learning across teams: how to build communities of practice in team organizations', *Knowledge Management Review*, vol. 8, pp. 6-21

McGinnis, T. C. & Huang, Z. 2007, 'Rethinking ERP success: a new perspective from knowledge management and continuous improvement', *Information & Management*, vol. 44, pp. 626–34.

Merriam, S. B. 1998, *Qualitative Research and Case Study Applications in Education[2nd edition]* San Francisco:Jossey-Boss.

Monk, E. & Wagner, B. 2006, *Concepts in Enterprise Resource Planning*, Thomson Course Technology, Boston, MA.

Moon, Y. B. 2007, 'Enterprise resource planning ERP: a review of the literature', *International Journal of Management and Enterprise Development*, vol. 4, pp. 235–64.

Morris, M. G. & Venkatesh, V. 2010, 'Job characteristics and job satisfaction: understanding the role of enterprise resource planning system implementation', *MIS Quarterly*, vol. 34, pp. 143–61.

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*, vol. 28, pp. 391–402.

Motiwalla, L. F. & Thompson, J. 2011, *Enterprise Systems for Management*, Prentice Hall Pearson, Upper Saddle River, New Jersey.

Motwani, J., Mirchandani, D., Madan, M. & Gunasekaran, A. 2002, 'Successful implementation of ERP projects: evidence from two case studies', *International Journal of Production Economics*, vol. 75, pp. 83–96.

Muscatello, J. R. & Parente, D. H. 2008, *A post-implementation case study and review of enterprise resource planning (ERP) implementations*. In: KHOSROW-POUR, M. (ed.) Innovative Technologies for Information Resources Management.

Nah, F. F.-H. & Delgado, S. 2006, 'Critical success factors for enterprise resource planning implementation and upgrade', *Journal of Computer Information Systems*, vol. 47, pp. 99-113.

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*, vol. 16, pp. 5–22.

Nandhakumar, J. & Jones, M. 1997, 'Too close for comfort? Distance and engagement in interpretive information systems research', *Information Systems Journal*, vol. 7, pp. 109–31.

Nandhakumar, J., Rossi, M. & Talvinen, J. 2005, 'The dynamics of contextual forces of ERP implementation', *The Journal of Strategic Information Systems*, vol. 14, pp. 221–42.

Neumann, W. L. 2003, *Social Research Methods: Qualitative and Quantitative Approaches*, 5th edn. Boston: Pearson Education.

Nicolaou, A. I. 2004a, 'ERP systems implementation: drivers of post-implementation success', *Decision Support in an Uncertain and Complex World: The IFIP TC8/WG8. 3 International Conference*, Prato,Italy. pp. 589–97.

Nicolaou, A. I. 2004b, 'Quality of postimplementation review for enterprise resource planning systems', *International Journal of Accounting Information Systems*, vol. 5, pp. 25–49.

O'Kane, J. F. 2001, 'ERP implementation and cultural influence: a case study', *2nd World Conference on POM*, Cancun, Mexico.

Orlikowski, W. J. 2010, 'The sociomateriality of organisational life: considering technology in management research', *Cambridge Journal of Economics*, vol. 34, pp. 125–41.

Orlikowski, W. J. & Baroudi, J. J. 1991, 'Studying information technology in organizations: research approaches and assumptions', *Information Systems Research*, vol. 2, pp. 1–28.

Orlikowski, W. J.& J. D. Hofman. 1997. 'An improvisational model for change management: The case of groupware technologies'. *Sloan Management Review* vol 38 _2, pp 11–21.

Orr, J. 1990, *Sharing knowledge, celebrating identity: community memory in a service culture*, *in Collective Remembering*, 2nd ed., ed. D. E. Middleton, Sage Publications.

Orr, J. 1996, *Talking about Machines: An Ethnography of a Modern Job*, Cornell University Press, Ithaca and London.

Orr, J. E. 1986, 'Narratives at work: story telling as cooperative diagnostic activity', *Proceedings of the 1986 ACM Conference on Computer-Supported Cooperative Work*, ACM, pp. 62–72.

Örtenblad, A. 2001, 'On differences between organizational learning and learning organization', *The Learning Organization*, vol. 8, pp. 125–33.

Pan, S. L. & Leidner, D. E. 2003, 'Bridging communities of practice with information technology in pursuit of global knowledge sharing', *The Journal of Strategic Information Systems*, vol. 12, pp. 71–88.

Panorama 2013, *ERP Report: A Panorama Consulting Solutions Research Report*. Panorama Consulting, Denver, CO.

Paré, G. & Elam, J. J. 1997, *Using Case Study Research to Build Theories of IT Implementation*, Springer.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* . SAGE Publications, inc.

Pentland, BT. 2003, 'Sequential variety in work processes', *Management Science*, vol 14, pp. 528-540

Peppard, J. & Ward, J. 2005, 'Unlocking sustained business value from IT investments', *California Management Review*, vol. 48, pp.52-70.

Peslak, A. R., Subramanian, G. H. & Clayton, G. E. 2007, 'The phases of ERP software implementation and maintenance: a model for predicting preferred ERP use', *Journal of Computer Information Systems*, vol. 48, pp. 25-31.

Plant, R. & Willcocks, L. 2007, 'Critical success factors in international ERP implementations: a case research approach', *Journal of Computer Information Systems*, vol. 47, pp.60-70.

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*, vol. 115, pp. 72–85.

Poston, R. & Grabski, S. 2001, 'Financial impacts of enterprise resource planning implementations', *International Journal of Accounting Information Systems*, vol. 2, pp. 271–94.

Ragowsky, A., Adams, S. & Somers, T. M. 2005, 'Assessing the value provided by ERP applications through organizational activities', *Communications of the Association for Information Systems*, vol. 16, pp. 381-405.

Rait, E. 1995. *Against the current: Organizational learning in schools*. In: Bacharcha, S. B. & Mundell, B. (eds.) Images of schools: Structures and roles in organizational behaviour. CA: Crowin Press, Inc Thousand Oaks.

Ram, J., Corkindale, D. & Wu, M-L. 2013a, 'Enterprise resource planning adoption: structural equation modeling analysis of antecedents', *Journal of Computer Information Systems*, vol. 54, pp. 53–65.

Ram, J., Corkindale, D. & Wu, M.-L. 2013b, 'Implementation critical success factors (CSFs) for ERP: do they contribute to implementation success and post-implementation performance?', *International Journal of Production Economics*, vol. 144, pp. 157–74.

Ramchand, A. & Pan, S. L. 2012, 'The co-evolution of communities of practice and knowledge management in organizations', *ACM SIGMIS Database*, vol. 43, pp. 8–23.

Rikhardsson, P. & Kræmmergaard, P. 2006, 'Identifying the impacts of enterprise system implementation and use: examples from Denmark', *International Journal of Accounting Information Systems*, vol. 7, pp. 36–49.

Roberts, N., Galluch, P. S., Dinger, M. & Grover, V. 2012, 'Absorptive capacity and information systems research: review, synthesis, and directions for future research', *MIS Quarterly*, vol. 36, pp.325-355.

Robey, D., Boudreau, M.-C. & Rose, G. M. 2000, 'Information technology and organizational learning: a review and assessment of research', *Accounting, Management and Information Technologies*, vol. 10, pp. 125–55.

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*, vol. 19, pp. 17–46.

Robinson, V. 1995, 'Organisational learning as organisation problem-solving', *Leading and Managing*, vol. 1, pp. 63–78.

Robinson, V. M. 2001, 'Descriptive and normative research on organizational learning: locating the contribution of Argyris and Schön', *International Journal of Educational Management*, vol. 15, pp. 58–67.

Rodecker, R. & Hess, T. J. 2001, 'User satisfaction with enterprise resource planning systems: the effect of user knowledge and involvement, training, and locus of control', *Seventh American Conference on Information Systems*, Boston.

Rogers, E. 2003, *Diffusion of Innovation*, Free Press, New York.

Ross, J. W. & Vitale, M. R. 2000, 'The ERP revolution: surviving vs. thriving', *Information System Frontiers*, vol. 2, pp. 233–41.

Ruivo, P., Oliveira, T. & Neto, M. 2012, 'ERP use and value: Portuguese and Spanish SMEs', *Industrial Management & Data Systems*, vol. 112, pp. 1008–25.

Sangster, A., Leech, S. A. & Grabski, S. 2009, 'ERP implementations and their impact upon management accountants', *JISTEM Journal of Information Systems and Technology Management*, vol. 6, pp. 125–42.

Scheer, A.-W. & Habermann, F. 2000, 'Enterprise resource planning: making ERP a success', *Communications of the ACM*, vol. 43, pp. 57–61.

Schenkel, A. & Teigland, R. 2008, 'Improved organisational performance through communities of practice', *Journal of Knowledge Management*, vol. 12, pp. 831-840.

Schwandt, D. & Marquardt, M. J. 1999, *Organizational learning*, CRC Press, Florida.

Scott, J. E. & Vessey, I. 2000, 'Implementing enterprise resource planning systems: the role of learning from failure', *Information Systems Frontiers*, vol. 2, pp. 213–32.

Sein, M. K., Bostrom, R. P. & Olfman, L. 1999, 'Rethinking end-user training strategy: applying a hierarchical knowledge-level model', *Journal of End User Computing*, vol. 11, pp. 32.

Sein, M. K., Olfman, L. & Bostrom, R. P. 1987, 'Training end users to compute: cognitive, motivational and social issues', *INFOR*, vol. 25, pp. 236–55.

Sein, M. K. & Santhanam, R. 1999, 'Research report: learning from goal-directed error recovery strategy', *Information Systems Research*, vol. 10, pp. 276–85.

Senge, P. 1990, *The Fifth Discipline*, Doubleday, New York.

Shang, S. & Seddon, P. B. 2002, 'Assessing and managing the benefits of enterprise systems: the business manager's perspective', *Information Systems Journal*, vol. 12, pp. 271–99.

Shang, S. & Seddon, P. B. 2007, 'Managing process deficiencies with enterprise systems', *Business Process Management Journal*, vol. 13, pp. 405–16.

Shanks, G., Parr, A., Hu, B., Corbitt, B., Thanasankit, T. & Seddon, P. 2000, 'Differences in critical success factors in ERP systems implementation in Australia and China: a cultural analysis', 8*th European Conference on Information Systems*, Vienna ,Austria, (2000).

Shehab, E., Sharp, M., Supramaniam, L. & Spedding, T. A. 2004, 'Enterprise resource planning: an integrative review', *Business Process Management Journal*, vol. 10, pp. 359–86.

Sheu, C., Chae, B. & Yang, C.-L. 2004, 'National difference and ERP implementation: issues and challenges', *The International Journal of Management Science*, vol. 32, pp. 361–71.

Sheu, C., Yen, H. R. & Krumwiede, D. W. 2003, 'The effect of national differences on multinational ERP implementation: an exploratory study', *Total Quality Management & Business Excellence*, vol. 14, pp. 641-657.

Sia, S. K., Tang, M., Soh, C. & Boh, W. F. 2002, 'Enterprise resource planning systems as a technology of power: empowerment or panoptic control?', *The Database for Advances in Information Technology Systems*, vol. 33, pp.23-37.

Snell, R. & Chak, A. M.-K. 1998, 'The learning organization: learning and empowerment for whom?', *Management Learning*, vol. 29, pp. 337-364.

Snider, B., Da Silveira, G. J. & Balakrishnan, J. 2009, 'ERP implementation at SMEs: analysis of five Canadian cases', *International Journal of Operations & Production Management*, vol. 29, pp. 4–29.

Snyder, W. M. & Wenger, E. 2010. Our world as a learning system: a communities-of-practice approach. Social Learning Systems and Communities of Practice. Springer.

Soh, C. & Sia, S. K. 2004, 'An institutional perspective on sources of ERP package: organisation misalignments', *The Journal of Strategic Information Systems*, vol. 13, pp. 375–97.

Somers, T. M., Nelson, K. & Karimi, J. 2003, 'Confirmatory factor analysis of the end-user computing satisfaction instrument: replication within an ERP domain', *Decision Sciences*, vol. 34, pp. 595-621.

Spathis, C. & Constantinides, S. 2003, 'The usefulness of ERP systems for effective management', *Industrial Management and Data Systems*, vol. 103, pp. 677-685.

Spencer, K. L., Hylton Rushton, C., Rumizen, M. C. & McDermott, R. 2003, 'Sustaining change with communities of practice', *Knowledge Management Review*, vol. 6, pp. 24–7.

Staehr, L. 2010, 'Understanding the role of managerial agency in achieving business benefits from ERP systems', *Information Systems Journal*, vol. 20, pp. 213–38.

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, vol. 13, pp. 424–65.

Stijn, E. V. & Wensley, A. 2005, 'ERP's best practices and change: an organizational memory mismatch approach'. *In Proceedings of the Thirteenth European Conference on Information Systems, Regensburg, Germany*.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.). Thousand Oaks, CA: Sage.

Sudzina, F., Pucihar, A. & Lenart, G. 2011, 'A comparative study of the impact of ERP systems implementation on large companies in Slovakia and Slovenia, in *Enterprise Information Systems, Pt 1*, eds M. M. Cruzcunha, J. Varajao, P. Powell & R. Martinho, Springer, New York.

Teo, L. K. Y., Singh, M. & Cooper, V. 2010, 'The impacts of organizational learning and innovation on enterprise systems benefits of Australian organizations', I*n Proceedings of the 16th Americas Conference on Information Systems*, D. E. Leidner and J. J. Elam (eds.),Lima, Peru, August 12-15

Themistocleous, M., Irani, Z., O'Keefe, R. M. & Paul, R. 2001, 'ERP problems and application integration issues: an empirical survey', *Proceedings of the 34th Hawaii International Conference on System Sciences* (Sprague RH, Ed.), Maui, Hawaii.

Thompson, M. 2005, 'Structural and epistemic parameters in communities of practice', *Organization Science*, vol. 16, pp. 151–64.

Tomblin, M. S. 2010, 'Theory development in enterprise systems and organizational learning', *Journal of Organizational Computing and Electronic Commerce*, vol. 20, pp.398-416.

Torbert, W. R. 1994, 'Managerial learning, organizational learning: a potentially powerful redundancy', *Management Learning*, vol. 25, pp. 57–70.

Trauth, E. M. 2001, *Qualitative Research in International Settings: Issues and Trends*, IGI Global, London.

Tsai, W.-H. & Hung, S.-J. 2008, 'E-commerce implementation: an empirical study of the performance of enterprise resource planning systems using the organizational learning model', *International Journal of Management*, vol. 25, pp. 348–52.

Umble, E. J., Haft, R. R. & Umble, M. M. 2003, 'Enterprise resource planning: implementation procedures and critical success factors', *European Journal of Operational Research*, vol. 146, pp. 241–57.

Utecht, K. M., Hayes, R. B. & Okonkwo, P A. 2004, 'Enterprise resource planning and the competitive advantage: the ease of integrating information between corporate headquarters in the United States and factories in Mexico', *Competitiveness Review*, vol. 14, pp. 13-17

Vandaie, R. 2008, 'The role of organizational knowledge management in successful ERP implementation projects', *Knowledge-Based Systems*, vol. 21, pp. 920–6.

Vathanophas, V. 2007, 'Business process approach towards an inter-organizational enterprise system', *Business Process Management Journal*, vol. 13, pp. 433–50.

Venugopal, C. & Rao, K. S. 2011, 'Learning from a failed ERP implementation: a case study research', *International Journal of Managing Projects in Business*, vol. 4, pp. 596–615.

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*, vol. 13, pp. 305–28.

Walsham, G. 1993, *Interpreting Information Systems in Organizations*, John Wiley & Sons, New York, NY, USA.

Walsham, G. 1995, 'Interpretive case studies in IS research: nature and method', *European Journal of Information Systems*, vol. 4, pp. 74–81.

Walsham, G. 2006, 'Doing interpretive research', *European Journal of Information Systems*, vol. 15, pp. 320–30.

Wang, E., Chou, H.-W. & Jiang, J. 2005, 'The impacts of charismatic leadership style on team cohesiveness and overall performance during ERP implementation', *International Journal of Project Management*, vol. 23, pp. 173–80.

Wang, P. & Ramiller, N. C. 2009, 'Community learning in information technology innovation', *MIS Quarterly*, vol. 33, pp. 709–34.

Wei, C.-C., Chien, C.-F. & Wang, M.-J. J. 2005, 'An AHP-based approach to ERP system selection', *International Journal of Production Economics*, vol. 96, pp. 47–62.

Wenger, E. 1998, *Communities of Practice: Learning, Meaning, and Identity*, Cambridge University Press, Cambridge, United Kingdom.

Wenger, E. 2000, 'Communities of practice and social learning systems', *Organization*, vol. 7, pp. 225–46.

Wenger, E. 2004, 'Knowledge management as a doughnut: shaping your knowledge strategy through communities of practice', *Ivey Business Journal*, vol. 68, pp. 1–8.

Wenger, E., McDermott, R. & Snyder, W. 2002, *Cultivating Communities of Practice*, Harvard Business School Press, Cambridge, United Kingdom

Wheatly, M. 2000, 'ERP training stinks', *CIO Magazine.* 'Viewed [10th April, 2013] http://www.cio.com/article/148900/ERP_Training_Stinks'.

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*, vol. 19, pp. 13–29.

Xu, H., Nord, J. H., Brown, N. & Nord, G. D. 2002, 'Data quality issues in implementing an ERP', *Industrial Management and Data Systems*, vol. 102, pp. 47–58.

Xue, Y., Liang, H., Boulton, W. R. & Snyder, C. A. 2005, 'ERP implementation failures in China: case studies with implications for ERP vendors', *International Journal of Production Economics*, vol. 97, pp. 279–95.

Yen, H. R. & Sheu, C. 2004, 'Aligning ERP implementation with competitive priorities of manufacturing firms: an exploratory study', *International Journal of Production Economics*, vol. 92, pp. 207-220.

Yin, R. K. 1998, *The Abridged Version of Case Study Research: Design and Method*. Thousand Oaks, CA:Sage.

Yin, R. K. (2002). *Case study research: Design and methods (3rd ed.).* Thousand Oaks, CA:Sage. California, New Delhi, London, Singapore.

Yin, R. K. 2009, *Case Study Research: Design and Methods*, Sage, California, New Delhi, London, Singapore.

Yi, M.Y. and Davis, F.D. (2003). Developing and validating an observational learning model of computer software training and skill acquisition, Information System Research, vol. 14, pp. 146-169.

Yu, C.-S. 2005, 'Causes influencing the effectiveness of the post-implementation ERP system', *Industrial Management & Data Systems*, vol. 105, pp. 115–32.

Zboralski, K. 2009, ‘Antecedents of knowledge sharing in communities of practice’, *Journal of Knowledge Management*, vol. 13, pp. 90–101.

Zhang, Z., Lee, M. K. O., Huang, P., Zhang, L. & Huang, X. 2005, ‘A framework of ERP systems implementation success in China: an empirical study’, *International Journal of Production Economics*, vol. 98, pp. 56–80.

Zygmont, J. 1999, ‘Mixmasters find an alternative to all in-one ERP software’, *Datamation*. 'Viewed [10th January 2013] http://www.datamation.com/erp/article.php/608181/Mixmasters-find-an-alternative-to-all-in-one-ERP-software.htm'