

**UNIVERSITY OF KWAZULU-NATAL**

**ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM IMPLEMENTATION IN  
A CONTRACTING AND CONSTRUCTION COMPANY**

**By**

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degree of Master of Business Administration**

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## **Dedication**

To my wife and kids

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## **Abstract**

In quest of sustainable competitive advantage, firms around the globe are increasingly turning to survival strategies founded in Information Systems (IS). It is arguable, Information Systems that are in alignment with business processes add immensely to a firm's value chain. Among the plethora of IS solutions available, the last 20 years has witnessed many companies invest heavily in Enterprise Resource Planning systems (ERP) with the intention of integrating their business processes under one common database. The ERP adoption trend is expected to rise on account of the impact of such technological break-throughs as cloud computing on affordability. ERP systems, when implemented correctly and to best practice, can make a positive impact on a firm's efficiencies, effectiveness and ultimately the bottom line. Sadly in spite of their value propositions and over 2 decades of maturity as products, ERP systems are still notorious for high system usage and implementation failure. In some quoted cases, these systems, often touted as the panacea to business pain during sales cycles, have paralysed adopting organisations to the point of bankruptcy. Against the depressing failure rates of ERP projects, this study aimed to establish factors that are critical to the successful rollout of ERPs. In addition the current study sought to determine company-specific factors militating against ERP project success in the target organisation as well as establishing change management effort required to turn around ERP outcomes. To ensure validity and reliability, a mixed method study was conducted. The method comprised a critical review of contemporary ERP literature as well a quantitative and qualitative census survey targeting 148 employees of the organisation studied. The study found some fundamental gaps, largely of a people nature, in ERP implementation methodologies of the company studied. These cracks, if unmanaged, cumulatively contribute to ERP project opposition and consequently failure. There are however solutions to address the identified gaps and these include but are not limited to change management, injection of top management support to ERP endeavours, business processes modelling and re-engineering before new ERP systems are implemented and an all-inclusive selection process of an ERP system or combination of systems with the most fit and alignment to current and future business processes.

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# **Chapter 1**

## **Introduction**

### **1.1 Introduction and Background**

This chapter presents a concise background of the study, defines the Enterprise Resource Planning Systems (ERPs), and spells out the objectives, research questions and research problem. The failure rates of ERPs implementation and the significance of the study are given. Finally, the scope of the study, outline of the thesis chapters and the summary are provided.

The world has become a one flat ultra-competitive market space (Baltzan and Phillips, 2008). In this environment, characterised by intense global rivalry, firms are forced to craft and implement sustainable strategies which move them from bloody red oceans into profitable uncontested blue oceans (Kim and Mauborgne, 2015). Among the plethora of vehicles available, an increasing number of firms are turning to strategies founded in information systems (IS) in order to continuously improve business processes on their value chains (Baltzan and Phillips, 2009). The Information Technology (IT) and business divide of the past is being replaced by IT/Business alignment and common line of sight (Hough, 2011). ERPs represent one of the widely adopted information systems in the world of commerce as measured by market share (Pang et al., 2014).

Finney and Corbett (2007) defined ERPs as integrated and packaged software solutions that facilitate seamless information flows throughout a company, such as Financials, Supply Chain, Human Resources, Operations, Maintenance, Customer Relations Management and Business Intelligence. Organisations around the globe have been adopting and implementing ERPs since the early 1990s as part of their information systems driven business-enablement strategies (Hong and Kim, 2002). ERP systems have largely replaced home-grown and silo-based legacy systems and they provide the potential for substantial business benefits if properly implemented (Zeng and Skibniewski, 2013).

Although ERP systems have matured for over two decades with latest trends being cloud-based models such as Software as a Service (SaaS) and Platform as a Service (PaaS), they are still characterised by high implementation process and system usage failure (Zeng and Skibniewski, 2013). According to the Panorama Consulting (2014) ERP Report, 54% of ERPs surveyed recorded cost overruns, 72% suffered durations overruns, while a staggering 60% of ERP adopting organisations received less than 50% of expected benefits pre-stated in business cases. The Standish Group, in its Chaos report, puts the ERP failure rate at a catastrophic 84% (Standish, 2014). In extreme cases, such failures have bankrupted adopting organisations on account of disabling mission-critical business processes (Glass, 2006, Chung et al., 2015). This high failure rate and the consequent risk are causes for concern because ERP implementations represent complexity, huge capital outlays, long durations and failure has negative impact not only on the payback criteria, but also the very business value chains it is meant to streamline (Consulting, 2014). Even more worrying is the fact that rescuing troubled implementations almost always costs in excess of 3 times more than the initial budget allocated to the ERP project (Williams, 2011). There is therefore a need for a study that investigates critical success factors as well as change management required to ensure better chances of future ERP implementation success.

## **1.2 Rationale for the Study**

The lack of a strategy supportive and well implemented ERP system is a perennial pain point for Teichmann Plant Hire (Pty) Ltd. Whereas competitors in the construction and contracting industries are deriving competitive and distinct advantages from their information and communications systems, the same cannot be said of the organisation under review. This organisation's current information systems are not integrated, exhibit excessive redundancy, cause job dissatisfaction among users, do not present a single version of the truth and as such slow down the business's speed to the markets. In light of this, it is the researcher's submission that a research based enquiry be conducted to unearth the root causes of the systems failure and offer solutions to avert future catastrophes. The results will be of significance not only to Teichmann Plant Hire, but also the Teichmann Group and other organisations in the contracting and construction industry which are facing the same predicaments.

ERP systems implementation represents massive effort, time, capital and other opportunity costs. As such, this research could go a long way in ensuring the organisation pays careful attention at steering away from critical failure factors. To the best of the researcher's knowledge, no research of this nature has ever been conducted in the history of Teichmann. Only subjective, untested and often biased reasons are advanced for failed ERP systems implementation. Through this study, organisations in the contracting and construction industry would be equipped with the right tools to manage risk factors in their ERP implementations and in the process, realise the full benefits of super-charging their value chains with an ERP system asset.

### **1.3 Problem Statement**

Teichmann Plant Hire (Pty) Limited is a South African entity formed in 1995 with the brand mantra of "Born in Africa to meet the challenges of Africa". The company has a very strong African footprint and presently runs lucrative contracts in the Democratic Republic of Congo (DRC), Zambia, Mozambique, Namibia and to a lesser extent, South Africa. As a result of an in-grained entrepreneurial culture, the organisation's business portfolio is diverse. Currently, its flagship businesses are construction, contracting and internal plant hire to affiliates under the Teichmann Group umbrella. Following massive business growth and realization of the need for efficiency and effectiveness across Teichmann value chains, there is stakeholder unanimity on the need for an enterprise-wide ERP system to, among other things, address the following business imperatives: better planning and management of organisational resources, improvement of business performance and the bottom-line, as well as the better integration of business operations given a distributed business model.

However, it is important to note that despite the unanimity and common purpose, internal sources revealed that the organisation has experienced two disastrous ERP project failures in the past decade namely the Ventyx Ellipse 6.3.2 and Pastel Evolution ERP implementations. Little is factually known about the root cause of the failed ERP implementations yet within the course of the 2015 financial year and before failure factors are addressed, the business intends to embark on a third ERP

attempt. Sage X3 ver 7, SAP Business all in One and Microsoft Dynamics are the firm's favourites.

Given the above background information, this research aims to unearth the underlying causes of failing ERP acquisitions and implementations in Teichmann Plant Hire (Pty) Ltd. In other words, the study aims to answer why the organisation is not realizing ERP benefits as stipulated in its business cases / project charters. Already, two successive implementations have failed to meet business expectations and exceeded both budget and timeframes.

#### **1.4 Focus of the Study**

This study will be conducted within a single organisation Teichmann Plant Hire (Pty) Ltd. The organisation is headquartered in Durban, South Africa, and has one branch in Namibia as well as another one in Zambia. The Zambian branch's sphere of influence extends to the Democratic Republic of Congo (DRC). Similarly, the main entity in South Africa has some business interests in Mozambique through joint ventures.

#### **1.5 Research Objectives**

This thesis seeks to shape the future of ERPs implementation in the construction and contracting industry and possibly on a global basis. The main focus of the study is to gain more understanding and insight in ERPs processes by exploring and identifying factors decisive for facilitating working and lasting business solutions. The specific objectives for undertaking the study are as follows:

1. To establish Critical Success Factors (CSFs) of ERP implementations.
2. To determine the causes of failure of ERP implementations in the Teichmann Plant Hire (Pty) context.
3. To establish change management initiatives required to ensure flawless execution in future ERP implementations.

## **1.6 Research Questions**

1. What are the Critical Success Factors of ERP system implementations?
2. What are the causes of ERP implementation failure in Teichmann Plant Hire (Pty) Ltd?
3. What change management initiatives are required to enhance ERP implementation success rates?

## **1.7 Significance of the Study**

The study has both managerial and theoretical contributions. Through a study of this nature, managers would be better equipped to steer away from ERP critical failure factors, thus ensuring better ERP outcomes in business. This is significant, especially given the size, duration and cost dimensions of ERP systems as well as the growing need for amassing as much competitive advantages as possible. Theoretically, the study would also add to the existing body of knowledge in the field of ERP critical success factors (CSFs). In the past, researchers have merely stated/listed ERP CSFs without going the extra mile of empirically testing them for criticality.

Key stakeholders who will benefit from this study include management, employees, suppliers and customers. Benefits for Teichmann management would be realised through the company's ability to have an enterprise-view of the business, better internal controls, quicker and more informed decision making, faster return on ERP investment, as well as regulatory compliance to entities such as South Africa Revenue Services (SARS). Future successful ERP implementations could also translate into easier and faster work methods for Teichmann employees. Currently, employees are working in multiple disintegrated systems to achieve their job outcomes and this has proved to be a silent source of job-dissatisfaction and disengagement as simple tasks are performed in convoluted cycles (Robbins et al., 2013). Assuming an all-inclusive successful ERP system rollout, external stakeholders such as suppliers and customers would also benefit in the sense of better coordination and collaboration. ERPs would enable mutually beneficial linkages in the form of Business to Business (B2B) or Business to Customer (B2C) integrations (Baltzan and Phillips, 2008).

## **1.8 Methodology in brief**

To ensure validity, reliability and generalizability of research results, a mixed method research design was employed. This combined a census survey targeted at all 148 employees of Teichmann Plant Hire (Pty) Ltd with critical literature review. In the census all 148 subjects in the population were afforded an equal chance to partake in the study. Using a census approach the possibility of Type I or Type II sampling errors were eliminated (Wegner, 2010). The quantitative census survey was conducted via a structured questionnaire instrument. On account of the wide geographical spread of target respondents, the researcher distributed both the questionnaire and informed consent letter electronically via QuestionPro, an online survey portal. Data from QuestionPro was then exported to Microsoft Excel 2013 before being imported into SPSS for statistical analysis. Chapter three covers the research methodology in greater detail.

## **1.9 Chapter outline**

The research is organised into five chapters. Chapter two provides the theoretical basis of the study in the form of literature review. The chapter explains CSFs in an ERP implementation. In addition, it will also review change management efforts required to turn-around ERP failures and mitigate implementation risks. Research methodology is presented in Chapter three where the research design and sampling approach are explained and justified. Furthermore, issues of data collection, the instrument to be employed, testing of the instrument and statistical methods for analysing collected data are articulated. Chapter four is the presentation and analysis of research results. The Statistical Package for Social Sciences (SPSS) has been used to analyse statistical data. In the end, Chapter five provides summarised evidence to prove that research questions have been adequately answered. The chapter highlights the research benefits, the researcher's recommendations on the business, an overview of inherent study limitations and recommended future work on the ERP failure subject.

## **1.10 Summary**

This chapter introduced ERP systems and highlighted their benefits to business strategic road-maps. Again, the high stakes of poor implementations were also highlighted. The research objectives and their accompanying questions, as well as the significance of the study are clearly indicated in this chapter. The next chapter provides the theoretical basis underpinning this research.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

The rate of failing ERP systems and Information Technology (IT/IS) projects remains very high. The failures leave trails of financial, operational and reputational disasters; thus the need to investigate the root causes in order to endeavour to reverse the depressing trend. In a research covering the periods 2010 to 2013, at least 56% of respondent organisations received less than half of their anticipated business benefits from ERP initiatives (Consulting, 2014). From the same study, the majority of organisations surveyed experienced 62% and 60% overruns in ERP duration and ERP budget respectively (Consulting, 2014). The Standish Group, in its Chaos Report, puts the average success rate of ERP system implementations at a concerning 16.2% and further argues that reported failures are only a tip of the iceberg since most ERP failures are not published but simply ~~deleted~~ (Glass, 2006). Some authorities have drawn parallels between ERP implementations and train wrecks while others have concluded that it is easier to put up real engineering structures such as bridges than it is to deliver ERP implementations on time, budget and to original specified requirements (Rubinstein, 2007). It is therefore the aim of this chapter to review literature on the underlying causes of high ERP failure.

The review of literature takes the form of identification and analysis of Critical Success Factors (CSF) throughout all phases of an ERP system implementation cycle. In addition, domains within ERP implementing organisations that require change management will be highlighted and investigated. The chapter begins with the prevailing forces of globalisation, the need for competitive advantage and the strategic role of business enabling Information Systems. Evolution of ERP systems is then presented before major ERP Critical Success Factors and Change Initiatives are analysed.

## **2.2 Business Information Systems**

The world has become flat because of advances in technology and its power to connect global communities (Friedman, 2006). In today's globalised 3.0 era, web platforms have enabled information sharing, collaboration and knowledge management by eliminating the traditional barriers of distance, language, geography and time (Friedman, 2006). With globalisation forces at play, individuals and companies are redefining their sources of rivalry. On an individual scale, the labour market has, for instance, taken an international outlook through such strategies as global sourcing of skills. Similarly, in a global village, more external competitive pressures are being exerted on firms, necessitating crafting of winning strategies that can sustain competitive advantages or make competition irrelevant (Hough, 2011).

Partly in response to globalization and its impact on business dynamics, most companies have turned to technological innovations by investing heavily in management information systems (MIS) to drive various aspects of their value chains (Baltzan and Phillips, 2008). Information and communications technologies are increasingly seen as business strategy enablers and rich platforms for creating and sustaining competitive advantages in fast-paced and changing red oceans characterised by bloody jockeying for market positions (Kim and Mauborgne, 2004). In fact, world-class enterprises of tomorrow are built on world-class Information Systems built today more so where business and IT are in alignment (Luftman, 2003).

### ***2.2.1 Business Decision Making***

According to Michael Porter, companies enter markets with distinctive strategies that set them apart from rivals and yield durable competitive advantages (Hough, 2011). The competitive advantages can broadly take the dimension of overall cost leadership, differentiation or focused niche (Jones et al., 2010). To attain sustainable competitive advantage, managers must be able to craft, align and execute winning strategies and this requires effective decision making and forecasting of future business needs and requirements. In today's information age, managers are over-loaded with information volumes and yet challenged to make

very complex decisions within acutely limited timeframes. There is significant value in companies harnessing the power of Information Systems across their value chains. Thus, organisations under environmental pressures are increasingly turning to Information Systems at all levels as depicted in Figure 2.1.

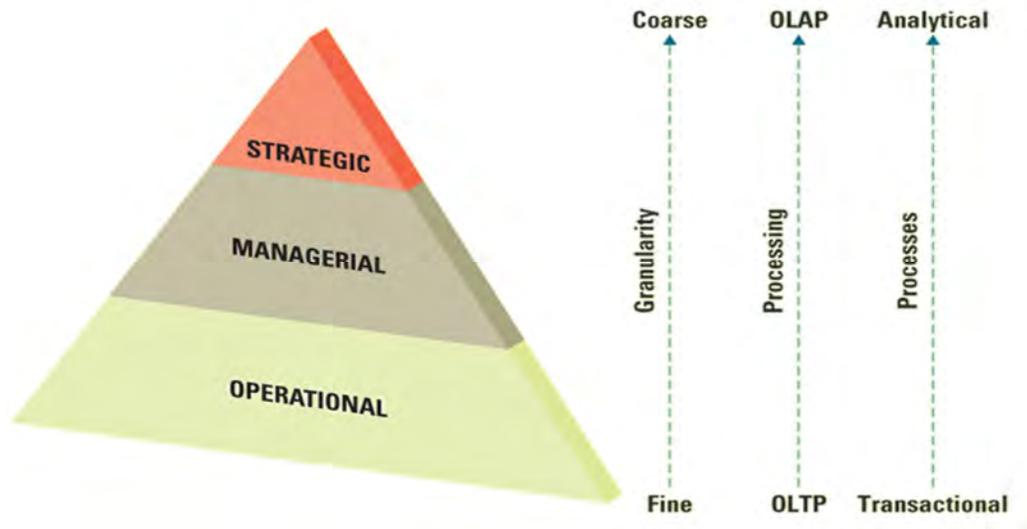


Figure 2.1: Enterprise Information Levels

Source: BALTZAN, P. & PHILLIPS, A. 2008. Business driven information systems, McGraw-Hill/Irwin.

### **2.2.2 Information Levels and Information System types**

As shown in Figure 2.1, organisations are typically divided into 3 levels and each of these layers has different requirements from information systems on account of the nature of decision made at each level on the hierarchy. Each of the 3 levels is discussed briefly hereunder.

- Operational . This level of the organisation makes recurring decisions of a structured type. It comprises company staff up to and including junior management. Information systems at this level are largely of a transaction processing nature (Fine granularity, OLTP etc.) and measure key performance indicators centred around business efficiencies (Baltzan and Phillips, 2008).

- **Managerial** . This set of managers is after business intelligence and comprises middle level managers right up to Directors. They make semi-structured as well as ad-hoc decisions. Among others, their performance metrics focus on critical success factors and business effectiveness. Information systems at this layer include Decision Support Systems (Baltzan and Phillips, 2008).
- **Strategic** . At this level, the vision, mission and strategic objectives of the business are determined. This group of leaders paint a high resolution picture of the future and use it to energise and excite their followers to implement. Decisions made at this level are largely long term in nature, highly unstructured and draw their input from the company's external environment (Industry analysis, PESTEL analysis etc.). Executive level managers need knowledge and analytics from information systems and this is satisfied by Executive Information Systems supported by emerging trends such as Artificial Intelligence (AI) (Baltzan and Phillips, 2008).

### **2.2.3 Definition and History of ERPs**

Faced with mounting competitive pressures and radically changing environments, many firms around the world have taken radical shifts in their Information Systems strategies since the mid-1990s (Kyung-Kwon and Young-Gul, 2002). There has been an increasing trend for firms to concentrate on their core businesses and outsource information system functions to other firms with requisite competencies and competitive advantages. This trend has witnessed firms moving away from in-house application development to purchasing strategic application packages such as Enterprise Resource Planning Systems (Laudon and Laudon, 2011). In addition, the rapid pace of technological developments has enabled such strategies as for example, SaaS (Software as a Service), IaaS (Infrastructure as a Service), PaaS (Platform as a Service) and Cloud Computing. With these developments, firms of all sizes can now capitalise on the benefits of information systems without necessarily owning the underlying systems and/or infrastructure or incurring huge capital outlays (Consulting, 2014). In other words the options and implementation models available to the firm have widened from the traditional on-premise models to subscription models, resulting in growth of the ERP global footprint.

### 2.2.4 Global ERP Market

Globally, the ERP market growth rate has stagnated. According to Gartner (2014), only a modest 3.8% growth was recorded from US\$24.4 billion in 2012 to US\$25.2 billion in 2013, rendering CBR (2011) forecast of US\$50.3 billion by end of 2015 unattainable. Figure 2.2 shows the global ERP market share together with the market leaders who include SAP (24%), Oracle (12%), Sage (6%), Infor (6%) and Microsoft Dynamics (5%).

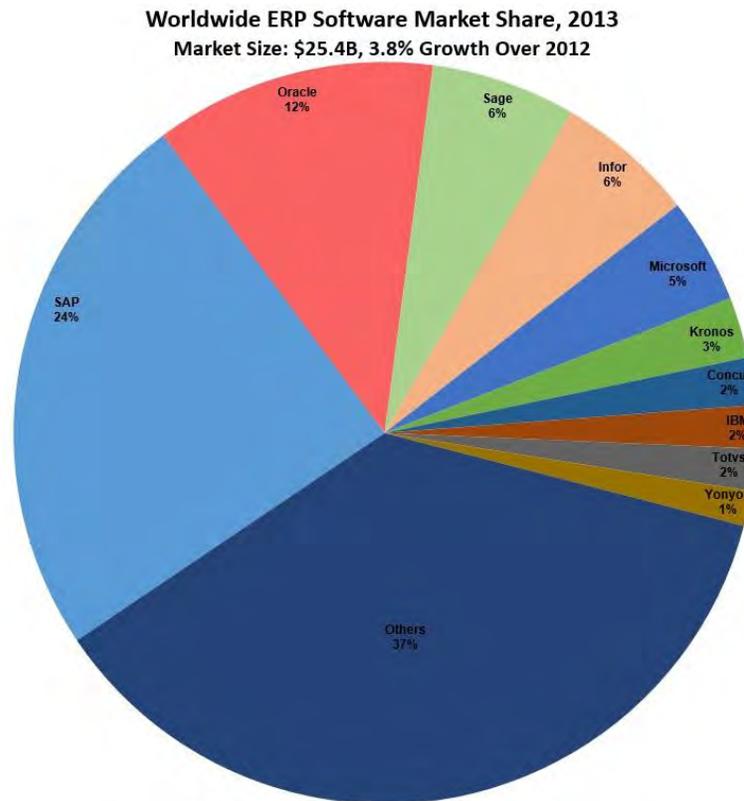


Figure 2.2: Worldwide ERP Software Market Share

Source: GARTNER 2014. Market Share Analysis: ERP Software, Worldwide, 2013.

Figure 2.2 shows the big 5 ERP systems as SAP, Oracle, Sage, Info and Microsoft Dynamics. The five traditionally followed the on-premise deployment models which are fast being replaced by cloud ERP models gaining prominence among mid-size enterprises (Gartner, 2014).

### 2.2.5 Definition of ERP

An Enterprise Resource Planning System is a transaction processing system which integrates the entire business processes of an organisation on a common database and makes information available in real-time for decision making by stakeholders (Rom and Rohde, 2006). ERP systems represent a diametric shift from functional silo approaches where several islands of information existed in one enterprise; presenting challenges such as redundancy, inconsistency, referential integrity and absence of a single version of the truth across the enterprise (Spathis, 2006). ERP systems have evolved since their inception in the 1990s to Extended ERPs at the turn of the millennium and today, they are in their third generation called ERP-II. Apart from being more functional, their major distinguishing feature is their ability to harness the power of the internet to connect all participants (internal and external) to a company's value chain. The present ERP generation, ERP-II is shown in Figure 2.3.

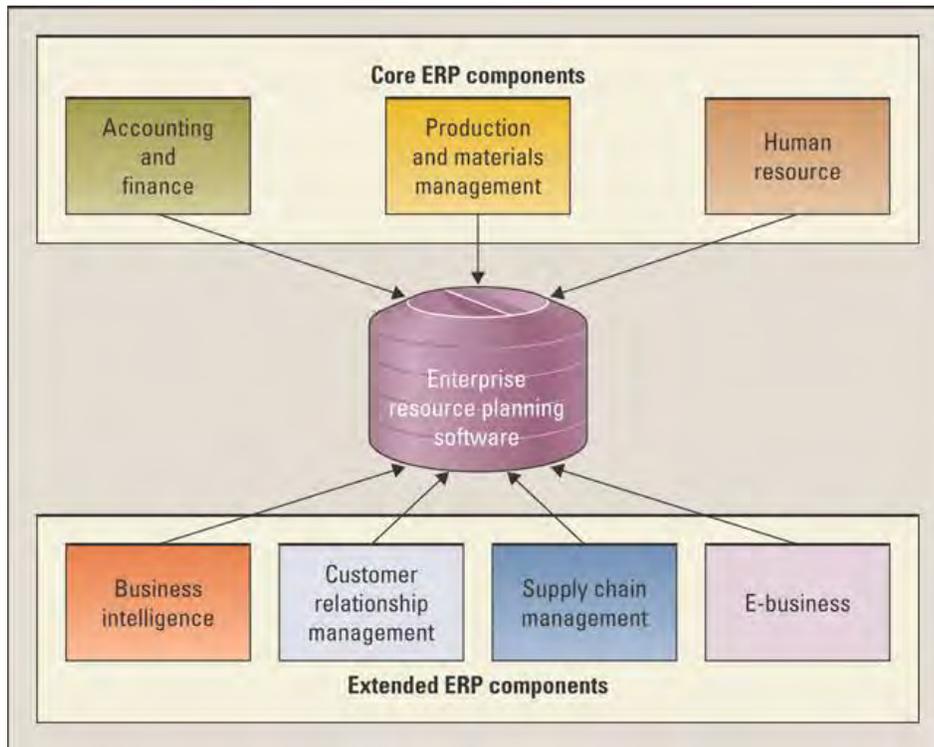


Figure 2.3: Core and extended ERP II component

Source: BALTZAN, P. & PHILLIPS, A. 2008. Business driven information systems, McGraw-Hill/Irwin.

A typical ERP-II ERP comprises the following core and extended components which cover most aspects on a company's balanced scorecard (Baltzan and Phillips, 2008):

- Supply Chain Management (SCM)
- Customer Relationship Management (CRM)
- eBusiness
- Product Lifecycle Management (PLM)
- Business Intelligence (BI)
- Financial Management (FM)
- Maintenance Management (MM)
- Human Resources (HRM)

#### **2.2.6 ERP benefits**

*ERP Benefits (Lee et al., 2006; Tsai et al., 2007; Baltzan and Phillips, 2008)*

- Accelerated decision making. Decision support information is readily available in a common source.
- Gives managers an enterprise-wide view and control of the business.
- Source of competitive advantage
  - ✓ Reduced cycle times
  - ✓ Improved flow efficiency
  - ✓ Better customer demand management and speed to the markets.
- Depending on modules implemented, an ERP has the potential to integrate a firm with its Suppliers (B2B linkages) and its customers (B2C or CRM linkages). A touted example in this regard is the Toyota Production System (TPS) which has been opened up to its suppliers and suppliers of suppliers to ensure well-oiled and coordinated material demand and supply chain management.
- Efficient and effective tool in the business.

- An ERP implementation presents the best opportunity for firms to take stock of their business processes with the view to automate, streamline or completely re-engineer sick and broken ones.
- Greater job satisfaction can be derived from a well implemented and received ERP system. In an era where employees are expected to produce more with constrained resources, well deployed ERP systems have proved to be strategic business assets.

### **2.2.7 ERP challenges**

*ERP Challenges (Lee et al., 2006; Tsai et al., 2007; Baltzan and Phillips, 2008)*

- High failure risk
  - ✓ Cost overruns
  - ✓ Duration overruns
- Expected benefits are often not realised
- Huge cost
  - ✓ Software/Hardware/Infrastructure
  - ✓ Consultancy
  - ✓ Training fees
- No matter how much fit they have with a particular business or industry, ERP systems change the way the entire organisation operates. This translates to:
  - ✓ Change management
  - ✓ Resistance
  - ✓ Adjusting to and learning new business processes
- It is difficult to measure and quantify returns on ERP investments or objectively measure the value of IT investments in general.

It is important to note that while ERP systems promise a lot of value and competitive edges to businesses, their implementations are still characterised by high failure

rates (Zeng and Skibniewski, 2013). Some authorities, including Spector and Gifford (1986), have juxtaposed projects in the civil as well as the software engineering disciplines and concluded that bridges come more on schedule, on budget and closer to original specifications than software projects. This is partly explained by the level of extreme detail that goes into construction projects, regulation and standards in that industry, as well as over 300 years of experience and learning as compared to the mere 25 years that ERP systems have been in existence (Standish Group, 2014). In spite of ERP systems maturity stage on the product life cycle and thousands of case studies in literature centred around ERP project risks, establishment of links between the success of IT projects and the influence of various factors and accompanying risk mitigation strategies, it is still very common to have implementing organisations suffer failure in the three dimensions of Cost overrun, Duration overrun and/or final delivered product not living up to business expectations (Somers and Nelson, 2001). These equally important project evaluation criteria are shown in Figure 2.4.



Figure 2.4: Three primary project variables

Source: BALTZAN, P. & PHILLIPS, A. 2008. Business driven information systems, McGraw-Hill/Irwin.

In extreme cases ERP implementations have bankrupted or paralysed key processes of implementing organisations or resulted in protracted legal battles (a

lose-lose situation where only legal firms stand to gain). Notable ERP train wrecks include, but are not limited to Table 2.1:

<b>Year</b>	<b>ERP Vendor</b>	<b>Customer</b>	<b>Disputed Issues</b>
2013	Infor	Buckley Powder	Duration overruns No benefits realised
2013	SAP	Avon	ERP disrupted operations Too complex to use for Avon's business model comprising simple representatives
2010	SAP	Lumber Liquidators	Malfunctions in ERP system itself
2010	SAP	Marin County	Vendor misrepresented skills and ERP capabilities
2010	GijimaAst	Department of Home Affairs	Failure to perform on the part of both GijimaAst and DHA
2009	Epicor	Ferazzoli Imports	System never worked as anticipated
2009	SAP	City of San Diego	Deficient project management practices

Table 2.1: Failed ERP and Lawsuits

Adapted from: KIMBERLING, E., 2008. ERP train wrecks failure and lawsuits. Online. Available at: <http://www.zdnet.com/article/erp-train-wrecks-failures-and-lawsuits/>

According to the 2014 Standish Group's Chaos report covering 1995 American companies, a staggering 31% of ERP projects will be cancelled before completion while an additional US\$59 billion will go towards rescuing ERP projects beset with duration overruns. Furthermore, the research points to 53% of ERP projects overshooting their approved budgets by as much as 89% excluding immeasurable opportunity costs. Current conditions on the ERP implementations landscape are

also reflected in the 2014 edition of the Panorama Consulting report which polled 192 corporate respondents and produced equally concerning results in Table 2.2.

<b>Year</b>	<b>Avg Cost US\$</b>	<b>Cost Overrun %</b>	<b>Duration Overrun %</b>	<b>Receiving &lt; 50% benefits</b>
2013	\$2.8 million	54%	72%	66%
2012	\$7.1 million	53%	61%	60%
2011	\$10.5 million	56%	54%	48%

Table 2.2: The extent of ERP implementation failure (Consulting, 2014).

Source: PANORAMA CONSULTING, 2014. ERP report. A Panorama Consulting Solutions Research Report.

From the Panorama report, over the period 2011-2013, approximately 54%, 62% and 58% of ERP projects exceeded their budget, exceeded their duration and registered less than 50% benefits realization. The majority of respondents whose ERP Projects performed poorly in all 3 dimensions (Cost, Duration and Benefits) cited internal organisational factors such as change management and business process management as the root causes. Thus, it is of paramount importance for implementing organisations to channel significant effort and resources to change management or they risk facing retrogressive organisational issues such as low ERP buy-in, often the pre-cursor of doomed implementations (Consulting, 2014).

### **2.3 Critical Success Factors**

This section seeks to determine factors that are critical pre-conditions for successful ERP outcomes. Referred to as the Critical Success Factors (CSFs), these are the key areas where management must pay careful attention to, and enact control mechanisms in order for satisfactory performance goals to be attained. Rockart (1978), as quoted in Ram and Corkindale (2014), defined CSFs as limited key areas where things must go right for desired performance outcomes to be achieved. In the context of ERPs and Information Systems in general, the concept of Critical Success Factors has gained wide acceptance and application, and this is partly explained by the high levels of failure in these domains (Ifinedo et al., 2010).

A number of scholars have come up with lists of Critical Success Factors aimed at avoiding costly ERP failure including Somers and Nelson (2001), Al-Mashari et al. (2003), Finney and Corbett (2007), Ngai et al. (2008), Kalbasi (2007), Carton et al. (2008). Somers and Nelson (2001) identified 22 factors that are critical for ERP success. They further associated each ERP implementation life cycle stage (Project Planning, Implementation, Go-live and Support) with its top 5 critical success factors (Plant and Willcocks, 2007a).

An independent study carried out in 2014 using the same research methodology as in the work of Somers and Nelson (2001) produced consistent results. Following an extensive review of ERP literature, Ram and Corkindale (2014) produced a 46 point list of critical success factors and conveniently categorised them into four sections namely organisational, technological, project and individual-related as shown in Table 2.3.

<b>Critical Success Factors</b>	<b>Some Sources</b>
<i>Organisational</i>	
1. Culture and Politics	Finney and Corbett (2007)
2. Management commitment	Young and Jordan (2008)
3. Change management	Aladwani (2001)
4. Leadership and Change agents	Finney and Corbett (2007)
5. Teamwork	Mohamed (2015)
6. Cross-functional cooperation	Mohamed (2015)
7. Management readiness for change	Aladwani (2001)
8. Scope of change	Finney and Corbett (2007)
9. Management of change	Aladwani (2001)
10. Presence of champions	Somers and Nelson (2001)
11. Business vision, mission, goals	Melville et al. (2004)
12. Project justification/Business case	Finney and Corbett (2007)
13. Re-train IT teams in new skills	Dorob and N stase (2012)
14. Employee job satisfaction, engagement and involvement	Wu et al. (2007)
<i>Technological</i>	

<b>Critical Success Factors</b>	<b>Some Sources</b>
1. Customisation of ERP	Huang (2010)
2. Technological complexity	Al-Mashari et al. (2003)
3. Compatibility	Osman et al. (2006)
4. Legacy systems	Al-Mashari et al. (2003)
5. Data analysis and conversion	Somers and Nelson (2004)
6. Data accuracy	Somers and Nelson (2004)
<i>Project-related</i>	
Project management	Aloini et al. (2007)
Training and education	Plant and Willcocks (2007b)
System integration	Baki and Çakar (2005)
Business process re-engineering	Finney and Corbett (2007)
Full time project manager	Aloini et al. (2007)
Communication	Aladwani (2001)
Minimal customisation	Finney and Corbett (2007)
Implementation strategy and methodology	Ngai et al. (2008)
Teamwork and team composition	Finney and Corbett (2007)
Project team competence	Aloini et al. (2007)
Appoint Steering committee	Ngai et al. (2008)
ERP product selection	Baki and Çakar (2005)
<i>Individual-related</i>	
Perceived usefulness (PU)	Bueno and Salmeron (2008)
Perceived ease of use (PEU)	Bueno and Salmeron (2008)
Attitude towards ERP system	Bueno and Salmeron (2008)
Shared beliefs on the ERP system	Ifinedo (2007)
Social factors	Ifinedo (2007)
Facilitating conditions	Chang et al. (2008)
Short-term consequences	Chang et al. (2008)
Long-term consequences	Chang et al. (2008)
Affect	Chang et al. (2008)
User absorptive capacity	Leknes and Munkvold (2006)
ERP usage performance	Leknes and Munkvold (2006)

<b>Critical Success Factors</b>	<b>Some Sources</b>
User satisfaction	Bueno and Salmeron (2008)
Learning capacity	Ngai et al. (2008)
User involvement	Wu et al. (2007)

Table 2.3: ERP Critical Success Factors

Adapted from: RAM, J. & CORKINDALE, D. 2014. How %critical+ are the critical success factors (CSFs)? Examining the role of CSFs for ERP. Business Process Management Journal, 20, 151-174.

Extensive review of ERP literature has revealed that although not empirically proven to cause ERP success, some CSFs featured more prominently in some studies than in others. In other words they featured in modal classes of CSFs reviewed. Table 2.4 shows, ERP CSFs and their relative degree of importance.

<b>Rank</b>	<b>Critical Success Factor</b>	<b>Mean</b>
1	Top Management Support	4.29
2	Competent ERP Project Team	4.20
3	Inter-departmental Teamwork	4.19
4	Clear ERP goals and objectives	4.15
5	ERP Project Management	4.13
6	Inter-departmental communication	4.09
7	Management of ERP expectations	4.04
8	Project Champions	4.03
9	ERP Vendor Support	4.03
10	Careful ERP Package selection	3.89
11	Data analysis and conversion	3.83
12	Dedicated Project resources	3.81
13	Appointment of ERP steering committee	3.97
14	Stakeholder training	3.97
15	Education on new Business processes	3.76
16	Business Process Re-engineering	3.68
17	Minimal Customisation	3.68

18	Architecture choices	3.44
19	Change management	3.43
20	Vendor partnerships	3.39
21	Vendor tools	3.15
22	Use of consultants	2.90

Table 2.4: Critical Success Factors ranked in descending order

Adapted from: SOMERS, T. M. & NELSON, K. The impact of critical success factors across the stages of enterprise resource planning implementations. System Sciences, 2001. Proceedings of the 34th Annual Hawaii International Conference on, 2001. IEEE, 10 pp.

For the purpose of this study, only the top 12 factors are addressed in more detail in the section below.

### 2.3.1 Top Management Support

A positive significant relationship has been established in previous studies between top management support of IT projects in the enterprise and IT Project outcomes (Ifinedo, 2008). Baltzan and Phillips (2008) have argued that both business and MIS management grossly under-estimate the complexity of planning, development and employee training required with an ERP project. For ERP projects to be successfully delivered, top management of the implementing organisation must be visible, offer continuous support throughout the implementation and post-implementation phases, as well as adequately resource and empower ERP project teams (Somers and Nelson, 2004). Typically, ERP project areas that require support of business executives include conflict resolution, managing organisational politics, financial and material support and more importantly, communicating the message of change enterprise-wide from the right pedestal of authority and influence. It is therefore clear that top management support in the ERP context goes beyond mere ERP project sponsorship and in fact entails total commitment of the executives to the business case for the new ERP and driving that case and its benefits throughout the organisation as a demonstration of effective leadership. With effective top management support, a high resolution picture of the future is painted,

communicated and sold across the enterprise. This also ensures higher levels of new system acceptance and flawless execution as applicable in military circles (Murphy, 2006). Literature is replete with failed ERP project case studies where top management commitment was evidently lacking. For example, the IT/Business divide often leads to under-funding of ERP projects, resulting in rushed quick-win implementations, burn-out induced staff turnover and system user resistance/low acceptance (Wong et al., 2005). However, some authorities have questioned the intrinsic impact of top management support on ERP implementations. Put differently, they believe the importance of top management support in ERP projects is over-stated and has but only added to existing mantras (Young and Jordan, 2008).

### *2.3.2 Clear ERP goals and objectives*

Clarity of ERP goals is largely a function of the extent to which management has built alignment and calibration mechanisms to ensure that IT initiatives are in sync with the vision and strategic intent of the whole organisation (Hough, 2011). It must be made clear:

- Where the company is (current situation/as-is)?
- Where it needs to go (future/to-be)?
- How it gets there (the strategic vehicle)?

An ERP implementation is not a standard software install and licensing. It represents complexity, risk and heavy capital injections and therefore requires significant strategic direction and planning to avoid failure (Melville et al., 2004). A business case for the ERP must be articulated and key performance measures devised to assess the success/failure of the implementation. It is often the case that businesses approach an ERP system without a charter/business case making it difficult if not impossible to align their ERP implementations with the vision, strategic and tactical goals of the implementing entity (Melville et al., 2004). With effective strategic thinking, every stakeholder is involved, identifies with the ERP system and is in a sound position to spell out what gaps in the business the ERP is meant to close.

### 2.3.3 *Inadequate change management*

According to the Panorama ERP Consulting (2014), organisational issues pose the most risk to ERP implementation outcomes. It is therefore prudent to channel more project resources towards change management initiatives. ERP projects demand special attention to change management because they (Zeng and Skibniewski, 2013):

- Change business processes
- Alter organisational structures
- Introduce new ways of working among employees and departments and in the process change power/political dynamics
- Increase employee workload during implementation
- Bring changes in corporate culture itself

Organisations that under-estimate change management in ERP projects often end up with failed implementations to the detriment of the very business trying to push the technology envelope (Aloini et al., 2007). As quoted in the ERP chaos section of this review, some projects have delivered outcomes that are worse off or more business crippling than the legacy system they replaced. The capacity of an organisation to implement change is to a great extent influenced by its culture; in fact there is a strong positive relationship between ERP implementation success and supportive organisational cultures of collaboration, power sharing, inclusive decision-making, tolerance for risk and conflicts (Ke and Wei, 2008). According to Baltzan and Phillips (2008), many ERP failures are accounted for by pushing too much change too fast as is characteristic in so called big-bang ERP implementations such as SAP Business All-in-One rapid deployment model. Since change management forms part of this research's objectives, a special section of this literature review will be dedicated to effectively managing change in the context of ERP systems.

#### *2.3.4 ERP Project Management Effectiveness*

ERP Project Management is a very challenging and demanding role. To achieve positive results, organisations must appoint competent ERP Project Managers who are able to:

- Manage people (ERP Project teams, ERP users, vendors and consultants)
- Manage systems
- Re-design business processes
- Communicate effectively with top management

Three common mistakes made by businesses include the appointment of an ERP Project Manager from IT/Technical instead of appointing from a business functional area; accepting ERP Project management services from ERP Vendors/Consultants and not having a steering committee acting as an oversight body for the ERP system project. Because of the often antagonistic relationship between business and IT, ERP implementations are wrongly perceived as technology projects and naturally, their management becomes the task of the Chief Information Officer/IT Managers desk (Stanciu and Tinca, 2013). This misplacement of responsibility produces a technically efficient/optimised solution which monumentally fails to resonate with business vision and strategy since among other reasons the CIO/IT position has no boardroom presence (Stanciu and Tinca, 2013). In addition, project managers evidently show a lack of ERP risk management techniques such as the Petri Net and PRINCE2 frameworks to measure project success and risk exposure (Aloini et al., 2007).

#### *2.3.5 Use of ERP Consultants and Implementing Partners*

Consultants and implementation partners have rich repositories of ERP implementation experience. Between 2013 and 2014, a 23% increase was recorded for organisations using the services of consultants in their ERP implementations (Consulting, 2014). This trend can be interpreted to mean that companies have come to understand the value of leveraging consultants throughout the life of their ERP projects. In 2014 ERP consultants were chiefly used in business areas indicated in Table 2.5.

<b>ERP Consulting Segmentation</b>	<b>%age of Total</b>
To supplement specific skills an organisation lacks	20
To manage the implementation	19
Strategic partner on all ERP phases	16
Assist in software selection (unbiased)	13
To manage change	13
To turnaround a failed implementation	13
Other reasons	6
<b>Total</b>	<b>100</b>

Table 2.5: Top reasons for engaging the services of ERP Consultants

Adapted from: PANORAMA CONSULTING, 2014. ERP report. A Panorama Consulting Solutions Research Report.

The top three reasons for hiring consultants account for nearly 56% of the total. While it is given that engaging the services of ERP consultants costs money, the payback is captured in Panorama respondent experiences. Organisations that invest in the services of ERP consultants achieve more business benefits as outlined in their business case than those that choose to do without consultants (Glass, 2006). It however remains the responsibility of ERP project management to guard the interests of the business by ensuring that consultants/partners perform on their contracted deliverables. Erik Kimberling (Panorama) strongly recommended ERP contracts which tie ERP payment triggers to successful milestone outcomes. There is significant debate on differences in value between local and international ERP implementation partners but common denominator is that organisations that engage reputable and quality ERP partners have improved their business performances and competitive positions with successful ERP project outcomes (Tsai et al., 2011).

### *2.3.6 Stakeholder Training*

As mentioned earlier, the scale of ERP systems bring inevitable change. In view of that, employees must be given adequate and relevant training which should be delivered in a timely manner (Sharma and Yetton, 2007). In some cases ERP consultants are themselves inexperienced and consequently unable to deliver adequate training or transfer knowledge to future system users. This might lead to resistance and falling back to the old system which at least enables users to meet their targets+or emergence of parallel systems within one enterprise (Wong et al., 2005). Since newer ERPs have extended functionality which integrates businesses backwards with their suppliers (B2B) and forwards with their customers (B2C), adequate training and education must be extended to all affected stakeholders including customers, suppliers and if required, suppliers of suppliers (Madapusi and Dsouza, 2007). Zornada (2005) ranks ERP training as the third most important critical success factor since, when bundled with user involvement, it plays the key roles of adapting users to the new system and managing the transition process. Further, Zornada (2005) proposes a cocktail of 26 training methods ranging from traditional to contemporary plus a 2-step training evaluation model that can be tailored to each organisational situation (learning styles etc.) to bolster ERP implementation success probabilities.

### *2.3.7 ERP Project Teams*

This area deals with three crucial related factors namely ERP project teams, the role of project champions and allocation of dedicated resources to ERP projects. Suffice to say adequate resourcing and careful selection of a core ERP project team with the right skills mix, experience, aptitude and motivation levels, is indispensable for successful ERP outcome (Finney and Corbett, 2007). Organisations must search their talent pipelines for resources with the most fit to the ERP task at hand as opposed to making political appointments that negate organisational climate and perceptions towards systems. Project teams must have a clear vision for the new ERP system. Equally important is careful selection of ERP project champions (super users) who are representative of business functional areas. The champions can easily become ERP brand/product evangelists in the business with strong incentive to see the project succeed as it directly alleviates pain-points in their functional

areas. ERP project managers must be tolerant to positive criticism and desist from surrounding themselves with yes-people who are afraid of questioning anything and in fact rewarded for blind loyalty (Robbins et al., 2013).

### *2.3.8 Business Process re-engineering*

While ERP systems are designed based on best industry practices, they do not fit every organisation's business processes (Huq et al., 2006). Some organisations have differentiated their core processes (deviated from vanilla) for strategic reasons resulting in incompatibilities with generic/standard functionality that ships out of the box with ERP systems (O'Leary, 2000). This incongruence forces an organisation to either invest in expensive and risky ERP software customization or embark on business process re-engineering aimed at tailoring business processes around the capabilities and dictates of the selected ERP package (in other words, a move towards standard processes). Finney and Corbett (2007) reinforced the criticality of BPR in the ERP success equation. However, as pointed out by Zhang et al. (2005), change management is a pre-requisite for successful BPR and there is still no consensus on the correct timing of BPR during an ERP implementation. A relevant case study is given in Stanciu and Tinca (2013) where top management autocracy bred passive resistance towards new ERP system among disengaged employees resulting in old inefficient business processes being super-imposed on a new ERP as opposed to being re-engineered.

### *2.3.9 Careful ERP Package selection*

Organisations must invest resources and effort in the ERP planning phase towards selecting and evaluating ERP packages with the most fit to business strategies, business processes and business culture (Baki and Çakar, 2005). With the ubiquity of ERP products, vendors and packages, it is quite easy for organisations to buy into sales misrepresentations and settle for solutions that scarcely address business imperatives. Once wrong choices are made earlier in the ERP cycle, organisations are forced to embark on heavy customizations to make up for the mistakes and this often comes at a higher cost, time and cascading risk (Grossman and Walsh, 2004). The decision on ERP package must be all-inclusive and not be imposed based on mere preference by a select group like top management without a clear appreciation

of vision, risk analysis or calibration with internal and external business processes. Inclusivity reduces complexity making the ERP projects easier to strategically manage for greater business benefit realization (Malhotra and Temponi, 2010).

### *2.3.10 Management of Expectations*

Some businesses place very unreasonable and unrealistic expectations on ERP systems. This often emanates from a lack of clear boundaries of the ERP rollout and lack of transparent communication around real business problems to be solved by an ERP system and complexities involved (Akkermans and van Helden, 2002). Unscrupulous ERP vendors desperate to seal a deal will overstate the capabilities of an ERP package, under deliver and then find reasons to blame the factors within the organisation implementing the ERP. Since the inception of ERPs, businesses have been promised the proverbial paperless world where Excel spreadsheets become extinct but that reality is yet to materialise twenty years later.

### *2.3.11 ERP End User Involvement*

The role of User involvement in an ERP Project was briefly addressed under selection of ERP system with the most fit to the business. Users (business process owners) must be actively involved and consulted in all stages of ERP system implementation from requirements engineering, to Business Process Modelling (BPM) to actual implementation and post implementation review (Wu et al., 2007). This inclusive approach shapes user attitudes, fosters system adoption, buy-in and is effective at catching and solving problems before they reach crisis proportions. To avoid expensive resistance, organisations must invest in participatory consultations, especially with legacy staff, using such tactics as selling how impending change will benefit the employees. Consultation is also a cost effective mechanism of crowd-sourcing work-flow improvement intelligence directly from the system operators themselves. Literature has a litany of organisations that have rightly set up core ERP project teams (freed from day to day mundane tasks) but went on to deliver disastrous ERP outcomes because the core team worked in such obscurity that it became detached from the very business users it was meant to serve (Stanciu and Tinca, 2013). The inevitable result is an ERP system that fails to improve the business bottom-line, simplify users' jobs, a new system that compares

like for like with the one it is replacing, one that is worse than the legacy system or one that is cancelled before going live. In a survey by the Standish Group, IT executives ranked user involvement (15.9%) as top-most critical success factor in an ERP implementation, closely followed by executive management support (13.9%) and clarity of ERP scope (Standish, 2014)

### *2.3.12 Architecture and Technical factors*

All too often, infrastructure and technical glitches have come in the way of ERP go-lives. Communication challenges may cut off the main hub from all the distributed branches, databases may degrade in performance under heavier load; system may become unstable and generate unpredictable results. Indeed, technical issues are a reality and they can be so disruptive that key business processes like shipping merchandise to customers are negatively affected (good fodder for rivals). On a positive note, compared to other critical success factors, infrastructure and technical issues are only responsible for short-term disruptions and can be easily resolved (Consulting, 2014). Roberts (2012) has attributed only 20% of ERP challenges to Technical factors and 80% to softer people issues.

Despite the existence of large resources of ERP critical success factors, ERP systems implementations continue to be associated with high failure and other challenges (Ngai et al., 2008). As a result, some researchers such as Ram and Corkindale (2014) questioned the validity and utility of the whole concept of critical success factors and its causative relationship to ERP success. Others have gone a step further to propose that factors must be identified as critical for success only if they have been objectively and empirically established as such, following strict definition of what precisely constitutes success in the context of ERP projects (King and Burgess, 2006).

## 2.4 ERP and Change Management

Successfully implementing an enterprise-wide system to increase organisational efficiencies and effectiveness requires massive organisational changes (departure from routine). In fact, the highest performing global organisations such as Toyota are constantly changing and continuously improving (Jones et al., 2010). Aladwani (2001) concurs and asserts that ERP implementations demand change management strategies on three fronts namely organisational, technical and people in order to transition from resistance to success. According to Kurt Lewin (1947,) as quoted in (Choi and Ruona, 2010), a wide range of forces develop over time from the way an organisation operates that make organisations inherently resistant to change . be it evolutionary or revolutionary change. Against this background, it is imperative for organisations seeking higher performances through ERPs to implement strategies that increase the forces for change and simultaneously reduce resisting forces as depicted in Figure 2.5.

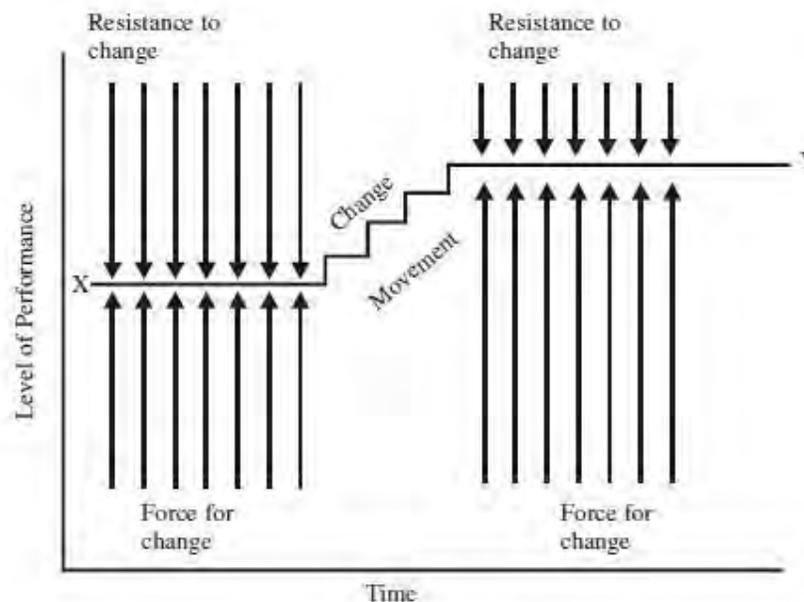


Figure 2.5: Lewin Force-Field Model of Change

Adapted from: JONES, G. R., GEORGE, J. M., ROCK, M., HADDAD, J. & LANGTON, N. 2010. Essentials of contemporary management, McGraw-Hill Ryerson.

An organisation at performance level X has forces of change and resistance in equilibrium. To reach the higher performance target (Y), the organisation must increase the ratio of forces of change to that of forces of resistance.

Lewin also developed a 3-step model that has been widely adopted and is still extensively used in change situations. The model breaks the task of change management into 3 simple, practical and distinct steps namely unfreezing, change and re-freezing (Vincent, 2013). Therefore, in quest for delivering a successful ERP project, organisations must do the following (Suraweera et al., 2012):

- Unfreeze . This step creates a need for organisational change, dilutes old ingrained values, attitudes and behaviours; ensuring paths of least resistance.
- Moving/Change . Entails execution of the intended change. For example implementing new processes, re-engineering broken processes, introducing new ways of thinking, behaviours, values etc. in the business.
- Re-freeze . Solidifies the new behaviours, values and attitudes as the norm until the next cycle for change is reached in the dynamic business environment. All three steps are represented schematically in Figure 2.6.

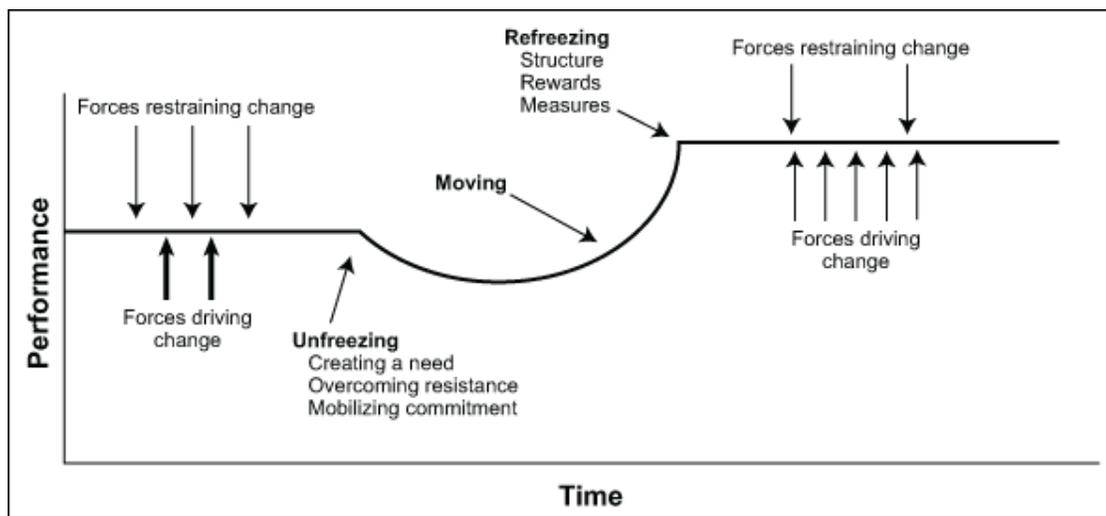


Figure 2.6: Lewin 3 Step Change Model.

Adapted from: JONES, G. R., GEORGE, J. M., ROCK, M., HADDAD, J. & LANGTON, N. 2010. Essentials of contemporary management, McGraw-Hill Ryerson.

Figure 2.6 shows that the journey to increase organisational performance will see a slump in the same performance before it rises to a new high where freezing then takes place.

Several other contemporary scholars such as Jones et al. (2010) proposed the following four-step generic organisational change management process that can be adopted to minimise forces of resistance in an ERP system implementation:

1. Assess the need for change
  - Problem recognition
  - Problem source identification
2. Decision on changes to make
  - Paint a desired future organisation state
  - Identify sources of resistance within the organisation
3. Implement the Change
  - Selection of Top-Down or Bottom-Up change strategy
  - Introduction and management of change
4. Evaluation of Change
  - Comparison of pre and post change performance
  - Use of bench-marking techniques

Aladwani (2001) agrees that change management is a cornerstone of improvement initiatives such as ERP implementations. He consequently proposed a 3-phase process-oriented conceptual framework for managing change specific to IT/ERP projects. The phases are namely knowledge formulation, strategy implementation and status evaluation, and they are primarily targeted at reducing stakeholder resistance to ERP system initiatives.

## 1. Knowledge Formulation

- a. Identify and evaluate attitudes of system users and influential groups
- b. Gather stakeholder concerns/fears around the new ERP system

## 2. Strategy Implementation

- a. Craft strategies to overcome resistance to ERP change using knowledge accumulated.
- b. Implement Think-Feel-Do ERP adoption process
- c. Communicate effectively, emphasizing ERP benefits to stakeholders, to influence cognitive and affective aspects of user attitudes towards the new ERP implementation project.

## 3. Status Evaluation

- a. A performance measurement system to measure ERP outcomes against the initial business case statement for the ERP

The change management model proposed by Aladwami (2001) places heavy importance on effective change management strategies with the objective of shaping the right user attitudes towards the new ERP system. If well implemented, the outcome is an ERP implementation users identify with, adopt positively and believe will reduce their transaction costs and make their overall work experience better than the systems being replaced (Aladwami, 2001). Parallels can be drawn between this model and the consumer behaviour model used by marketers to influence potential buyers to adopt and buy products. The model also advocates for the use of influential formal and informal groups within the ERP implementing firm to endorse and openly support the system in the same way marketers use celebrities and other popular personalities as brand ambassadors. A close cousin to Aladwami's change framework is action research. Action research approaches change by systematic collection of data surrounding the problem, analysing the data and then selecting change actions based on analysed data (Robbins et al., 2013). Compared to other change management strategies, action research has two distinct quick wins for organisations . being problem focused and strong

employee/stakeholder involvement which sustains the change momentum (Robbins et al., 2013). Some change agents breed resistance because they approach ERP situations with solutions already and deliberately seek out problems in the environment that fit their ready-made solutions. To illustrate with an example, ERP project managers often give ERP reviews that are skewed towards systems they have used/implemented before even if in real terms their favourites do not have the best fit to business requirements at hand.

A review of ERP change management would be incomplete without including organisational development (OD) and the role of effective leadership. ERP implementing organisations can enjoy higher success rates if they incorporate planned change interventions built on humanistic and democratic values using such OD techniques as team building, sensitivity training, survey feedback, process consultation and inter-group development (Robbins et al., 2013). An ERP implementation, as afore-said, changes the status quo in an organisation and if this is not managed well, dysfunctional conflict and resistance might result. It therefore becomes important for managers to exercise true situation-based leadership from the front by, among others:

- Articulating an appealing vision and how the new ERP will help reach that dream
- Using framing to give greater meaning to the ERP cause and inspire followers through actions and words to go the extra mile and subordinate their self-interests for the good of the organisation. A South African study revealed positive correlations between transformational leadership, meaning and organisational citizenship behaviour (Engelbrecht and Schlechter, 2006).
- Communicating realistic high performance targets but at the same time motivating and expressing confidence that followers can attain them. This step energises followers and has a positive effect on their self-confidence and self-esteem.
- Conveying a new ERP supportive set of organisational values
- Possessing excellent team skills

## **2.5 Summary**

This chapter highlighted the competitive advantages brought to businesses by Information systems in general and ERP systems in particular. On account of the alarming failure rates of ERP implementations, a significant portion of the chapter dealt with factors that are considered critical to the successful delivery of business enabling IT/Business projects such as ERPs. Some Critical Success Factors which include change management, top management commitment, user involvement, selection of ERP package with the most fit to the business, ERP risk management, as well as business process engineering have been discussed in this chapter. Since people factors are believed to carry 80% of ERP failure blame, the importance of organisational change management and culture alignment was emphasised with the view of limiting resistance to ERP initiatives grounded on improving business triple bottom lines. The next chapter presents and justifies the research approach that has been adopted in order to arrive at findings that are both valid and reliable.

## Chapter 3 Research Methodology

### 3.1 Introduction

In chapter two, literature relevant to the success and failure of ERP system implementations was reviewed. The present chapter is organised into four parts. Firstly, the research design is discussed. Secondly, the nitty-gritty of the research design is explained in the methodology section. Thirdly, limitations of the methods adopted are established. Finally, all attempts at adhering to the University's ethical guidelines are detailed before the chapter concludes.

### 3.2 Research design

To attain the research objectives of the study, the researcher employed a mixed research methodology. The research employed triangulation, that is, the use of multiple methods of data collection. This is presented in Table 3.1:

<b>Research Objective addressed</b>	<b>Method</b>
1. To establish critical success factors of ERP implementation	Qualitative analysis
2. To determine the causes of ERP failures in Teichmann Plant Hire (Pty) Ltd	Quantitative analysis and Qualitative analysis
3. To establish change management initiatives required to turnaround Teichmann's ERP outcomes	

Table 3.1: Research design

Triangulation uses multiple methods for data collection and analysis. The methods can be both qualitative and quantitative. The primary reason for using the mixed technique approach is to increase confidence and reliance levels of research findings by reducing inherent weaknesses in individual methods (Dörnyei and

Griffiee, 2010). In other words, it is not a matter of which method is best, but which set of methods is likely to result in the research objectives being fulfilled (Creswell, 2013).

#### *Advantages of Triangulation*

- It is a rigorous and pluralistic data collection method
- Complimentary mix of numbers and words
- Enhances validity and confidence. This is especially so when certain objectives call for deeper more qualitative analysis.
- Creates new frontiers, results and exploration (Creswell and Clark, 2007)

### **3.2.1 Qualitative content analysis**

The research method has been used to assemble factors that are critical to the successful delivery of ERP solutions. It is a 5-step process that has been applied rigorously to relevant ERP literature.

#### **3.2.1.1 Sample frame**

The sample frame comprised the following:

- Contemporary ERP studies published between 2005 and 2015
- ERP studies with a focus on Critical Success Factors
- Attempts have been made to confine sample to peer-reviewed articles only

#### **3.2.1.2 Data collection**

ERP articles, less than or equal to 10 years, were searched from four databases namely Academic Search Complete (Ebsco), Emerald Insight, Business Source Complete and Google Scholar using the following search strings:

- ERP + Critical Success Factors
- ERP + Success
- ERP + Implementation + Challenges
- ERP + Project + Rescue
- ERP + Failure + Factors

- ERP + CSFs
- ERP + Implementation + Risks

This process was expected to produce volumes of articles to which the researcher would apply reduction strategies aimed at eliminating those that were not relevant to the research objective at hand. The following section explains how articles extracted from the database search engines were filtered and classified for relevancy and inclusion for further analysis.

### **3.2.1.3 Data classification**

The online database Ulrichweb.com was extensively used to authenticate articles and conference papers as peer-reviewed. On each article yielded by the search engine and tested for authoritativeness via Ulrichweb.com, the following steps were performed:

- Read the abstract page
- Read Research objectives
- Read Research questions
- Read Research findings and conclusions

Through the above 4-step process, the researcher aimed to reduce the set of articles for further analysis to only those that focus directly on ERP Critical Success Factors and nothing else. The next step entailed analysing the ERP CSF data contained in the remaining set of articles using such techniques as Open, Axial and Selective coding.

### **3.2.1.4 Data analysis**

This was a systematic process of categorising and appropriately coding the remaining set of articles. Below is a discussion of the two types of coding that was performed.

#### 3.2.1.4.1 Open coding

In this process, the researcher swept through the articles to establish themes and form broad labels for classifying the literature reviewed. This process involved going through qualitative data and marking, circling or highlighting sections of text to use as codes/labels. As each paper was reviewed, it was classified into the closest matching theme and the process was repeated several times in order to ensure correct labelling and classification. The main deliverable of this process was the identification of major themes from articles such as effective management of critical success factors, effect of CSFs on ERP project outcomes as well as the identification of the CSFs themselves.

#### 3.2.1.4.2 Axial coding

Whereas open coding focused on identification of major categories and themes in the data set, this coding cycle was directed at a more purposeful examination of the raw data. Among others, the researcher embarked on searching and summarising non-hierarchically, using descriptive statistics, what the authors in the selected articles claim to be critical success factors for ERP. In other words, critical success factors identified during open coding were matched with the frequency with which they were cited in the literature data set, with the ultimate objective of arriving at a descending mean for each CSF. A CSF with the highest mean would translate into more ERP criticality and the opposite holds true.

#### **3.2.1.5 Literature comparison phase**

This was the last phase of the qualitative content analysis aimed at satisfying the first of the three research objectives. In this phase, parallels were drawn between ERP CSFs identified by the present study with CSFs from ERP studies in general to gauge the level of similarity or difference.

#### **3.2.2 Quantitative survey**

A census was conducted using a structured questionnaire which was deployed to all participants employed by Teichmann Plant Hire (Pty) Ltd. The total number of employees was 148 and they were geographically dispersed among 3 company

branches in South Africa, Namibia as well as Zambia. As a result of the mobile nature of the organisation's workforce, only estimates could be given for the proportion of employees at each branch at any given time. To ensure every respondent was reached and thus enhancing response rates, the questionnaire was electronically administered via QuestionPro online survey platform. All targeted respondents had internet access and were connected via a corporate Office365 email system on their smart devices and notebooks during the period of this study.

### **3.2.2.1 Strengths and weaknesses as it relates to the study**

The classification of research as causal/explanatory, exploratory or descriptive is a function of the questions it intends to answer (Yin, 2013). Based on the quantitative nature of data that were to be collected for this part of the research and research questions at hand, questionnaires were selected as the primary data collection instrument. Questionnaires are an efficient data collection mechanism in descriptive and explanatory studies (Sekaran and Bougie, 2013).

### **3.2.2.2 Advantages of questionnaires**

According to Wegner (2010), questionnaires have the following advantages:

- Less expensive and less time consuming to administer compared to interviews and observations
- Respondents can answer at their convenient time and space
- Can ensure anonymity of respondents
- Efficient mechanism for collecting standardised data in large populations

### **3.2.2.3 Disadvantages of questionnaires**

Despite their popularity as data gathering tools, questionnaires pose the following drawbacks (Wegner, 2010) (Bryman and Bell, 2011):

- Associated with higher rates of non-response
- Have a greater chance of non-response error

- Data collected is as good as the characteristics of the population (their memory, motivation, experience etc.)
- Ambiguity and misunderstanding the survey questions may go undetected
- Tendency to give socially desirable responses

#### **3.2.2.4 Questionnaire design implications**

Sound questionnaire design entails adequately addressing various aspects of research questions and in sufficient detail (Bryman and Bell, 2011). To ensure these two issues are addressed, three inter-related areas need to be taken into account namely principles of wording, categorization and scaling of variables as well as the general appearance of the instrument (Sekaran and Bougie, 2013).

##### ***Principles of wording***

Sekaran and Bougie (2013) emphasise the impact of principles of wording on questionnaire response rates. These principles are aimed at bias minimization and include but not limited to:

- Question wording and intelligibility . the language and wording used should be intelligible to respondents. In case of wide variation in respondent profiles the lowest common denominator should be used.
- Question content appropriateness . Each question asked must be appropriate for tapping the variables being investigated.
- Question complexity, form and type . Gear this to minimise respondent bias.
- Question sequencing . Questionnaires with a natural and logical order significantly improve the response rate.
- Requests for personal data . Personal data should be requested on a need basis with due regard to respondent privacy and feelings.

The above views are also shared by Forza (2002) who contends that good questionnaires have firm foundations in structure, focus, phraseology and ability for data they collect to be statistically analysed. To ensure that the above issues are

adequately addressed, a pilot study (pre-testing of instrument) is paramount (Bryman and Bell, 2011).

### ***Principles of measurement***

These refer to guidelines aimed at ensuring appropriateness of data collected to test the research hypothesis as well as answer research questions. They comprise scaling techniques as well as assessment of goodness of data obtained through tests of reliability and validity (Sekaran and Bougie, 2013). In addition, measurement principles help in ensuring that collected data is easily categorised and coded.

### ***General appearance of questionnaire***

An elegant questionnaire with an appropriate introduction, completion instructions, well arrayed questions and response options has motivatory effects on respondents and in most instances translates into higher response rates (Sekaran and Bougie, 2013).

### ***How present questionnaire avoided the Big 3 pitfalls***

To address the three issues discussed above and in the quest for higher response rates and greater levels of information, the questionnaire used for this research followed below design principles:

- Length . kept short and to the point in order to avoid respondent fatigue
- Simplicity . kept questions simple at the lowest common denominator
- Question types . included a higher proportion of closed questions as they are generally easier and quicker to answer. Closed questions were also used in places where deeper insight into issues being investigated was needed. The researcher made every possible attempt to avoid double-barrelled, leading, loaded, positively worded, negatively worded and ambiguous questions.
- Structured . To get responses from the population in a standard format that is statistical-analysis ready and in the process enhancing study validity.
- Presentation . Weight was placed on the external appearance of instrument, to have flow, among other things.

### **3.2.2.5 Justification of Census approach**

Using surveys, it is possible to collect data through administrative means, a sample or a census. In the context of this research, population refers to the universal set of all potential respondents, which in this case entails all the employees of Teichmann Plant Hire (Pty) Ltd located in South Africa, Namibia and Zambia. A sample on the other hand refers to only a subset of the population in question and can be derived using a number of possible approaches. One example would be a representative sample of 50 Teichmann employees selected by probability stratified random sampling technique, based on proportion of employees in that country at the exact time of survey, at 95% confidence interval with each of 3 countries represented considered as a strata.

For the reasons listed below, the present study targeted the entire population by means of a census (Denscombe, 2009):

- The total number of all employees targeted is 148, meaning that the population was small and therefore manageable in terms of time, cost and effort.
- It was practical, cheap and easy to reach all 148 subjects through email and online avenues. The researcher asked for permission to company global distribution lists.
- Absence of sampling errors since all population elements were given an equal probability to partake in the survey. Assuming a higher response rate, the findings are generalizable to the entire organisation with greater confidence and greater precision.
- A census has wide and inclusive coverage.

According to the Research Advisors (2006), given a population of 150, a researcher should target at least 108 responses. If attained, this response rate will guarantee a 95% confidence level and consequently 5% margin of error. With a total population of 148 in Teichmann Plant Hire (Pty) Ltd, a response rate of 107 was therefore targeted to achieve the above-stated level of statistical significance.

### 3.3 Overview of possible methods

It is important to note that alternative methods could have been used for this study. These are listed below alongside their strengths, weaknesses and reasons why the researcher did not employ them.

#### 3.3.1 Case Study

The case study method examines a single case in a detailed structured way. It is useful when detailed knowledge is required about the case itself or the researcher's hypothesis on the case. From literature reviewed, the case study method was evidently the most common research approach in ERP system success and failure studies. Among other ERP system researches, the method has been used by several scholars including (Venugopal and Rao, 2011), (Stanciu and Tinca, 2013), (Plant and Willcocks, 2007a) as well as (Saatçioglu, 2009).

#### *Advantages*

- The best method for examining a single case
- Produces most detailed knowledge about the case under study

#### *Disadvantages*

- Bias makes it difficult to extrapolate results from one case to another confidently, despite some similarities in the cases.
- Subjectivity is inherent in case studies
- Risk of losing focus in a case method. In other words, deviating from the hypotheses being tested and the conversation drifting.

#### *Reasons not used*

- The impact of staff turnover on organisational history.
- Some of the former employees who were part of the ERP implementations are still contactable but there were doubts about reliability of data they would provide since this can be influenced by the circumstances under which they left.

- There were gaps in the source material for the two failed projects.

### 3.3.2 *Personal Interviews*

Personal interviews are a subset of survey-based research design. They are used when a researcher wants to elicit information from a limited pool of resource persons who are presumed to not only be representative of the population at hand, but also to possess the facts sought in sufficient quantity and quality (Hofstee, 2006). Personal interviews, in structured, semi-structured or unstructured formations, have been used in ERP research before and common cases involve researchers asking for insight from executive managers, ERP project managers, ERP vendors, ERP consultants (implementation partners), ERP steering committees and ERP project members in general. This can be done as a standalone approach or in complementarity with other research designs already employed in the same study with the ultimate objective of improving validity, reliability and generalisability of findings (Dörnyei and Griffee, 2010). This research design was used by Beheshti et al. (2014) in their selection and critical success factors in successful ERP implementation study.

#### *Advantages*

- Offer interviewer opportunities to establish rapport and motivate respondents
- Opportunity to clarify questions, clear doubts and/or add more questions
- Can read nonverbal cues such as body language
- Interview can be recorded with permission
- Chance to use rich computer assisted telephone interviewing (CATI) techniques

#### *Disadvantages*

- Inherent interviewer bias
- Costs more with increased geography
- Respondent confidentiality concerns

- Time constraints

*Reasons not used*

- Concern about keeping identity of respondents confidential as per ethical commitment made in the informed consent document.
- Not enough time to personally reach out all 148 geographically dispersed respondents
- Not enough financial resources available to reach all respondents in 3 countries

*3.3.3 Focus Groups*

Focus groups consist of teams of subject matter experts assembled to discuss a topic on which information is sought. Typically, they are made up of 10 respondents and a moderator who sit for about 2 hours to share their impressions, interpretations and opinions on the topic under discussion (Sekaran and Bougie, 2013).

*Advantages*

- Relatively inexpensive
- Can provide dependable data within a short space of time
- Offer genuine and spontaneous opinions and feelings of respondents on a topic

*Disadvantages*

- Requires experts to be available for subject under investigation
- Suffers from representation issues and therefore inferring the findings to the entire population may be problematic.

*Reasons not used*

- No such experts on ERP systems existed in Teichmann Plant Hire (Pty) Ltd.
- Inference problems from focus group to population.
- The need to keep the confidentiality of respondents.

### 3.3.4 *Extended Literature Reviews*

Extended literature review research design is undertaken to provide an overview, based mainly on secondary sources, of scholarly work done in a part of a field or the field in total (Bryman and Bell, 2011). This design was rigorously applied by (Khaparde, 2012) in reviewing 200 papers to uncover barriers of ERP while implementing ERP+.

#### *Advantages*

- Quick and easy to address research objectives and questions at hand based on previous work of other scholars

#### *Disadvantages*

- Literature reviews rely on secondary data and therefore cannot produce anything substantially new
- They take a lot of reading, therefore posed risk of not completing dissertation on time
- Different environment, contexts and weaknesses in the specific literature reviewed.
- Literature reviews suffer from researcher bias.

#### *Reasons not used*

- Organisations are by their very nature different and as such a Teichmann specific study had to be conducted. The study itself was investigating an IT topic and given the rapid pace of change in this domain, credible findings of yesterday may be outdated today.

### **3.4 Research Instruments**

#### *3.4.1 Research Instrument*

As afore-mentioned, this study employed a multi-method approach. The first objective was fulfilled through qualitative content analysis of contemporary ERP literature. To address the second and third objectives, a structured questionnaire survey was partly used. The method is commonly used in business and management research (Baker and Foy, 2008). The questionnaire (refer to Appendix B), comprising 56 items, was divided into eight major sections (A to H) designed to elicit the following kinds of information:

- Respondent demographics (excluding anything that could identify respondent)
- Respondent views on the causes of ERP system implementation failures. In other words this section was testing the presence or lack of ERP Critical Success Factors, as derived from literature review, within the Teichmann environment.
- Respondent views on change management initiatives required to turn the failures into success stories. This section was aimed at producing a cocktail of changes necessary to ensure success in future ERP implementations.
- Finally, a qualitative section H allowed respondents to express their ERP enhancing suggestions freely on the topic at hand.

As already covered under Questionnaire Design Implications (3.2.2.4), best practice was followed in ensuring that questions were simple, concise and free from any IT technical jargon. Questionnaire completion time was also given due attention since most target respondents were time constrained. Expert review of questionnaire design was done by the researcher's supervisor who paid close attention to its effectiveness in the areas of validity, reliability and representativity. The questionnaire was also subjected to pre-testing using 12 Teichmann DRC employees. These 12 employees were not part of the main study but possessed similar demographic profiles to target population. Pre-testing was aimed at identifying any gaps and modifying the questionnaire appropriately before the main survey was done. After pre-testing changes were made, the questionnaire was pilot

tested among a representative sample of 12 employees from Teichmann Plant Hire (Pty) Ltd and modified accordingly to ensure that the researcher and the respondents had the same question interpretation. Table 3.2 summaries material changes made to the questionnaire instrument as a result of pre-testing and pilot testing exercises:

<b>Issue raised</b>	<b>Description</b>	<b>Remedial action</b>
Time	Respondents were time constrained and asked for number of questions to be reduced.	The researcher limited questions to relevancy and reduced total number to only 56.
Wording	Some technical IT words were not interpreted correctly by business respondents.	The questionnaire was made IT-jargon free to facilitate effective communication at all respondent levels.
Sections	The need for sectioning was raised.	In response to the voice of the testers, eight clear sections were introduced. In addition, the order and layout of questions was changed to enhance flow and motivate the respondent to get to the finishing point.
Layout	Poor interface design	Utilities, styles and templates available in QuestionPro were used to make the user interface design elegant and presentable.
Scales	The 7-point Likert scale was very unpopular with pilot and pre-test respondents. They considered it too cumbersome to choose from.	Two response categories namely <del>slightly agree</del> and <del>slightly disagree</del> were dropped resulting in only a 5-point Likert scale.

<b>Issue raised</b>	<b>Description</b>	<b>Remedial action</b>
Confidentiality	Justifiably, respondents raised anonymity concerns on questionnaires sent to them via email for completion and return.	The option to email a questionnaire to users for completion was dropped completely and replaced with QuestionPro online survey. Only the survey link was transmitted by email.

Table 3.2: Changes to research instrument emanating from pre and pilot testing

Remedial action on instrument had important implications on quality of data collected, research findings and prevented the case of unlike terms being compared due to slight differences in syntax and semantics. Based on ease of access to the target population, the questionnaire was deployed in QuestionPro, a web-based survey platform. To reduce non-response, emails shown in Table 3.3 were sent out through distribution lists of Teichmann employees working in South Africa, Namibia and Zambia:

<b>Email</b>	<b>Date sent</b>	<b>Purpose</b>
1	13/03/2015	An introductory and courtesy email was sent out to ask for participant input and cooperation in an online survey to be soon published. The objectives of the survey were clearly stated and it was made categorically clear that participation was purely voluntary.
2	25/03/2015	An email with link to the online survey was released. NB: An online version of the informed consent forms part of this survey. This was done to protect respondent identity.
3	30/03/2015	First reminder to all participants to complete the online survey if they have not done so already. Reminder email contained a link to the survey.
4	06/04/2015	Second and final reminder to all participants to complete the online survey if they have not done so already. Again, reminder contained a link to the survey.

Table 3.3: Sequence of emails sent out to participants to maximise response rate

### *3.4.2 Data management*

Data collected using QuestionPro was exported to Microsoft Excel 2013 and then imported into SPSS (Statistical Package for Social Science) ver 22.0 for quantitative analysis. Since poor data analysis is a precursor to incorrect results and biased findings (Sekaran and Bougie, 2013), the researcher gave weight to the following issues:

- Data coding
- Data clean-up
- Statistical treatment of missing (null) values.

The data itself comprised mainly interval variables measured on a 5-point Likert scale to facilitate calculation of statistical means for each variable.

### *3.4.3 Analysis of the Data*

Descriptive statistics was extensively used as the analytical tool on collected data to turn it into information and evidence. The following descriptive statistics summary measures were applied on data collected from the online survey (Wegner, 2010):

- Mean, standard deviation and range for variables of a continuous type. The arithmetic mean was computed for central tendency measurement. Similarly, the range, variance and standard deviation was used as measures of dispersion in the responses collected.
- Percentages and frequency distributions were computed and interpreted for categorical variables
- Two-sided Chi-square tests at 0.05 level of significance to find associations between categorical variables.

### 3.5 Limitations

This study, just like any other academic work, is by no means a perfect one, however its findings are still reliable. The weaknesses of the study can potentially affect the reliability of findings or the extent to which the findings are generalisable. The study could have been done differently through a mixed methods research design comprising case studies, focus group interviews as well as structured and semi-structured interviews using the segmented approach as depicted in Table 3.4.

Target Group	Research design
Teichmann Management Teichmann ERP Project Management	Personal semi-structured interviews
ERP Project team (Internal members)	Focus Group plus semi-structured personal interviews
ERP Consultants and Vendors	Focus Group plus semi-structured personal interviews
ERP Users in the business	Structured questionnaire
All Groups	Case study

Table 3.4: Mixed method as an alternative research design for this study

The proposed alternative research design was not possible for the following reasons:

- The two previous ERP implementations have seen relationships deteriorate beyond salvage among management, ERP vendors and ERP implementation partners. It was therefore impossible to solicit unbiased input from external parties. The situation was further exacerbated by staff exodus in Teichmann Plant Hire (Pty) Ltd. The bulk of the bearers of organisational history around the ERP systems have since left the company and therefore were not available and unwilling to partake in this survey.
- Time and resource constraints to complete the dissertation using a mixed method approach in quest for perfection.

- There were ethical issues involved. On account of the sensitivity of some of the questions, respondents would have felt uncomfortable sharing their views in an open forum for fear of victimisation.

### **3.6 Ethical considerations**

Ethical clearance for this study (refer to Appendix C) was approved and fully granted by the Ethics committee of the University of KwaZulu-Natal. Every respondent participated voluntarily with no undue pressure as evidenced by completion of mandatory informed consent online before any survey could begin. Furthermore, it was made clear to participants that they could opt out of the study at any point without penalty if they so desired. Confidentiality of participants was given high priority and there were no identifiers on the questionnaire instrument traceable to the respondent.

### **3.7 Summary**

In this chapter, a mixed method research design used was presented and discussed. The first objective on identifying Critical Success Factors was satisfied qualitatively through content analysis. A combination of quantitative and qualitative analysis was employed for the second and third research objectives using the entire population (148) of Teichmann Plant Hire (Pty) Ltd. The researcher also offered alternative approaches to reaching more valid and reliable conclusions and answers to research questions at hand. Having administered the data collection instrument online using the web-based QuestionPro survey portal using a census and reviewed ERP literature for Critical Success Factors, the next chapter will among others refer to both qualitative and quantitative methods to present data and turn it into research evidence and information.

## Chapter 4 Presentation and Discussion of Results

### 4.1 Introduction

This chapter presents and discusses the research findings. It is organised into three major sections namely quantitative analysis, qualitative analysis and an overall interpretation and discussion of the findings.

### 4.2 Quantitative Analysis

An electronic survey link was distributed to all 148 Teichmann employees. Out of 148 surveys, 103 complete responses were received, giving a 70% complete response rate. A further 38 respondents started the survey but failed to entirely complete the questionnaire, giving an incomplete response rate of 25%. However it is important to note that completed sections from the 38 incomplete questionnaires were used in the analysis. About 5% of the target population chose to exercise their right not to participate in this study. Results for Sections A to G are presented and discussed hereunder.

#### ***Section A: Demographics***

##### 4.2.1 Country of operation

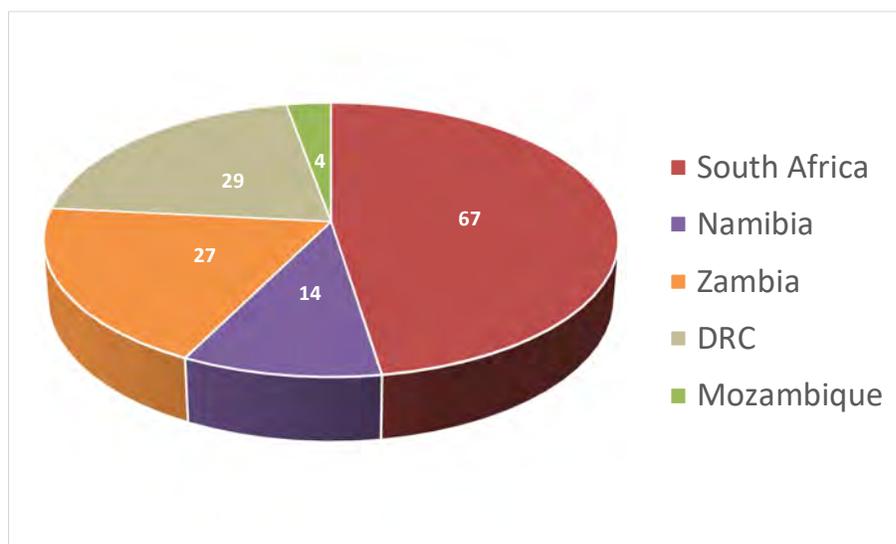


Figure 4.1: Respondent territory

The majority of respondents were from South Africa (N= 67; 47.5%), and Mozambique was the least represented in the sample population (N= 4; 2.8%). South Africa had the highest response rate partly because it is currently the data processing hub for the Teichmann Group and consequently houses the highest number of information workers. The DRC territory attracted 29 respondents, all of which were exclusive of the 12 used in the pilot study.

#### 4.2.2 Job status



Figure 4.2: Job Status of Respondent

Two major categories of employees contributed over two-thirds of total responses. These were namely non-managerial positions (N= 53; 37.6%) and middle management staff (N=43; 30.5%). These results are consistent with Baltzan's classification of information systems into organisation levels at which they are consumed. According to Baltzan, ERP systems and other transaction processing systems mainly appeal to operational employees who employ them for recurring structured decision-making purposes. There was notable low response among the 15 company executives (N=5; 3.5%) and this can be explained by limited knowledge and analytic functions embedded in ERP systems. To make unstructured decisions, executives rely on knowledge, analytics and intuition and information systems in the

range of artificial intelligence or executive information systems have more appeal to this level of managers than ERP systems.

#### 4.2.3 Length of service



Figure 4.3: Length of respondent service in Teichmann

About half of the total respondent population (70/141) is relatively new staff with less than 2 years service (N=70; 50%). This rate of new entry has its roots in high staff turnover trends in the company as well as the business growth trajectory. The ratio of new employees to old employees is in balance. Some schools of thought would view it in positive light in the context of implementing an ERP system because new employees are less likely to be as resistant to ERP-induced change as longer service employees. In addition, the 50% legacy employees can be strategically used as custodians of organisational history to fast track infusion of business processes in the new staff. Other schools of thought view it from a team dynamics perspective and argue that a 50% ratio of new to old employees is counter-productive since traditionally group performance suffers in early forming and storming team development stages. As an example, new employees may attempt to bring on board practices and cultures from their previous companies and inadvertently create conflict with longer service staffers. Thus, from merely looking at the company demographics, the need for change management becomes evident

as Teichmann attempts to merge two different sets of diverse employees into a united new ERP implementation front.

#### 4.2.4 Work experience

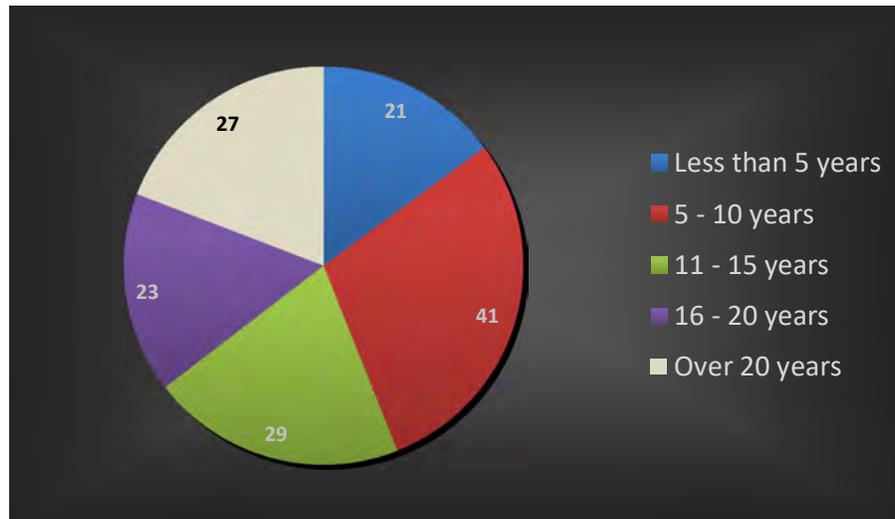


Figure 4.4: Total work experience of respondent

Slightly over 85% of total respondents have in excess of 5 years working experience. If this experience is harvested, Teichmann is in a better position to craft the best business processes for implementation in the new ERP system. Instead of looking outside of the organisation for costly consulting services, the combined staff experience can be effectively and cheaply used to avoid common ERP implementation pitfalls. Employees with less than 5 years total working experience, the generation Ys, can have their professional development accelerated through mentorship by the seasoned and more experienced employees before, during and after the ERP implementation.

#### 4.2.5 Education level

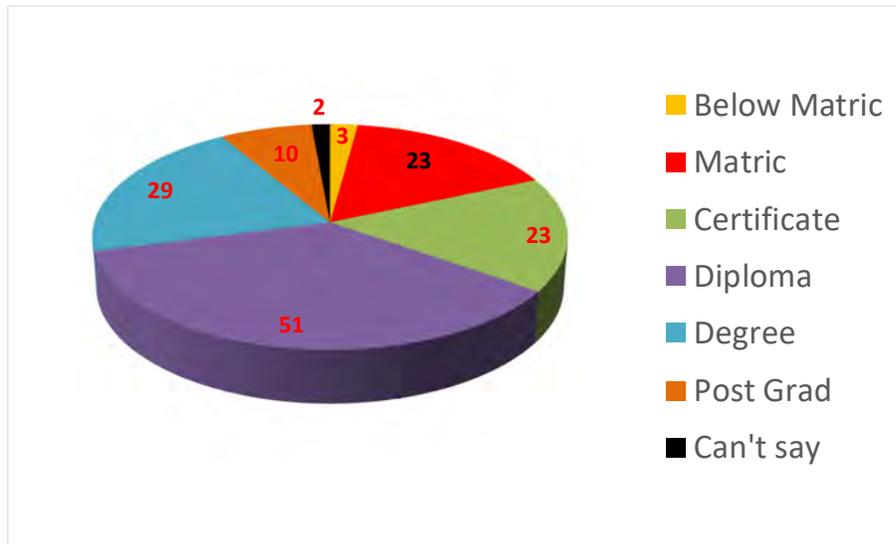


Figure 4.5: Highest education level attained by respondent

Teichmann Plant Hire boasts of a good literacy rate when benchmarked with national statistics. About 97% of respondents attained an educational level of at least Matric with about half of total respondents having achieved Diploma education level. Education level of employees is a proxy barometer for an organisation's learning ability and willingness to embrace the winds of change that ERP can bring. In a South African environment where skills mismatch is a norm, Teichmann is in a vantage position to start a new ERP implementation effort. In most cases, people issues pose the greatest risk to ERP implementation. Fortunately, Teichmann appears to possess a well-educated, agile and therefore trainable work-force. This is an ERP enabler in itself since the bulk of the training budget can be well spent in training employees on core ERP functions as opposed to investing in add-on preliminary courses to close employee skill gaps.

#### 4.2.6 Business functional area

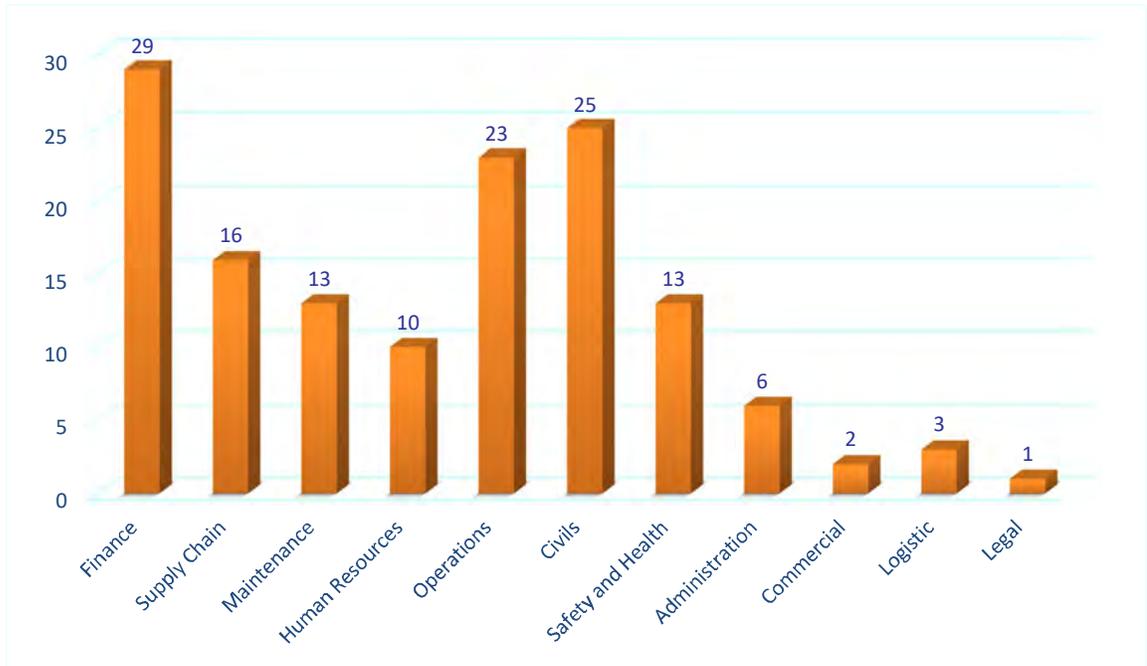


Figure 4.6: Business functional area assigned

This research cumulatively attracted 55% responses from three departments namely Finance, Civils and Operations departments. These departments are at the core of the company's business and are possibly enduring the most pain, the result of silo-based and dis-integrated currently running information systems.

#### 4.2.7 Computer application usage

Which computer application helps you the most in your work		
	Frequency	Percent
Email	56	39.7
Excel	39	27.7
Pastel	6	4.3
Ellipse	19	13.5
VIP	3	2.1
Project	4	2.8
CCS	8	5.7
MS Word	4	2.8
MS Power Point	1	0.7
Sage	1	0.7
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.1: Most used computer application

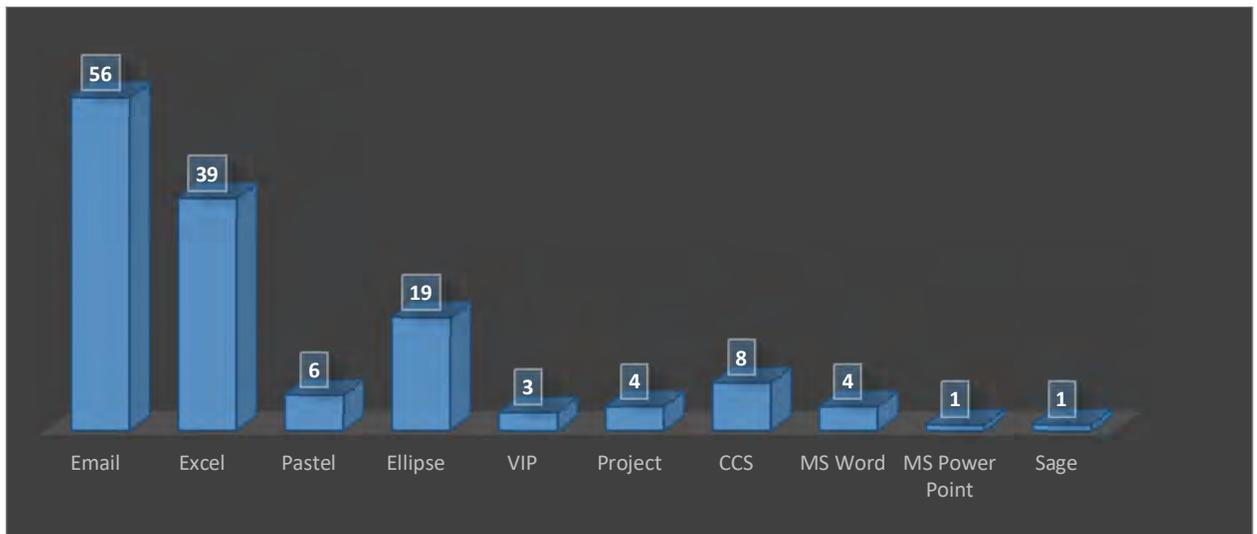


Figure 4.7: Most used computer application

This research revealed that the current line of business ERP system is considered to be the most useful tool for accomplishing tasks by a minority of the work force (N=19; 13.5%). Some authorities have described this trend as ERP usage failure. The vast majority of employees predominantly use Email and Excel to meet their

deliverables. Business processes are being conducted on Excel with email being employed as a vehicle for collaborating on those spreadsheets.

#### 4.2.8 Frequency of usage of computer systems

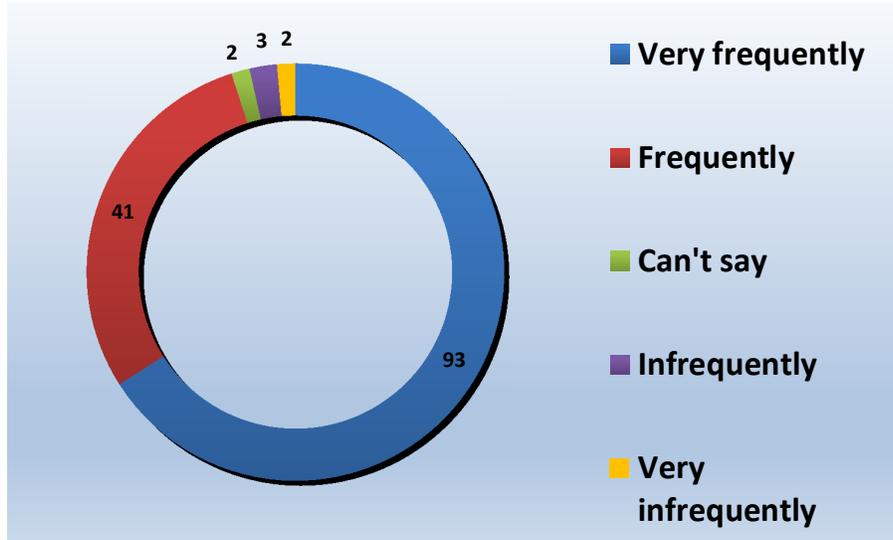


Figure 4.8: Frequency of computer system usage of respondent

Research results indicated that usage of computer systems is very extensive at Teichmann (95%), a trend attributable to the information age, the distributed nature of the company's operations, employee literacy levels and the ubiquity of computer applications in the business (Sage Pastel, CCS, MS Office, VIP etc.). Worryingly, in comparison to other systems deployed, only 14% (N=19) of respondents rated Ellipse as the most helpful application for meeting their work deliverables.

#### 4.2.9 Quality of IT and Communications

Rate the quality of IT and Communication links		
	Frequency	Percent
Very good	28	19.9
Good	75	53.2
Can't say	17	12.1
Poor	18	12.8
Very poor	3	2.1
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.2: Respondents rate IT and Communication links

Overall, respondents appreciated the quality of IT and communication infrastructure at their sites. About 20% rated it very good and 53% good. Nevertheless, 12.8% and 2.1% deemed site IT services poor and very poor respectively. In order to get a full understanding of this result, a series of cross-tabulation was performed to see whether this rating of IT and Communications changed according to the respondents' job status, country and education level. A chi-square test for independence was performed. Table 4.3 summarises the Chi-square test outcomes.

	<i>P-Value</i>	<i>Phi</i>	<b>Chi-square</b>
Quality of IT and Communication systems			
Job status	.480	.333	15.62
Country	.005*	.493	34.266
Educational level	.270	.444	27.756

Table 4.3: Chi-square test for independence

The Chi-square test shows that there is a significant relationship between the country and the rating assigned to quality of IT and communications ( $p = .005$ ), whereas, the rating did not significantly vary according to the job and education level. Furthermore comparisons were made between user ratings of IT services and the computer application they find most helpful; but once again no significant association was established. Table 4.4 details how respondents working in different countries rated IT and communication systems.

			<b>Country</b>					<b>Row Total</b>
			<b>RSA</b>	<b>Namibia</b>	<b>Zambia</b>	<b>DRC</b>	<b>Moza</b>	
<b>Rate the quality of IT and communication</b>	Very good	Count	22	1	4	1	0	28
		%	15.6%	0.7%	2.8%	0.7%	0.0%	19.9%
	Good	Count	29	9	20	14	3	75
		%	20.6%	6.4%	14.2%	9.9%	2.1%	53.2%
	Can't say	Count	9	1	0	6	1	17
		%	6.4%	0.7%	0.0%	4.3%	0.7%	12.1%
	Poor	Count	4	3	3	8	0	18
		%	2.8%	2.1%	2.1%	5.7%	0.0%	12.8%
	Very poor	Count	3	0	0	0	0	3
		%	2.1%	0.0%	0.0%	0.0%	0.0%	2.1%
<b>Column Total</b>		<b>Count</b>	<b>67</b>	<b>14</b>	<b>27</b>	<b>29</b>	<b>4</b>	<b>141</b>
		<b>%</b>	<b>47.5%</b>	<b>9.9%</b>	<b>19.1%</b>	<b>20.6%</b>	<b>2.8%</b>	<b>100.0%</b>

Table 4.4: Respondent ratings of IT and communications per territory

From table 4.4, 18 participants (12.8%) rated IT services poorly. Amongst those 18 participants, 4 (i.e. 2.8% within the 12.8%) are from South Africa, 3 from Namibia, 3 based in Zambia, and 8 from DRC. It appears that the sites in DRC need more attention in terms of improving quality of IT and communications infrastructure. Two previous ERP implementations in Teichmann failed partly because of limitations in routing and remote accessibility over vSat links from some areas of business presence. On a positive note, communication technologies have improved in the past 5 years, compression tools to streamline ERP traffic over slow links have been availed and lighter web-native ERP protocols such as SaaS are now available as options to businesses intent on harnessing the power of integrated ERP systems.

#### 4.2.10 Teichmann's intention to roll out a Group wide ERP system

<b>Are you aware of Teichmann's intention to roll out a Group wide ERP system</b>			
		Frequency	Percent
	No	82	58.2
	Yes	59	41.8
	<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.5: User awareness on new ERP initiatives

The results show that the majority (58.2%) are not aware of the company's intention to rollout a group-wide ERP system. To further the analysis, a chi-square test for independence was performed to understand how the responses differed among respondent groups. It appeared that the awareness of Teichmann's intention to roll out a Group wide ERP significantly differed across business functional areas. Respondents from the various functional areas have different level of awareness about this information ( $p = .000$ ;  $\Phi = .534$ ;  $\text{Chi-Square} = 40.13$ ). Table 4.6 details how participants responded to this question according to their business functional areas:

			Awareness Levels		Total
			No	Yes	
<b>Business functional area</b>	Finance	Count	6	23	29
		%	4.3%	16.3%	20.6%
	Supply Chain	Count	10	6	16
		%	7.1%	4.3%	11.3%
	Maintenance	Count	8	5	13
		%	5.7%	3.5%	9.2%
	Human Resources	Count	5	5	10
		%	3.5%	3.5%	7.1%
	Operations	Count	13	10	23
		%	9.2%	7.1%	16.3%
	Civils	Count	25	0	25
		%	17.7%	0.0%	17.7%
	Safety and Health	Count	10	3	13
		%	7.1%	2.1%	9.2%
	Administration	Count	2	4	6
		%	1.4%	2.8%	4.3%
	Commercial	Count	1	1	2
		%	0.7%	0.7%	1.4%
	Logistics	Count	2	1	3
		%	1.4%	0.7%	2.1%
Legal	Count	0	1	1	
	%	0.0%	0.7%	0.7%	
<b>Total</b>		<b>Count</b>	<b>82</b>	<b>59</b>	<b>141</b>
		<b>%</b>	<b>58.2%</b>	<b>41.8%</b>	<b>100.0%</b>

Table 4.6: User awareness of new ERP initiatives per business functional area

From Table 4.6, while the better part of respondents from Finance (23 are aware and 6 are not) reported being aware of the intention to roll out a group-wide ERP system, respondents from Civils department (25 unaware, and 0 aware) were all unaware of this business intention. This finding is consistent with the percentage of persons who have been involved in an ERP system implementation at some stage in their career (see Table 4.7).

#### 4.2.11 Have you ever been involved in an ERP system implementation before?

	Frequency	Percent
No	88	62.4
Yes	53	37.6
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.7: Previous respondent exposure to the world of ERPs

Table 4.7 shows that the greater part of respondents (62.4%) has never been involved in ERP implementations. A close analysis at the differences within groups reveals that answers differed significantly according to business functional area.

Table 4.8 provides the detailed results matched with functional areas.

Have you ever been involved in an ERP system implementation before?					
			No	Yes	
<b>Business Area</b>	Finance	Count	8	21	29
		%	5.7%	14.9%	20.6%
	Supply Chain	Count	9	7	16
		%	6.4%	5.0%	11.3%
	Maintenance	Count	10	3	13
		%	7.1%	2.1%	9.2%
	Human Resources	Count	5	5	10
		%	3.5%	3.5%	7.1%
	Operations	Count	14	9	23
		%	9.9%	6.4%	16.3%
	Civils	Count	23	2	25
		%	16.3%	1.4%	17.7%
	Safety and Health	Count	11	2	13
		%	7.8%	1.4%	9.2%
	Administration	Count	4	2	6
		%	2.8%	1.4%	4.3%
	Commercial	Count	1	1	2
		%	0.7%	0.7%	1.4%
	Logistic	Count	2	1	3
		%	1.4%	0.7%	2.1%
Legal	Count	1	0	1	
	%	0.7%	0.0%	0.7%	
<b>Total</b>		<b>Count</b>	<b>88</b>	<b>53</b>	<b>141</b>
		<b>%</b>	<b>62.4%</b>	<b>37.6%</b>	<b>100.0%</b>

Table 4.8: Previous ERP involvement per functional area

Once again it appears that the Financials department is more exposed to the use of ERP than other departments in the Teichmann business. On a global level, trying to implement an ERP system in an environment where 62% of the employees have had no previous exposure to such a system places a heavy burden on the organisation in terms of managing change as well as steering the business towards ERP readiness.

#### 4.2.12 Willingness to adopt a ERP system

<b>Rate your willingness to adopt a new ERP system in Teichmann</b>		
	Frequency	Percent
Extremely willing	51	36.2
Very willing	65	46.1
Moderately willing	20	14.2
Slightly willing	3	2.1
Extremely unwilling	2	1.4
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.9: Measure of willingness to embrace a new ERP system

Questioned about the extent of their willingness to embrace a new ERP system in Teichmann, over 82% of participants expressed a strong desire. This is an opportunity for Teichmann because, all other things being equal, the ERP implementation process is assured a path of least resistance. In that regard, management should take cognisance of employee ERP interest levels and seize the opportunity to effectively communicate the business case of the new system. If done precisely, the same employees can begin to serve as new ERP brand evangelists in the business and could ultimately increase both awareness and adoption rates. Chi-square tests were subsequently performed on response data as depicted in Table 4.10 to establish if significant associations existed between job status and willingness to adopt a new ERP system, as well as job status of respondent and their previous involvement in ERP implementation projects.

	<i>P-Value</i>	<i>Phi</i>	<i>Chi-square</i>
	Job Status		
Willingness to adopt ERP	.135	.397	22.261
Involvement in ERP	.179	.211	6.289

Table 4.10: Associating respondent job status with ERP adoption willingness and prior ERP project involvement

As seen in table 4.10, there is no significant relationship between job status of respondents and the willingness to adopt ERP ( $p = .135 > .005$ ), and prior involvement in ERP implementations ( $p = .179 > .005$ ). There being no evident relationship, the organisation could therefore apply universal ERP prescriptions across all employee classes as opposed to the costly segmentation approaches.

**Section B: Business requirements, processes and project scope**

<b>Descriptive Statistics</b>					
<b>Item</b>	<b>Description</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Std. Deviation</b>
B1	Clarity of Business Requirements/Needs	1	5	2.86	.958
B2	Business Process Mapping	1	5	2.77	.940
B3	Business Process Re-engineering	1	5	2.92	1.005
B4	End user involvement	1	5	2.91	1.053
B5	Clarity of ERP scope and boundaries	1	5	2.86	.974
B6	Level of ERP customisation	1	5	2.99	1.019
B7	ERP implementation methodology	1	5	3.01	1.057

Table 4.11: Aggregate responses Business Requirements, Processes etc.

Table 4.11 provides the mean and standard deviation for each response item B1-B7. From the means, it appears that most of the respondents disagree with the statements (means < 3) except for B7 (ERP implementation methodology) which was barely superior to 3.0. In order to get a full understanding of the way statements were appraised by respondents, Table 4.12 below provides detailed information about how each statement was rated.

Items	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
B1	5	3.9	49	38.8	39	30.2	31	24	5	3.9
B2	6	4.7	54	41.9	36	27.6	3	23.3	3	2.3
B3	7	5.4	41	31.8	44	34.1	29	22.5	8	6.2
B4	6	4.7	48	37.2	37	28.7	27	20.9	11	8.5
B5	5	3.9	50	38.8	38	29.5	30	23.3	6	4.7
B6	9	7.0	35	27.1	38	29.5	42	32.6	5	3.9
B7	8	6.2	36	27.9	43	33.3	31	24.0	11	8.5

Table 4.12: Detailed responses Business Requirements, Processes etc.

B1	Business requirements from an ERP system are clear and un-ambiguous
B2	Current (as-is) and desired (to-be) business processes are clearly mapped out
B3	Broken business processes are re-engineered before ERP implementations
B4	End users are fully involved in ERP requirements and business process modelling
B5	ERP project scope is clear and project boundaries are clearly demarcated
B6	Functionality implemented is kept simple and customisation is reduced to essentials
B7	The business implements ERP systems in smaller phases as opposed to big bangs

Table 4.12 shows that, for example, 38.8% (N=49) of participants do not agree that business needs from an ERP system are clearly spelt out, while only 24% (N= 31) believe the opposite is true. Surprisingly, 30.2% (N= 39) of respondents neither agreed nor disagreed with the statement B1 (Clarity of Business Requirements/Needs).

### **Section C: Top management and commitment to ERP causes**

<b>Descriptive Statistics</b>					
Item	Description	Min	Max	Mean	Std. Deviation
C1	Level of Top Management involvement in ERPs	1	5	2.96	1.165
C2	Do Managers actively use ERP systems?	1	5	2.87	1.161
C3	Adequacy of ERP resource allocations?	1	5	2.85	1.020
C4	How realistic are ERP expectations?	1	5	2.98	1.040
C5	ERP Project Sponsorship?	1	5	2.86	1.007
C6	ERP and Staff turnover?	1	5	2.82	1.044

Table 4.13: Aggregate responses on the role of Top Management in ERP Projects

It appears from the descriptive statistics in Table 4.13, that the bulk of respondents disagreed with the statements ( $2.82 \geq \text{Mean} \leq 2.98$ ), the standard deviation (all  $> 1$ ) also reflects a discrepancy in the way respondents perceived the top management commitment to ERP causes. To further the analysis, the researcher also looked at how each statement was perceived in terms of the level provided by Likert scaling (strongly agree, agree etc.).

Items	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
<b>C1</b>	11	8.9	39	31.5	32	25.8	28	22.6	14	11.3
<b>C2</b>	16	12.9	34	27.4	34	27.4	30	24.2	10	8.1
<b>C3</b>	8	6.5	45	36.3	35	28.2	30	24.2	6	4.8
<b>C4</b>	6	4.8	43	34.7	30	24.2	38	30.6	7	5.6
<b>C5</b>	10	8.1	38	30.6	39	31.5	33	26.6	4	3.2
<b>C6</b>	12	9.7	37	29.8	43	34.7	25	20.2	7	5.6

Table 4.14: Detailed responses on the role of Top Management in ERP Projects

C1	Management is actively involved and visible from start to end in ERP implementations
C2	Management actively uses ERP systems and encourages ERP usage
C3	Full-time human resources are assigned to ERP project teams
C4	Top management expectations from ERP systems are realistic
C5	ERP projects are adequately sponsored and resourced
C6	Staff turnover in ERP system implementation teams is kept to a minimum

As can be seen in Tables 4.13 and 4.14, respondents mainly expressed the view that Top Management commitment to ERP implementations in Teichmann fell below levels required to guarantee successful ERP outcomes.

**Section D: The role of ERP Consultants**

Descriptive Statistics					
Item	Description	Min	Max	Mean	Std. Deviation
D1	ERP Vendor/Consultant selection criteria	1	5	2.90	.940
D2	Product knowledge	1	5	2.97	.927
D3	Business knowledge	1	5	2.94	.982
D4	Subservience to business	1	5	2.86	.965

Table 4.15: Responses on the role played by ERP consultants

D1	ERP consultants selection process is on objective grounds
D2	ERP consultants are value-adds and possess unquestionable ERP product knowledge
D3	ERP consultants engaged demonstrate strong business interest
D4	ERP consultants subordinate themselves to the business

The column Mean+ in Table 4.15 indicates that few respondents agreed with the statements related to the role of ERP consultants (Means all < 3). Table 4.16 details the responses obtained for each of the statements D1 to D4.

Item	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
D1	7	5,7	36	29,5	44	36,1	32	26,2	3	2,5
D2	5	4,1	35	28,7	45	36,9	33	27	4	3,3
D3	8	6,6	33	27	44	36,1	32	26,2	5	4,1
D4	9	7,4	34	27,9	49	40,2	25	20,5	5	4,1

Table 4.16: Detailed feedback on the role played by ERP consultants

From Table 4.16, it appears that most participants selected the neutral option of neither agreeing nor disagreeing. It might indicate that they have not enough information or sufficient expertise to respond to questions related to the role of ERP consultants. Such a situation was expected, given that a large percentage of respondents have not implemented any ERP system before, as well as considering the fact that 50% of all respondents were relatively new employees still trying to find their way in the business and toxic industrial relations of the past which depleted the corporate memory bank.

**Section E: ERP project management**

<b>Descriptive Statistics</b>					
Item	Description	Min	Max	Mean	Std. Deviation
E1	Appointment of Project Management from business	1	5	2.96	1.030
E2	Project Management and change management	1	5	2.91	.974
E3	Project team selection	1	5	3.04	1.108
E4	Motivation of Project teams	1	5	2.95	1.128
E5	Inclusiveness in system selection decision	1	5	2.94	1.058
E6	Project Management and ERP Risk mitigation	1	5	2.90	.940
E7	Delegation of authority to Project Mgt	1	5	2.86	1.012
E8	Presence of effective Steering Committees	1	5	2.83	1.047

Table 4.17: Respondent appraisal of Top Management commitment to ERPs

E1	ERP project managers are appointed from business functional areas as opposed to Information Technology (IT)
E2	ERP project managers are good at leadership and managing change
E3	ERP project members are carefully selected based on required competencies
E4	ERP project teams are energised, highly motivated and results-oriented
E5	ERP system selection is a transparent, all-inclusive process
E6	ERP project managers mitigate risks throughout the project life cycle
E7	ERP project managers have sufficient decision making authority
E8	Every ERP project in the business is overseen by a steering committee

Questions related to ERP project management indicate that respondents predominantly disagreed or were neutral with the statements. Table 4.18 provides detailed information on how the statements were rated following a five point Likert scale.

Items	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
E1	5	4,4	38	33,3	36	31,6	26	22,8	9	7,9
E2	5	4,4	38	33,3	39	34,2	26	22,8	6	5,3
E3	6	5,3	35	30,7	35	30,7	24	21,1	14	12,3
E4	9	7,9	36	31,6	33	28,9	24	21,1	12	10,5
E5	6	5,3	39	34,2	35	30,7	24	21,1	10	8,8
E6	5	4,4	36	31,6	43	37,7	25	21,9	5	4,4
E7	6	5,3	42	36,8	35	30,7	24	21,1	7	6,1
E8	9	7,9	40	35,1	32	28,1	27	23,7	6	5,3

Table 4.18: Detailed Respondent appraisal of Top Management commitment to ERPs

### **Section F: User involvement in ERP projects**

Descriptive Statistics					
Item	Description	Min	Max	Mean	Std. Deviation
F1	Adequacy and Timeliness of ERP user training	1	5	2.90	1.111
F2	How the ERP business case is sold?	1	5	2.88	1.148
F3	Employee sense of ERP ownership?	1	5	3.03	1.120

Table 4.19: Respondent appraisal of full End User involvement in ERP initiatives

Responding to questions on levels of user involvement, respondents predominantly disagreed or were neutral with the statements. Table 4.20 provides detailed information on how the statements were rated following a five point Likert scale.

Items	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
F1	5	4.3	48	41.7	30	26.1	18	15.7	14	12.2
F2	8	7.0	46	40.0	26	22.6	22	19.1	13	11.3
F3	6	5.2	39	33.9	29	25.2	28	24.3	13	11.3

Table 4.20: Detailed Respondent appraisal of full End User involvement in ERP initiatives

F1	Adequate training is delivered timeously to ERP users
F2	Employees are kept informed about the business case for ERP systems
F3	I have a sense of ownership of Teichmann ERP systems

**Section G: What must change in the company to usher ERP success?**

In this section of the survey, each respondent assumed the role of business decision maker and was allocated a fixed 100 virtual units of resources to use exclusively for turning around Teichmann ERP implementations. A total of 141 respondents exhausted their allocated budget of 100 resources (total 14100 units) and sliced and diced it among 15 competing resource consumption areas to give the results shown in descending mean order in Table 4.21. In other words suggested areas of change are ordered from the most important (highest mean) to the least important (lowest mean).

<b>Weights allocation (by descendant mean)</b>					
	Description	Mean	Min	Max	Std. Deviation
G9	Deliver sufficient and relevant ERP training to users	8.46	0	100	11.588
G2	Business process modelling and re-engineering	8.31	0	40	9.264
G4	Investment in change management	7.83	0	45	9.353
G1	Top management commitment	7.80	0	50	9.019
G5	Clarity of ERP scope and business case	6.55	0	100	10.068
G6	Right project team selection	5.67	0	100	10.206
G3	Good project management skills	4.52	0	50	7.335
G12	Right ERP package selection	4.21	0	100	10.245
G7	Appointment of ERP Project champions	4.04	0	30	6.138
G10	Effective business communication	3.44	0	20	5.028
G11	Proper ERP Vendor/Consultant selection	3.13	0	20	5.213
G13	Full user involvement at all ERP stages	2.56	0	30	4.856
G8	Minimally customise ERP functionality implemented	2.54	0	20	4.101
G15	User driven acceptance testing	2.12	0	25	4.310
G14	Management of business expectations	1.85	0	20	3.594

Table 4.21: ERP change priority list from the respondent perspective

The column %Mean+of Table 4.21 refers to the average number of the units allocated to a particular item by participants from their fixed budget of 100. For example, the average number of units assigned to change unit G14 (Management of business expectations) is 1.85, with 0 being the minimum and 20 the maximum. From survey results, it appears that change unit G9-User training (Mean=8.46; Rank=1) and G2-Business Process Engineering (Mean=8.31; Rank=2) were allocated the most units by respondents. Surprisingly at variance with literature, full user involvement in all ERP life cycle stages (Mean=2.56), ranked 12th on the resource allocation priority list followed closely in 13th position by going vanilla business processes (Mean=.54). The least amount of resources and change effort was assigned to managing business expectations (Mean=1.85; Rank = 15).

<b>G2: Business process modelling and re-engineering</b>		
<b>Number of units allocated</b>	<b>Count</b>	<b>Percentage</b>
40	2	1.4
30	5	3.5
25	3	2.1
20	18	12.8
15	6	4.3
10	28	19.9
9	1	.7
8	3	2.1
7	2	1.4
6	5	3.5
5	9	6.4
4	3	2.1
3	1	.7
0	55	39.0
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.22: Budget allocations to BPM and BPR by participants

As depicted in Table 4.22, the highest number of units assigned to BPM and BPR was 40 (N= 2; 1.4%). About 28 respondents assigned 10 units to G2 and 39% of respondents (N=55) did not see the need for BPR and therefore completely starved this item of resources.

<b>G9: Adequately train target ERP system users</b>		
<b>Number of units allocated</b>	<b>Count</b>	<b>Percentage</b>
100	1	.7
40	1	.7
30	5	3.5
25	2	1.4
20	15	10.6
15	8	5.7
10	28	19.9
9	1	.7
8	3	2.1
7	6	4.3
6	3	2.1
5	9	6.4
4	2	1.4
2	3	2.1
1	1	.7
0	53	37.6
<b>Total</b>	<b>141</b>	<b>100.0</b>

Table 4.23: Budget allocations to ERP User training by participants

Table 4.23 indicates that one respondent placed heavy emphasis on ERP user training by allocating all 100 units at his/her disposal to ERP user training. About 28 respondents allocated exactly a tenth of their total ERP budget to user training. The modal class (N=53; 38%) had other priorities and consequently channelled none of the resources to ERP user education.

### 4.3 Qualitative Analysis

Question 20 was qualitative in nature and sought to elicit suggestions on improving the success rates of ERP implementations in Teichmann. In total, 106 areas of suggestions were offered and then coded into 14 themes as ranked in Table 4.24.

Rank	Suggested Theme	%age
1	User awareness and Involvement	33.85
2	Build Group-wide consensus in actual package(s) selection	20.00
3	Adequate Training and Education	13.85
4	Business Process Mapping and Engineering	13.85
5	Ensure availability of IT support on Sites	12.31
6	Well-resourced ERP Project	10.77
7	Good Project Management skills	10.77
8	Top Management Support in all ERP phases	9.23
9	Fully integrated system	7.69
10	Pay attention to IT networks in remote site areas	7.69
11	Invest in Change Management	7.69
12	Simplicity. Limit Customisation	6.15
13	Don't integrate the business recklessly	4.62
14	Implement ERP in smaller phases / milestones	4.62

Table 4.24: Fourteen suggestion themes captured from qualitative responses

From the perspective of Teichmann respondents, two areas need the most urgent attention and these are user involvement and awareness as well as making ERP package selection an all-inclusive process. The need for adequate ERP system training and business process re-engineering was expressed by 13.9 percent of the respondents. 12% also indicated that Teichmann Group IT services must be decentralised to reach out to sites where these services are currently in very high demand compared to supply. The next two suggestion themes were centred on adequately resourcing the whole ERP project and ensuring good internal ERP project management skills (10.8% each). The rest of the suggestions were offered by less than 10% of the respondents and hence, could perhaps be put aside for further research.

#### 4.4 Discussion of Results

The lack of Top Management commitment to ERP projects manifested itself in a number of ways in this research. For instance, the survey attracted the least responses from the executive organisational level. Apart from that, dimensions of Section C of the survey revealed that the majority of respondents did not believe that top level support to ERP projects in Teichmann was at the right level. In fact, for dimensions C1-C6 on a 5-point Likert scale, the Mean response was between 2.82 and 2.98 with Standard Deviations all greater than 1. ERP literature is replete with failed implementations whose roots were inadequate commitment by executives. Baltzan and Phillips (2008) concluded that a lack of top management support gives way to under-estimation of the levels of planning and resourcing requirements of an ERP project. This view is buttressed by Somers and Nelson (2004) who argue that company executives must be prepared to get their hands dirty at all the ERP life cycle phases. Top management is often of the mistaken belief that their role in an ERP project starts and stops at project sponsorship. This view of the role of executives is a myopic one since it neglects more value-adding executive functions such as change management, communication of the ERP business case and management of organisational politics and conflict (Wong et al., 2005). It is through unwavering top management commitment, that a winning-oriented organisation can be created to flawlessly execute future ERP projects to the strategic advantage of the business (Murphy, 2006).

ERP systems are made for the broader market segment and come preloaded with best practice business models, which often results in misfits with firm-specific business processes (Yen et al., 2011). Most of these pre-loaded business models are either Euro or American centric. Thus, when an organisation adopts an ERP system, it is forced to either re-engineer its business processes to suite the models supported by the ERP or embark on the costly and often unsupported route of customizing/tailoring the ERP system around its specific business processes (Gattiker and Goodhue, 2002). Section B of the survey was dedicated to soliciting respondent views on the manner in which Teichmann approaches its business processes and business requirements in the context of ERP implementations. Results revealed that not enough attention is being given to both areas. In other

words, the business is taking huge risks by attempting ERP implementations without first addressing business requirements and business processes. It is important to note that ERP systems are only configurable to a certain extent and thus poor fits between ERP systems and business processes arise, leading to fatal disasters in some cases (Yen et al., 2011). The fact that Teichmann is not treating its ERP requirements and business processes in a structured way is a critical failure factor in itself. Among others, it brings to question the basis of the ERP package decisions made so far. As strongly argued by (Finney and Corbett, 2007), clear business requirements and well-engineered business processes are the bedrocks for a successful ERP system implementation.

The contribution of ERP system vendors and Consultants to the failing implementations was put under the spot light. Respondents questioned the objectivity of criteria used to select ERP vendors/consultants, product and business knowledge of implementation partners selected, as well as the level of business interest in vendors/consultants. For all dimensions D1 to D4, the mean outcomes were all below but close to 3, meaning that participants believed ERP consultants in Teichmann have in the past not added as much value to implementations as expected. These findings are at variance with literature which seems to view ERP consultants and implementing partners as rich repositories of both product specific and business specific knowledge. As a matter of fact, a 23% increase in the demand of ERP consulting skills was recorded between years 2013 and 2014 (Consulting, 2014). The negativity towards ERP consultants in the survey can thus be attributed to internal factors such as quality of Teichmann ERP project management skills. Consultants must therefore be effectively managed and where possible, delivery-triggered payment milestones put in place. In the absence of this strict project monitoring, runaway project costs not matched by outputs arise; leading to consultants who become permanent features on a client site (a true sign that knowledge transfer has not occurred).

An ERP system implementation should be an all-inclusive process from the start to the end in order to foster adoption, buy-in and manage project opposition (Wu et al., 2007). Users, as the process owners, must be genuinely engaged in co-creating ERP solutions. In the Teichmann context, this does not seem to be the case since

the majority of respondents rated ERP user involvement lowly (Mean  $\leq 3$ ). The rest of the respondents selected the neutral option of neither agreeing nor disagreeing. While user involvement is not common practice at Teichmann, a recent survey of IT executives ranked it (15.9%) as the most important ERP success factor (Standish, 2014). Times have changed and as such, the era of making closed door executive decisions and forcing them down on operational employees is now history. Employees expect to be treated as valuable assets and it is the little things like consulting them or seeking their input on a subject that will affect them, which make the difference between strategy supportive ERP project support and costly ERP project resistance.

Yet another silent ERP project killer is the in-competency of ERP project management as appointed by the implementing firm. Modern approaches now entail dual project management; a project manager appointed from the ERP vendor side and another one from the implementing business side. Key roles in which project management contribute to ERP failure include inadequate risk management, poor project team assembly, low motivation and job satisfaction of team members (Aloini et al., 2007). Once again, responses obtained seem to point to a deficit of project management related critical success factors in Teichmann. For instance, ERP project managers are not being drawn from business functional areas, the situation of which causes the resultant ERP systems to be viewed from a technical, as opposed to a business view point. The end result is often a technically optimised solution which hardly solves any business process problem on the ground (Stanciu and Tinca, 2013).

ERP systems are synonymous with change. They change organisational structures, business processes and even upset the power and politics equilibrium in organisations. Somers and Nelson (2001) researched the space of ERP failure and came up with a list of 22 specific factors where things must change in order to bring ERP success. It is however important to note that there is room to reduce the intimidating list by merging some of the factors. This research compressed the 22 critical success factors into 15 distinct dimensions and asked respondents to play a resource allocation role aimed at turning around Teichmann ERP experiences from failure to success. From the perspective of the participants, Teichmann was strongly

urged to focus its change efforts on staff training, business process re-engineering, increasing top management commitment to ERPs, honing internal project management skills, getting ERP project team selection right, proper consultant selection, selection of ERP brand with the most fit to business, full process owner involvement, to mention but a few. The suggestions by respondents were consistent with the 22 ERP critical success factor prescription as given by (Somers and Nelson, 2001) except that the order of importance differed. For instance, respondents ranked investment in change management third whereas this factor ranks 19<sup>th</sup> on the 22 CSF list, re-enforcing the need to treat each ERP implementing organisation differently.

The final section on the survey comprised an optional response qualitative question seeking further views from participants on change management initiatives aimed at positioning the business towards flawless executions of ERP systems in the future. Being an optional section, the question was attempted by only 65 out of the 141 respondents giving rise to 14 themes of continuous improvement. Top 5 themes suggested included full user involvement (34%), ERP Package selection decision (20%), adequate user training (14%), Business Process Re-engineering (14%) and On-site availability of ICT resources. Again, these suggestions/findings are consistent with change management initiatives proposed in this study, as well as Somers and Nelson (2001) identified list of ERP critical success factors. The need for on-site IT presence is explained by participant responses in the demographic section. Some of the business sites are so remote that they have never experienced on-site IT support. Remote support using technology has its place, and this place is certainly not found in successfully rolling out an ERP system. The Japanese believe in the principle of *Genchi Genbutsu* which means *Go out and see for yourself* and this has super-charged systems as the renowned Toyota Production System (Haghirian, 2010).

## **4.5 Key Study Findings**

The study produced key findings which are summarized per intended objective below:

### ***Establish critical ERP success factors based on literature***

- Tonnes of literature has been written on what authors claimed to be ERP CSFs
- Some CSFs featured more prominently and frequently across articles/literature reviewed for instance support of top management, change management, full user involvement, business process re-engineering, vendor and package selection decisions as well as ERP project management.
- Unfortunately, none of the so-called critical success factors has been empirically proven, thus it is difficult to objectively conclude true existence of cause and effect relationship between the CSF and success/failure ERP outcome (independent and dependant variables)

### ***Determine why ERP system implementations in Teichmann are failing***

- Inadequate end-user awareness and involvement
- Lack of correct dosage of executive management ERP support
- Lack of a high resolution picture of the future grounded in solid ERP business case.
- Flawed ERP system/package selection decisions
- New systems being superimposed on sick and often broken business processes (business process re-engineering)
- Ineffective and inadequate stakeholder training and education on ERP systems
- Poor IT and communications infrastructure in remote areas of business presence such as DRC territories.

***Establish change management initiatives to guarantee future flawless ERP project executions***

- Respondents stressed the strong need for relevant ERP training and evaluation
- Mapping and re-engineering of business processes (brown paper exercises) before any technical configuration can take place.
- The full support of top management manifested, for instance, in adequate project sponsorship, resourcing, leadership, conflict resolution and communication of the business case to all stakeholders.
- Clarity and non-ambiguity of ERP scope and business case
- Good ERP project team selection . right aptitude, competencies and willingness to go the extra mile in the project
- Good internal ERP project management skills
- Follow unbiased processes of ERP product selection. The aim is to settle for an ERP package(s) with the most fit to business requirements and processes.
- Draw ERP key role players from the business functions as opposed to technical.

**4.6 Summary**

The aim of this chapter was to derive answers to research questions from data collected from respondents. Important findings include massive change management required for any hope of a successful ERP implementation to be entertained. Specific areas that require concerted change management include commitment of executives towards ERPs and IT projects in general, increasing the level of end user awareness to the ERP business case, delivering sufficient and relevant training to all stakeholders, investment in business process modelling and re-engineering as well as objective selection of an ERP package that offers the best fit to business processes and user cultural considerations. On a positive note, demographics point to an organisation richly endowed with human capital and readiness to embrace a new system. Research findings were also discussed in the context of literature and it was clear that there is consistency between the scholarly literature and these findings. In the next chapter, a conclusive statement of the whole

study is given. This is followed by presentation of recommendations and suggestions for future areas of research in the domain of ERP project failure.

## **Chapter 5**

### **Recommendations and Conclusion**

#### **5.1 Introduction**

It is arguable that a well implemented and adopted ERP system serves as a rich source of competitive advantage to a firm facing uncertain business environments (Ram et al., 2014). The previous chapter presented, analysed and discussed research findings covering all the three objectives. The present chapter, organised into five parts, aims chiefly to give practical prescriptions for ensuring future ERP implementation success for the organization under review. The first part will give a short summary of the entire dissertation followed immediately by a critique on whether the present study has done justice to the research questions at hand. Parts three and four will be dedicated to offering practical recommendations to solving the business problem and highlighting overall limitations of current study respectively. The chapter then closes with an overall summary for the whole dissertation.

#### **5.2 Summary and Conclusion**

ERPs have emerged a fundamental vehicle (founded in the information systems) for continuous improvement on business processes along value chains (Baltzan and Phillips, 2009). Businesses around the globe have been adopting Enterprise Resource Planning Systems (ERPs) over the past two decades (Kilic et al., 2014). The adoption trend is expected to remain on an upward trajectory courtesy of cloud computing technological breakthroughs that have enabled wide adoption by previously under-served small and medium scale enterprises (Johansson et al., 2015). Although, ERPs serve as integrated and packaged software solutions that provides substantial improvement associated with seamless information flows throughout a company, the implementation process and system usage has been characterised by high failure rates (Zeng and Skibniewski, 2013). In the extreme cases, such failures have bankrupted adopting organisations on account of disabling mission-critical business processes (Glass, 2006; and Chung et al., 2015). The high failure rate and the consequent risk are causes for concern (considering that ERP investment represent huge capital outlays, long durations and failure has negative impact not only on the payback criteria, but also the very business value

chains it is meant to streamline) for both researchers and practitioners (Consulting, 2014).

The focus of this study was therefore to gain insights into ERPs implementation processes by exploring the CFS in ERPs implementation, as well as exploring the underlying causes of ERPs failure in the construction and contracting industry. To address the objective of the study, a sample of 148 geographically dispersed respondents, from a company which has operations which straddle across different African countries, was used. Initial examination of the data showed that all the three objectives were achieved; indicating that successful implementation of ERPs is positively influenced by certain key factors.

### **5.3 Has the data answered research questions?**

Based on the extensive review of ERP literature spanning a decade, the researcher was able to identify and explain factors that scholars and practitioners have considered critical to the successful implementation and delivery of an ERP system. Factors identified included business process re-engineering, change management, effective ERP project management, executive ERP commitment and selection of an ERP product with the best fit to both business processes and culture. A questionnaire survey of a chiefly quantitative nature was designed and distributed to test the presence or lack of ERP Critical Success Factors in the Teichmann environment. The survey produced very insightful results into the root causes of failing ERP projects within the company studied. As an example, the study suggested a lack in top management support, inadequate business process mapping, glaring desire for change management etc. Finally, data collected was used to identify areas within Teichmann that must change in order to ensure flawless future ERP executions. Areas identified as needing the most change effort included increasing ERP awareness and user involvement, selling the business case of the ERP system and adequate training of target ERP users and business process owners. In summary, data collected was able to answer the 3 research objectives and questions as articulated above.

## **5.4 Policy implications**

The study has some important policy implications. Authorities cannot continue to cast a blind eye to failures in the IT industry that leave trails of destruction. As aforesaid the rate of ERP project failure is understated since some failures largely go unreported. There is therefore need for regulation of the whole Information and Communications Technology (ICT) industry of South Africa in the best interest of instilling accountability in key role players. It is arguable that bridges come more on time, specifications and budget because the construction industry is regulated and practitioners undergo strict rigorous registration processes. The same concept should be considered for the ICT industry through an oversight body such as the Institute of IT Professionals (IITPSA) to ensure software implementation standards, accountability and ultimately delivery on contracted business cases. Another policy recommendation emanating from the present study is centred on close cooperation between industry and software engineering departments of universities. Literature is ubiquitous with what academics have long considered to be critical software success factors but sadly this intelligence has not filtered through to industry in the form of training and development packages.

## **5.5 Managerial implications and recommendations of the study**

Teichmann Plant Hire (Pty) Ltd faces an ultra-competitive and dynamic business environment. To gain a competitive edge while making competition irrelevant, there is need for constant innovation and differentiated strategies whose business processes depend heavily on sound information systems (Kim and Mauborgne, 2015). Against this background, taking the route for an Enterprise Resource Planning (ERP) system is a step in the right direction on account of ERP's capabilities to integrate, optimise company resources and processes and increase the bottom-line (Baltzan and Phillips, 2009). However, in spite of their documented advantages and value propositions, ERP system implementations have a notorious reputation of high failure rates (Standish, 2014). To date, Teichmann has recorded two ERP main-wrecks and the true cost has been in massive man-hour effort invested, financial commitments, sub-optimal business processes and lost opportunities. Based on research findings, this section will offer some possible solutions to deal with the identified business problems namely failure of ERP

systems to deliver on business expectations. Some of the recommendations will be quick-wins while others will be long term and costly. The decision on which suggestions to implement and in what order rests solely with the management of Teichmann. For convenience, recommendations from this study will be split into three parts for consistency with the three research objectives/questions.

### ***5.5.1 What are the key success factors of ERP system implementations?***

Based on systematic and critical review of ERP literature published in the past 10 years, the study produced lists of factors that are deemed critical for ERP project success. It is strongly advised that care is taken not to take these CSFs at face value for the reasons stated below:

- Most of the claimed CSFs have not been empirically validated as such.
- There is no universally accepted definition of ERP project success
- ERP implementation organisational contexts differ and the same applies to applicable CSFs.

Therefore, before Teichmann embarks on a third ERP implementation attempt, it may need to perform self-introspection in order to come up with a short-list of critical success factors relevant to its situation. Even if these particular CSFs are identified, still it must be made clear that success factors are dynamic. Their relative degree of criticality has been reported to be a function of ERP implementation phase or organisational development (Somers and Nelson, 2001).

### ***5.5.2 What are the causes of ERP implementation failure in Teichmann Plant?***

The results of the study point to a number of causative factors within the Teichmann environment responsible for negative ERP outcomes. It is important to note that the findings for this objective are consistent with literature review results on ERP success factors. Since there exists some question marks around what literature considers being ERP critical success factors, the researcher recommends the engagement of an independent ERP consulting firm with the mandate of validating the findings of this study. Independent ERP consulting is a new phenomenon wherein the consultants, in the best interest of transparency and objectivity, are not affiliated to any ERP product/vendor and therefore expected to give

recommendations/assessments free from bias. Examples of independent ERP consulting firms with global outreach include Panorama Consulting and the Standish Group. Closer to home, similar services, albeit on a reduced scale but at higher costs, are offered by audit firms such as KPMG, Ernest and Young, Deloitte and PwC.

### ***5.5.3 What change management initiatives are required to enhance ERP implementation success rates?***

#### *5.5.3.1 User awareness and involvement*

Survey results revealed that 59% of respondents are not aware of the company's intention to rollout a Group-wide ERP system in the course of year 2015. This is a true recipe for a third ERP failure as literature is replete with organisations that have made ERP decision making a top-down management affair and subsequently failed (Ngai et al., 2008). It is imperative for every internal stakeholder to be aware of the company's ERP roadmap, the rationale for embarking on the ERP journey and any inherent change implications (Somers and Nelson, 2004). A Teichmann environment characterised by inadequate awareness and open communication of major projects that affect employees and internal functions in several ways breeds resistance to an otherwise value-adding strategic ERP initiative (Stanciu and Tinca, 2013). It is never too late to start communicating with staff and such communication should, among other things, address ERP project objectives, short and long term benefits as well as offer support mechanisms for allaying employee fears brought about by impending change (Ngai et al., 2008). Communication of the ERP message must be regular and where possible, come from authoritative offices of the Directors or Chief Executive Officer. To compensate for the palpable delay in addressing staff on the 2015 ERP roadmap, management could arrange special team building sessions dedicated to ERP systems across company geographical territories. This proposed initiative, apart from ushering company cohesion, also serves as a rich platform for soliciting ERP continuous improvement ideas from the target system drivers themselves. Survey results point to an organisation that is ready to embrace a new ERP system (34% extremely willing; 46% Very willing), therefore management could capitalise and channel this high level of energy and motivation

within staff towards a successful ERP project. A different remedy would have applied to a situation where ERP awareness was inadequate and employees were extremely unwilling to adopt a new system.

#### *5.5.4 Top Management Support of ERP system*

There is a strong positive relationship between top management support and ERP outcome (Young and Poon, 2013). Management must demonstrate its support through unwavering commitment to the ERP business case. Top management should also show support through adequate project sponsorship, decentralizing ERP decision making, change management and painting the strategic picture of the future premised on the ERP system (Young and Jordan, 2008). From the survey results, it would appear that Teichmann Executives' level of interest in the ERP borders on the low end. Only 4% of survey participants were from the executive management band. This fact was further buttressed in Section C where the majority of respondents expressed disagreement to all six statements around Teichmann's Management commitment to ERP project initiatives. It is strongly recommended that Teichmann Executive Management steers change from the top in order to turn around the fortunes of ERP projects. As afore-said, the starting point for the Executives is to oil the ERP project communication machinery and use it to sell the business case for the project. Thereafter, top management, in its figure head role, must be visible and felt in all implementation phases. Some tactics like having executive managers login and use the new ERP system to approve transactions or executives linking part of their performance (KPIs) to the outcome of an ERP project implementation are known to produce good desired results. ERP adoption and acceptance in Teichmann is a huge function of the attitude of the executives towards Information System in general. For as long as Executives make decisions out of the system and hardly remember their ERP credentials, selling the ERP message to the rest of the Group would be another insurmountable task. As discussed extensively elsewhere in this study, change management (behavioural and cultural) is one of the cornerstones for a successful ERP implementation. It is the role of the Executives to ensure that the right ERP ingredients are in place before a third implementation attempt. These inputs include (Aladwani, 2001):

- Organisational learning ability
- Supportive Leadership/Management style
- Risk attitude
- Effective communication skills

If change management skills are not readily available in the Teichmann talent pipelines, the commercial change management agents on the market can be hired for the duration of the ERP project. External agents can actually do a better job because internal stakeholders affected by change can find it easier to trust and open up with external as opposed to internal change agents.

#### *5.5.5 ERP User Training and Education*

A significant amount of the ERP project budget must be reserved for employee training. This is more so in the Teichmann context where results indicate:

- 62% of employees have never had exposure to an ERP system before, notably (16% of the total respondents in company are in Civils dept., 8% in HSE dept. and 7% in Supply Chain)
- The current Ellipse ERP system is being used by a mere 13.5% of the total population as their primary IT system; the rest of employees do their business predominantly on Email (40%) and Excel (28%)
- Half of the respondents are new to the company (less than 2 years) and are therefore still on the business process learning curve
- Only 28% of survey participants agreed ~~%~~adequate training is delivered timeously to target ERP users+

Employees must be adequately trained on executing their day to day business processes in the new ERP system using a combination of contemporary methods (Dorob and N stase, 2012). Overall, the new ERP system must introduce efficiencies in business processes and employees must be trained until they are confident, self-sufficient and weaned from dependence on costly consultants (Albadri and Abdallah, 2009). It must be clear in the project charter that ERP

consultants have a bounden responsibility to transfer skills to Teichmann employees at all phases and sub-phases of the ERP life cycle. Resources permitting, each key business functional area must have at least 3 stream champions (super users) in each train-the-trainer session to mitigate potentially crippling staff turnover risks. Important lessons on staff retention were learnt by Teichmann during the Pastel Evolution and Ventyx Ellipse ERP implementations. Resistance to training and change is expected to be minimal since about 50% of employees are still relatively new (less than 2 years length of service) and therefore have not ingrained legacy business processes they do not want to change. In addition, the company's workforce would appear to exhibit a higher propensity for training (97% of respondents have attained at least Matric education level). New improved business processes on the best ERP system count for very little if employees don't know how to operate them and thus resist them in favour of inefficient but familiar work-arounds.

#### *5.5.6 Business Requirements and Business Processes*

In line with the findings of Zyabjek et al. (2009), it is best practice for business requirements/needs from an ERP system to be unambiguously spelt out upfront and where possible, signed off. In addition, both AS-IS and TO-BE business processes must be clearly mapped out and agreed on by the business process owners (Gattiker and Goodhue, 2002). In cases where current business processes are broken and putting unnecessary strain on the business, they must be mended via business process re-engineering to avoid paving the cow paths (Baltzan and Phillips, 2008). Such myths as ERP solutions that come pre-configured with best in industry configurations and business processes must be dismissed with contempt because they limit the firm's capacity to optimize its specific processes (Consulting, 2014). From part B responses, it can be inferred that Teichmann is needlessly exposing itself to ERP failure by simply ignoring the industry's best practice when it comes to properly managing business processes and business requirements (Finney and Corbett, 2007). The risk will cascade to wrong ERP package selection, inadequate business solution design etc. To minimise the risk, it is recommended that:

- The company engages the services of a seasoned business analyst with a track record in business process modelling in an ERP environment and specifically in the same industry as Teichmann. The analyst must have a clear mandate to deliver a Business Requirements Statement and AS-IS and TO-BE process maps in a 6 months timeframe.
- The company postpones any ERP package selection or implementation decision until business processes and business requirements exercises are finalised and signed off by relevant business parties.

#### *5.5.7 ERP Vendor / Consultant selection*

Survey results on the ERP Vendor/Consultant selection were largely neutral. This indicated that respondents were not in a position to comment on the role and effectiveness of ERP consultants/vendors engaged by Teichmann Plant in the last two ERP implementations. Part of this is explained by internal staff turnover that characterised the last two ERP efforts and the fact that ERP consultant/vendor selection and evaluation is treated as a Management preserve in Teichmann Plant Limited. Below are recommendations for this stage:

- Teichmann must only start hunting for an ERP vendor or ERP implementation partner/consultant after the finalisation and signoffs of Business Requirements Statement (BRS) and Business Process Modelling (BPM) documents. Only this way can a package with the fit to business processes be selected.
- In line with the recommendations of Consulting (2014), the business must dismiss the three myths around ERP consultants, namely.
  - Segregation of ERP selection from ERP implementing consultants.
  - ERP implementing consultants need to be strictly an ERP vendor. In contemporary cloud-based ERP models, it is not uncommon, for instance, to buy SAP All-in-One directly from the vendor and have Ernest and Young or KPMG implement it in the business.

- Technical proficiency of implementer is more important than the implementer's understanding of the business.
- Teichmann must invest the 6 months requirements engineering gap, proposed above, in conducting due diligence on potential ERP partners and vendors. The business must avoid implementation partners who are always in the papers and courts for the wrong under-delivery reasons.
- ERP package to be selected must have excellent support networks and an active user community. There is no point in selecting an obscure ERP package based on cheapest quote or falling into the all too known traps of the sales cycles. The business decision makers must remain cognisant of the inherent conflict of interest; ERP vendors are there to sell software, bill for their resources and maximize profit while the business is intent on lowering total cost of ERP ownership while deriving the best value from ERP efficiency and effectiveness enhancement (Stanciu and Tinca, 2013).

#### *5.5.8 The Role of ERP Project Management*

As captured from the survey responses, participants pre-dominantly disagreed with all eight statements dealing with the presence of good ERP project management skills in Teichmann Plant Hire. Below are suggestions to address gaps of a project management nature in future Teichmann ERP implementations:

- In all future ERP implementations, project managers must be appointed from business functional areas and they must be given enough authority to make necessary ERP induced changes in the business. A Chief Information Officer (CIO)/IT manager must never manage an ERP implementation. This ensures the ERP is rightly viewed as a business project as opposed to just another IT endeavour (Stanciu and Tinca, 2013). The Project Manager must have a well-crafted job effectiveness description, clear deliverables (KPIs) and must report to a well-represented ERP steering committee which serves as a vanguard for business interests.
- Teichmann's Human Resources Management strategy must be aligned to respond to the growing needs of the business. In this respect, the strategy must create a talent pipeline with sufficient project management quality and

quantity. Project management skills are required in many facets of the Teichmann value chain so they can be re-used post ERP go-live; the positive factor is that project skills can be learnt and developed. In an ERP context, good project management skills combined with Lean Six Sigma and Flawless Execution modern practices are known to produce (Aloini et al., 2007, Murphy, 2006):

- Highly energised and motivated project team members
- Results oriented team members
- Low staff turnover and high morale (job satisfaction) in ERP implementation teams
- Low ERP risk factors since risks are mitigated at every phase/sub-phase
- The best navigation in the murky waters of change brought about by new ERP system.
- Optimised resource utilization and consumption by eliminating waste in processes
- A continuously learning and improving organisation

#### *5.5.9 Right Internal ERP Project Team Selection*

The need for the right ERP Project team with the right mix of competencies, skills and aptitude is non-negotiable if a successful outcome is expected as measured by cost, budget, functionality, user satisfaction and quality goals. The ERP Project Manager has the following options at his/her disposal:

- Internally advertising ERP project vacancies and making selections with the best role fit. If required talent cannot be easily grown, the Project Manager must use the cheque book as provided by the Top Management ERP support section in preceding paragraphs.

- Incorporating ERP measures in performance contracts of ERP Project members.
- Motivating for a dedicated ERP project team that is free from mundane day to day duties. This may entail justifying extra cost to the business in the form of temporary employees to replace project resources. A split-scope where the same incumbents are expected to do both routine and project work has been known to cause employee fatigue and burnout, much to the detriment of the new project.
- Use the hot stove rule in addressing people issues in the ERP project team as they may easily derail the project plan. It must be made clear that project team members are under the Project Manager for the full duration of the ERP implementation since some staffers conveniently take advantage of the temporary dual reporting relationship reminiscent of matrix structures.

#### *5.5.10 Teichmann specific circumstances*

The ERP Package selected must talk directly to Teichmann's unique business circumstances. This construction and contracting company has points of presence in the remotest parts of Africa. In the territories such as the Democratic Republic of Congo (DRC), communication links suffer from such extreme latency that ERP transactions timeout. As a matter of fact, the DRC respondents overall rated IT and communication links poorly. The following pointers must be addressed prior to settling for the final ERP package:

- The package must accommodate the organisation's entrepreneurial culture and offer agility to respond to market opportunities as they emerge. As mentioned in earlier sections, the company has a diverse portfolio which spans construction, contracting, plant hire, aviation, agriculture, mining, property and investing. It may well be the case that no one ERP system will deliver all the required functionality to carry business processes. Therefore, the business should be open to such options as best of breed solutions comprising multiple ERP systems (in one company) or a single carefully selected best-fit ERP system interfaced with key specialised standalone packages such as Construction Computer Software (CCS) or Builtsmart. Examples abound of organisations that have implemented only select

modules of a variety of ERP brands and interfaced them programmatically with some mission critical non-ERP products like SCADA systems, payrolls or even laboratory information systems.

- Consider a light-weight Cloud-based ERP solution as opposed to the traditional on-premise model. Cloud models pose less risk to the business and represent significant cost savings as compared to their on-premise counterparts. They come in many variants for example IaaS, SaaS and PaaS. It is the duty of the ERP project management to evaluate the various Cloud Computing ERP offerings and recommend the ones which offer the best return on investment.
- The Group ERP system must be:
  - Multi-Lingual (English, French and Portuguese)
  - Multi-currency
  - Support diverse accounting standards as dictated by local territory legislation. Examples include OHADA and IFRS.
  - Support smart devices to cater for the mobile workforce and increasing demand to interact with corporate information asset anytime and from anywhere.
- Management of expectations
  - In certain territories, the ERP will not run live all the time because of communication challenges. Therefore, there will still be the need for manual business procedures in the new ERP era. The business must introduce bullet-proof manual procedures that kick in automatically in cases of link/system outages at remote sites. Suggestions include importable and pre-formatted excel templates for key business processes that sites can populate in off-line mode.
  - An ERP, just like any other computerised system, will not solve all the business problems. In that regard, managers must still enforce strict

deadlines to have their teams do what they have to do on the new ERP vehicle. As the old IT adage goes %Garbage In, Garbage Out+

- The business cannot go-live with all 17 separate entities on the new ERP system at once. A cost and benefit exercise must be conducted to measure the true value-add of migrating the smaller and near-dormant companies onto the new ERP platform. It makes more business sense to leave some smaller entities (Dustymoon, Festival Bay etc.) on Pastel Partner 14 and in the process free project resources to focus on big ticket portfolios (Cash cows and Stars on Teichmann's BCG matrix).
- Teichmann must consider implementing vanilla ERP processes in areas where business competitiveness is not compromised and make an effort to standardise the processes across its Group structure. Vanilla processes translate into minimal system customisation, lower implementation times and costs as well as easier package support and maintenance. The temptation for low value adding customisations must be frowned on by company and project management as they often lead to scope creep and ultimately failure. As applied in ERP systems, Pareto rule states that companies must aim to implement very well 20% of ERP functionality to drive 80% of the business processes.

Business recommendations offered above are consistent with respondent views on areas that require change before successful ERP outcomes can be registered at Teichmann. The top 10 change management views expressed by respondents are listed below:

- Adequately train target ERP system users
- Embark on Business Process Mapping and Re-engineering
- Invest in organisation-wide change management
- The commitment and support of Top Management
- Clarity of Project Scope and ERP business case

- Get internal ERP team selection right
- Have Good ERP Project Management skills
- Select ERP package with the most fit to business processes and culture
- Draw project champions from business functional areas
- Effective communication at all levels of the ERP business case

## **5.6 Limitations and areas for further studies**

This study was conducted in a single organisation namely Teichmann Plant Hire. Although some of the ERP inhibiting factors are common, it is not possible to generalise the findings to the entire construction and contracting industry of South Africa because of company specific ERP circumstances. Furthermore, as a result of lack of literature on local ERPs, the study lacks an Afrocentric perspective since it was largely bench-marked against European and American ERP studies of the past. For future researchers in the ERP system failure domain, greater reliability and generalisability can be obtained through a qualitative mixed research methodology comprising focus groups and case studies. Focus groups would target the main stakeholders in an ERP project including, but not limited to ERP vendors, ERP consultants, management, ERP users, ERP project managers and business process owners (CFO, CSO etc.). Cases studied, for relevancy purposes, would be limited to the last 5 years because of the rapid pace of change in IT and ERP landscapes. Furthermore, more valid and more reliable results could be obtained if respondents are drawn from companies in the construction and contracting industry who have implemented an ERP system in the last 5 years. Good questionnaire design principles must also be followed to eliminate the possibility of mid-range responses that are of little utility in answering the research questions at hand. In other words, a four point Likert scale with no neutral position is suggested for future research. Further future research work is proposed to depart from mere claims and empirically prove the relationship between CSFs and actual ERP success/failure outcomes.

## **5.7 Conclusion**

In spite of near 25 years evolution, ERP systems continue to be characterised by high levels of implementation and system usage failure. This study sought to investigate factors that are critical to a successful ERP rollout. This objective was achieved through an extensive review of ERP literature focusing on critical success and critical failure factors. The study also extensively examined the Teichmann ERP implementation environment for the presence or absence of identified Critical Success Factors as identified from literature. Based on research findings and review of literature, change management initiatives aimed at turning around ERP projects at Teichmann were established before sound business recommendations were presented. Indeed, ERP systems promise significant value to business but before that value can be realised organisations must ensure that Critical Success Factors are addressed adequately in their respective environments.

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## Appendices



13 March 2015

Mr Itai Mpofu (213570598)  
Graduate School of Business & Leadership  
Westville Campus

Dear Mr Mpofu,

Protocol reference number: HSS/0137/015M

Project title: Enterprise Resource Planning (ERP) system implementation in a contracting and construction company

**Full Approval – Expedited Class Approval**

With regards to your application received on 09 March 2015. The documents submitted have been accepted by the Humanities & Social Sciences Research Ethics Committee and **FULL APPROVAL** for the protocol has been granted.

**Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.**

**Please note: Research data should be securely stored in the discipline/department for a period of 5 years.**

**The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.**

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Mr CT Chikandiwa  
Cc Academic Leader Research: Professor Brian McArthur  
Cc School Administrator: Ms Gina Mshengu

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Founding Colleges:  Edgewood  Howard College  Medical School  Pietermaritzburg  Westville

## Survey: Towards Flawless ERP system Implementations

**Researcher: Mr. Itai Mpofu (+27 82 371 2070)**  
**Research Office: Ms. P Ximba (+27 31 260 3587)**

**Dear Highly Valued Respondent**

**I am, ITAI MPOFU, a student at University of Kwa-Zulu Natal (UKZN). I cordially invite you to participate in a research project entitled Enterprise Resource Planning (ERP) system implementation in a contracting and construction company. The aim of this study is:**

- To establish Critical Success Factors of ERP implementations based on literature.**
- To determine the causes of failure of ERP implementations in the Teichmann context.**
- To establish change management initiatives required to ensure flawless execution in future ERP implementations.**

**Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time without negative consequence. There will be no monetary gain from participating in this survey. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN. If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or the University's Research Office using the numbers listed above. The survey should take at most 10 minutes off your very hectic schedule. I hope you will take the time to run it to completion before 05 April 2015. Profuse upfront thanks.**

**Kindly indicate your informed consent to participate and then start this relatively short online survey.**

I Agree

---

### **You work for Teichmann in**

**\***

- South Africa
- Namibia
- Zambia
- DRC
- Mozambique
- Other

---

### **Your Job Status**

**\***

- Non Managerial
- Junior Management
- Middle Management
- Senior Management
- Executive Management

---

### Length of service

\*

- Less than 1 year
  - 1 – 2 years
  - 3 – 4 years
  - 5 years and above
- 

### Total work experience

\*

- Less than 5 years
  - 5 – 10 years
  - 11 – 15 years
  - 16 – 20 years
  - Over 20 years
- 

### Highest Education Level

\*

- Below Matric
  - Matric
  - Certificate
  - Diploma
  - Degree
  - Post Grad
  - Can't say
- 

### Which business functional area are you assigned currently?

\*

- Finance
  - Supply Chain
  - Maintenance
  - Human Resources
  - Operations
  - Civils
  - Safety & Health
  - Other
- 

### How often do you use computer systems in your work?

\*

- Very frequently
  - Frequently
  - Can't say
  - Infrequently
  - Very infrequently
- 

**Which computer application helps you the most in your work?**

\*

- Email
  - Excel
  - Pastel
  - Ellipse
  - VIP
  - Projects
  - CCS
  - Other
- 

**Rate the quality of IT and communications infrastructure at your site**

\*

- Very good
  - Good
  - Can't say
  - Poor
  - Very poor
- 

**Have you ever been involved in an Enterprise Resource Planning (ERP) system implementation?**

**Examples: SAP, Oracle, Sage, Microsoft Dynamics, Ellipse, Netsuite etc**

\*

- No
  - Yes
- 

**Are you aware of Teichmann's intention to roll out a Group-wide ERP system?**

\*

- No
  - Yes
-

## Rate your willingness to adopt an integrated Group-wide ERP system in Teichmann

\*

- Extremely willing
- Very willing
- Moderately willing
- Slightly willing
- Extremely unwilling

### Part B:

Indicate the extent to which you agree with the following statements in the context of the Teichmann Group ERP implementations.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Business requirements from an ERP system are clear and unambiguous *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Current (as-is) and desired (to-be) business processes are clearly mapped out *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Broken business processes are re-engineered before ERP implementations *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
End users are fully involved in ERP requirements and business process modelling *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP project scope is clear and project boundaries are clearly demarcated *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Functionality implemented is kept simple and customization is reduced to essentials *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business implements ERP systems in smaller phases as opposed to big bangs *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Part C:

Indicate the extent to which you agree with the following statements in the context of the Teichmann Group ERP implementations.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Management is actively involved and visible from start to end in ERP implementations *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management actively uses ERP systems and encourages their usage *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Full-time human resources are assigned to ERP project teams *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Top management expectations from ERP systems are realistic *	<input type="radio"/>				
ERP projects are adequately sponsored and resourced *	<input type="radio"/>				
Staff turnover in ERP system implementation teams is kept to a minimum *	<input type="radio"/>				

**Part D:**

Indicate the extent to which you agree with the following statements in the context of the Teichmann Group ERP implementations.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
ERP consultants selection process is on objective grounds *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP consultants are value-adds and possess unquestionable ERP product knowledge *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP consultants engaged demonstrate strong business interest *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP consultants subordinate themselves to the business *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Part E:**

Indicate the extent to which you agree with the following statements in the context of the Teichmann Group ERP implementations.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
ERP Project managers are appointed from business functional areas and not from IT *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP Project managers are good at leadership and managing change *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP project members are carefully selected based on required competencies *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP project teams are energized, highly motivated and results-oriented *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP system selection is a transparent, all inclusive process *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP project managers mitigate risks throughout the project life cycle *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ERP project managers have sufficient decision making authority *	<input type="radio"/>				
Every ERP Project in the business is overseen by a steering committee *	<input type="radio"/>				

**Part F:**

Indicate the extent to which you agree with the following statements in the context of the Teichmann Group ERP implementations.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Adequate training is delivered timeously to ERP users *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employees are kept informed about the business case for ERP systems *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a sense of ownership of Teichmann ERP systems *	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Part G:**

Assume you are tasked with turning around Teichmann Group ERP system implementations and you have only 100 units of resources at your disposal. Indicate how you would allocate/split/prioritize your 100 fixed resource units to the items below.

**NB: It is not a requirement to allocate resources to every item, but you can if you so wish as long as your sum total equals 100. For example you could allocate the entire 100 units to a single item and starve the rest.**

Top Management support & commitment to ERP system causes	<input type="text"/>
Business process modelling and re-engineering	<input type="text"/>
Good project management skills to drive the massive scales of ERP implementations	<input type="text"/>
Change management initiatives Group-wide aimed at getting buy-in for the ERP systems	<input type="text"/>
Clarity of project scope, business case and problems to be solved.	<input type="text"/>
Right internal ERP project team selection.	<input type="text"/>
Have project champions drawn from each business functional area	<input type="text"/>
Go vanilla. Avoid wants and low value-add customisations	<input type="text"/>
Adequately train target ERP system users	<input type="text"/>
Effective communication at all levels on the ERP project and its business case	<input type="text"/>
	<input type="text"/>

Proper selection of ERP consultants with business knowledge.

ERP package selection with the most fit to the business processes, culture etc

User involvement and participation throughout the life cycle of the ERP implementation

Management of business expectations from ERP systems

Full User driven Acceptance Testing

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Values must add up to 100

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**What other factors do you think need addressing to ensure successful future ERP system implementations for the Teichmann Group?**

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Towards Flawless ERP System Executions @2015



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