

Enterprise Resource Planning Systems Implementation and Upgrade (**A** Kenyan **S**tudy)

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A thesis submitted to the School of Engineering and Information
Sciences,
Middlesex University in partial fulfilment for the degree of Doctor
of Philosophy
April 2010

Dedication

“All things so bright and beautiful, the Lord God created them all”

This thesis is dedicated to my late supervisor, Prof. Colin Tully in recognition of his unerring support. I am indebted not only for his intellectual leadership, but also for his boundless enthusiasm and insightfulness, and his equally remarkable humanity.

Abstract

In recent years there has been an increase in using Enterprise Resource Planning (ERP) systems in large companies and government corporations mainly in developed countries. While there is wide adoption of ERP systems in Western economies, developing countries lag far behind. However, due to recent economic growth, developing countries such as Kenya are increasingly becoming major targets of ERP vendors. There is an urgent need for understanding ERP implementation issues in developing countries, as ERP systems are still in their early stages in these countries. They face additional challenges related to economic, cultural and basic infrastructure issues. This research investigates the organisational and national context within which ERP is adopted and used in Kenya, and how the context and ERP influence each other. In general, this research is based on the need to study organisations in their societal contexts and information systems in their organisational settings. The research contributes to the controversial debate on the conflict between standardisation imposed by ERP systems and localisation of business practices. This study provides some key insights into the implementation and use of ERP systems in the public and the private sectors in Kenya. Case study findings suggest that the company sector plays an important role in ERP implementations in several key dimensions. ERP systems with in-built business practices express the tendency toward standardisation. In addition, the study investigates the challenges faced by organisations implementing ERP systems in Kenya and factors influencing ERP upgrade decisions. Findings of this research suggest that ERP implementation and upgrade is influenced by, but not necessarily bound by, existing contextual factors – national and organisational. Two models, namely, the Empirical ERP Implementation Model (EEIM) and the Upgrade Decision Model (UDM), are developed to represent ERP implementation and upgrade practices. The EEIM helps to identify why there will be particularly high variance in potential outcomes and further validates which organisational contexts and ERP implementation configurations create options during ERP implementation and usage. The UDM makes a novel contribution by showing how different forces interact to bring an aggregate of influences to a threshold level where an ERP system upgrade becomes necessary. The findings of this study also aid the management of organisations that are implementing ERP systems to gain a better understanding of the likely challenges they may face and to enable them to put in place appropriate measures to mitigate the risk of implementation failures. This study also proposes an IT strategy framework which can be used by organisations planning to implement ERP to align their business and IT strategy. Finally, the study provides practical guidelines to practitioners on ERP implementation and upgrade based on the experience of the case study organisations and the ERP consultants interviewed.

Acknowledgements

Throughout the period of this PhD, my supervisors, Dr. Geetha Abeysinghe, the late Prof. Colin Tully, and Ms. Elli Georgeadou have demonstrated endless faith in my ability. The confidence I have gained through working with them is something that will remain with me for the rest of my career. First and foremost, my thanks to go them.

This opportunity to study for doctorate would not have become a reality were it not for Prof. Manny Lehman. A special heartfelt gratitude goes to him. Our meeting in a flight from Bangalore to Mumbai in India, is where this doctorate journey began.

The School of Engineering and Information Science at Middlesex University is a very rich intellectual environment in which to study. The opportunity to teach and share research with people were part of ‘the everyday’ and provided a source of constant inspiration to me. Particular thanks go to Dr. Geetha Abeysinghe for the support and guidance throughout the entire period of my study; Dr. Elke Duncker, who taught me invaluable lessons on research methods; Ms. Elli Georgeadou, my second supervisor, who kept a keen eye on my progress both academically and pastorally. Encouragement, insight and inspiration were three things I gained from my fellow PhD students at Middlesex –Amala, Lindsey, Dili, Hany, Enver, Yoney, and Michael Foster. Special thanks go to Emma Warne, Frida Attrams, and Pia Wallington for their friendship and support (which apparently goes by the label of ‘research office’). Very special thanks go to the technical support team particularly to Leonard Miraziz and Gerald Osei-Kofi.

This ‘training’ exerts a toll and I have a debt of gratitude to pay to my wife, Ruth Kengere, and my two little angels, Lincoln and Nicole, who refused to desert me, even though it appeared I had at times deserted them. Also, special thanks for their prayers and the endless encouragement and support.

I was encouraged by my department, and supported by the school, to attend a number of conferences and doctoral consortia. I was fortunate enough to spend time presenting and discussing research with a number of faculty and students whom I would like to thank. In particular, I would like to thank, Prof. Raymond Hackney and Prof Trevor Hopper at the UKAIS doctoral consortium in March 2005 whose feedback greatly informed my work; Dr. Gerald Grant, Dr. Nancy Johnson, and Dr. Evan Duggan at the IRMA doctoral consortium for the encouragement and valuable recommendations.

This thesis could not have been written without the tremendous support extended to me by Bidco Oil Refineries, Bamburi Cement Limited, Kenya Power and Lighting Company, Kenya Electricity Generating Company, and Agro-chemical and Food Company, my case

study organisations. I am especially indebted to Albert Mitamita, Joseph Ombongi, David Nzioka, and Betty Olweny.

Finally, I thank God for this opportunity to study for doctorate degree, the gift of life, and the wisdom and knowledge which enabled me to complete this thesis.

List of publications

- Otieno, J. (2008) “ERP implementation challenges: A Kenyan case study”, *Lecture Note in Business Information Systems*, Springer, pp.399-409
- Otieno, J. (2008) “ERP implementation challenges: Vendors perspective” in *Proceedings of International Conference on Enterprise Information Systems (ICEIS)*, June 12 – 16 2008, Barcelona, Spain
- Otieno, J. and Abeysinghe, G. (2006) “A framework for ERP implementation in Kenya: An empirical study” in, *Proceedings of Information Resource Management Association (IRMA) International Conference*, 21st May – 24th May 2006, Washington DC
- Otieno, J. (2005) “A framework for ERP implementation in developing countries: Kenyan case study” in *Proceedings of Information Resource Management Association (IRMA) International Conference*, 14th May – 18th May 2005, San Deigo, California USA
- Leopoldo, E. and Otieno, J. (2005) “Critical Success Factors of ERP implementation”, *Encyclopedia of Information Science and Technology*, pp. 628-633
- Otieno, J. (2005) “A Model for ERP Adoption in Organisations in Developing Countries” in *Proceedings of 10th United Kingdom Academy of Information Systems (UKAIS) Annual Conference*, 21st – 22nd March 2005, Northumbria University, Newcastle, UK

Contents

1	Introduction	1
1.1	Research Background and Problem	1
1.2	Aims, Objectives and Research Questions	6
1.3	Research Rationale	7
1.4	Scope and context of the study	8
1.5	Expected Contribution to Knowledge	10
1.6	Thesis Structure	11
2	Literature Review	12
2.1	Introduction	12
2.2	What is ERP?	12
2.3	Drivers for ERP	15
2.4	ERP as a change process–Business Process Re-engineering (BPR)	17
2.5	ERP Implementation	18
2.5.1	ERP Implementation Strategies	19
2.5.2	ERP Implementation Models	23
2.5.3	ERP systems upgrade	26
2.5.4	What makes ERP implementation a nightmare?	28
2.6	Critical Success Factors (CSFs)	40
2.7	Current ERP trend	41
2.8	Summary	42
3	Research Methodology	44
3.1	Introduction	44
3.2	Relevant Research Methods/Approaches	44
3.3	Selected Research Method	46
3.3.1	Case Study Research	47
3.3.2	Survey	49

3.4	Research Design and Techniques	49
3.4.1	Phase One: Pilot Study	49
3.4.2	Phase Two: Qualitative Research	50
3.4.3	Phase Three: Quantitative Research	53
3.4.4	Phase Four: Model Development and Validation	55
3.5	Summary	55
4	Kenya and Case Study Organisations	57
4.1	Introduction	57
4.1.1	Overall Background	57
4.1.2	Economic environment	58
4.1.3	Information and Communication Technology (ICT) in Kenya	59
4.1.4	Policy and Regulatory Frameworks	62
4.2	ERP Adoption in Kenya	63
4.3	Introduction to Case Study Organisations	64
4.3.1	Bidco Oil Refineries Company Background	64
4.3.2	Bamburi Cement Limited (BCL) Background	65
4.3.3	Agro-chemical and Food Company (ACFC) Background	66
4.3.4	KPLC and KenGen Company	66
4.4	Summary	69
5	Qualitative Data Presentation and Analysis	70
5.1	Introduction	70
5.2	Phase 1: Pilot Study	70
5.2.1	Preliminary Literature Review	71
5.2.2	Questionnaire Design	71
5.2.3	Questionnaire Administration	71
5.2.4	Pilot Study, Analysis, and Interpretation	71
5.2.5	Revision of Data Collection Instrument	76
5.3	Phase 2: Qualitative Research	76
5.3.1	Further Literature Review and Conceptual Model Development	76
5.3.2	Selection of Case Study Organisations	77
5.3.3	Data Collection	78
5.3.4	Data Analysis	80
5.3.5	Within-Case Analysis and Interpretation of Findings	85
5.3.6	Cross-Case Analysis and Interpretation of Findings	86
5.4	Summary	117

6	Empirical Models	118
6.1	Introduction	118
6.2	Empirical ERP Implementation Model (EEIM)	118
6.2.1	ERP Implementation Outcome	120
6.2.2	ERP Implementation Decisions	121
6.2.3	Organisational context	123
6.2.4	ERP Delivery Service	124
6.2.5	External Environment	125
6.2.6	ERP Implementation Challenges	126
6.3	ERP Upgrade Decision Model (UDM)	126
6.3.1	Upgrade Decisions: Motivating forces	127
6.3.2	Contingency: Internal resource availability	130
6.3.3	Interaction among motivating forces and resource availability	131
6.4	Validation of the developed models	132
6.4.1	Comparison With Similar and Conflicting Models	133
6.4.2	Critical Group Discussion	134
6.5	Summary	135
7	Conclusion	136
7.1	Introduction	136
7.2	Summary of the Research Findings	136
7.2.1	ERP Implementation Practices in Kenya	136
7.2.2	Organisational Context	138
7.2.3	Project Management and Support	144
7.2.4	External environmental factors	146
7.2.5	ERP Implementation challenges	147
7.3	Research Contribution	150
7.3.1	Contribution to Knowledge	150
7.3.2	Contribution to Practice	152
7.4	Limitations and Future Work	159
	Appendices	178
	A Within-Case Study Analyses and Interpretation	179
	B Quantitative Data Presentation and Analysis	227
	C Pilot Study Data Collection Collection Questionnaire	255

D Field Study One – Interview Protocol	259
E Survey Questionnaire – Field Study 2	262
F Critical Group Discussion Guide	271
G IT Strategy Framework	275

List of Figures

2.1	ERP implementation phases and organisational choices	20
2.2	IS function performance evaluation model by Saunders & Jones (1992).	25
2.3	Somers et al. (2000) contextual framework	27
4.1	Kenyan Map	58
4.2	KenGen corporate objectives (KenGen Newsletter	68
4.3	Power generation, transmission and distribution bodies in Kenya	69
5.1	Preliminary ERP implementation conceptual model	77
5.2	Sample Excerpt from Nvivo software	81
5.3	KenGen Wide Area Network (Source: Project Document)	107
5.4	ERP system availability and speed at KenGen	108
6.1	Empirical ERP Implementation Model(EEIM)	119
6.2	Model of the upgrade decision process	127
B.1	The adapted measurement development paradigm	231
B.2	Frequency distribution graph of ERP solutions implemented	234
F.1	ERP Implementation Model	271
F.2	Model of the upgrade decision process	273
G.1	Proposed IT strategy analysis framework	275

List of Tables

2.1	Drivers for Adopting ERP systems	16
4.1	E-readiness Assessment in Kenya (Source: bridges.org)	60
4.2	ERP Installations in the Kenyan Market (source: symphony consulting) . . .	64
5.1	Summary of Pilot Study Findings	73
5.2	Summary of five case organisations	78
5.3	Summary of data collection, techniques and sources from case studies	79
5.4	Sample identification of concepts	82
5.5	Categories, properties and dimensions derived from data analysis	83
5.6	Business factors influencing upgrade strategies and schedules	113
5.7	Results of factor analysis	117
B.1	Summary of response rate	233
B.2	Summary responses for motivational factors	235
B.3	Degree of customisation	236
B.4	Module Customisation	237
B.5	ERP Module Adoption Rates	238
B.6	Summary responses for package adoption	239
B.7	Summary of responses for package implementation	239
B.8	Implementation strategies	240
B.9	Summary responses for performance measures	241
B.10	Summary responses for areas benefiting in percentage	242
B.11	Results of factor analysis	249
B.12	Factor Analysis of ERP implementation scope categories	254

Chapter 1

Introduction

This chapter presents an overview of this research. The presentation will thereafter be followed by a problem discussion that will lead to the formulation of the statement of purpose, research questions, objectives, and rationale of the study. In summary, this chapter discusses the purpose, importance, timeliness, and relevance of this research study to information systems research, and in particular to ERP implementation in developing countries with Kenya as a case study.

1.1 Research Background and Problem

Lured by guarantees of improved business productivity, streamlined business operations, and increased cost savings (Tilley *et al.*, 2007), organisations worldwide have launched initiatives to integrate ERP systems into their existing business environments. There has been a growing increase in using Enterprise Resource Planning (ERP) systems developed by, for example, SAP, Oracle, BaaN, PeopleSoft and JD Edwards as a business information system platform for large organisations and government corporations in developed countries such as USA, UK, Canada, and Australia (Davenport, 1998). Kumar & Hillegersberg (2000) state that:

ERP systems have now been adopted by the majority of the Fortune top 500 firms, and as the high end of the market becomes saturated, ERP systems are filtering down to medium-sized organizations, and to regions beyond those initially penetrated in Europe and North America.

While there is wide adoption of ERP systems in Europe and North America, developing countries lag far behind (Huang & Palvia, 2001; Huang *et al.*, 2004). However, due to economic growth, developing countries such as Kenya are becoming major targets for ERP

vendors (O’Kane, 2002; Davison, 2002; Huang *et al.*, 2004). In some developing countries, for example Kenya, a number of large and mid-sized organisations have implemented ERP solutions and more are expected to follow suit. The majority of adopting organisations that joined the ‘ERP bandwagon’ (Kraemers & Dissel, 2000) presumed that with relative ease they can benefit from the alleged ‘best business practices’ that are embedded within ERP systems.

However, the transfer of information systems like ERP – typically developed in developed countries – to developing countries is often marred by problems of mismatch with local, cultural, economic and regulatory requirements. For instance, (Huang & Palvia, 2001, page 276) state that:

Meanwhile, ERP is beginning to appear in many organisations of developing countries. Little research has been conducted to compare the implementation practices of ERP in developed vs developing countries...ERP technology faces additional challenges in developing countries related to economic, cultural, and basic infrastructure issues.

Gargeya & Brady (2005) state that studies, mostly conducted in developed countries, show that organisations often run into costly and sometimes fatal difficulties with implementation and subsequent maintenance of ERP systems. For example, Akkermans & van Helden (2002) and Monk & Wagner (2006) observe that a typical ERP implementation initiative takes anywhere between one and three years and typical budgets are in tens to hundreds of millions of dollars.

Popular press and trade journals have documented both successes (Johnston, 2002), and failures (Voordijk *et al.*, 2005; Kim *et al.*, 2005; Alshawi *et al.*, 2004; Sia & Soh, 2002) but with very little explanation on the underlying causes. Poba-Nzaou *et al.* (2008) estimate the failure rate of ERP implementations in developed countries to be between 66% and 70%. Since the trade press is now replete with articles on ERP failures in Europe and North America where most these systems originate from, we agree with the Huang & Palvia (2001) argument that ERP implementation is likely to be more problematic in less developed countries like Kenya, given that “ERP technology faces additional challenges in developing countries related to economic, cultural, and basic infrastructure issues”.

In Kenya, the state-owned Uchumi supermarket chain closed down in June 2006 after admitting it was insolvent — throwing more than 1,000 employees out of work and leaving debts of hundreds of millions of Kenyan shillings (Vardan, n.d.). The over-ambitious expansion strategy and the poor installation of the ERP system were cited by experts as some

of the reasons which contributed to insolvency, especially since they were financed out of working capital which resulted in tying up the much needed financial resources to pay off suppliers, employees and other trade creditors. Analysts further argued that the ERP system was poorly integrated and implemented, staff were poorly trained, and costs were unjustifiable. The Uchumi supermarket experience is an example that there is an urgent need for understanding ERP implementation practices in less developed countries, and in Kenya in particular, because these systems are still in their early stages in these countries and face economic, cultural and infrastructure challenges. The adoption and use of ERP in Kenya raises a unique question for less developed countries within Sub-Saharan Africa that has not been addressed in previous studies, i.e. the challenges faced by user and vendor organisations during ERP implementation and the contextual factors (national and organisational) that influence ERP adoption, implementation, and use. This research will, therefore, explore ERP implementation and upgrade practices among the private and public sector organisations in Kenya.

The difficulty in ERP implementation in developed countries may be exacerbated by the claim that ERP embodies established ways of doing business thereby requiring organisations adopting ERP systems to change their business processes to conform to business practices inbuilt in ERP packages. Vendors argue that the adoption of these best practices makes the configuring of the software less costly and brings about improvement in the organisation's processes. Consequently, organisations and their members often experience pressure to adopt these practices (Gosain, 2004).

ERP systems are developed by vendors who draw on their existing sources of knowledge, resources and norms. These would include the developer organisation's own business strategy and prevailing norms about what constitutes best practice. In general, the 'spirit' of ERP packages reflects beliefs about the value of having a single enterprise-wide system, and hence tend to have features that are aligned with cross-functional process integration and enterprise-wide data sharing (Markus & Tanis, 2000; Soh & Sia, 2004b).

Soh & Sia (2004b) further argue that developers, while modeling likely organisational requirements in order to design the system, usually draw on the network of organisations to which they have access. These 'referent' organisations are usually those from their home market and other markets in which they have a major presence. Such markets are likely to be defined by national and industry boundaries. The structures embedded in the resultant package will therefore reflect the context of the group of companies that the developers interacted with most closely during the design and development of the software. As a result, organisations adopting ERP systems may find the assumptions embodied by these systems

about the nature of organisations and the ways in which they operate run counter to their own existing structures and work practices. Soh *et al.* (2000), for instance, observed misalignments between ERP packages and organisational structures expressed in formal rules, procedures, and cultural norms in their study which was conducted in Singapore. They stated that:

Our findings suggest the “misfit” issue (gaps between the functionality offered by the package and that required by the adopting organisation) may be worse in Asia because the business models underlying most ERP packages reflect European or U.S. industry practices. Procedures in Asian organisations are likely to be different having evolved in a different cultural, economic and regulatory context.

Given that Sub-Saharan Africa cultural contexts embody organisational practices different from those encountered in North America and Europe where most of ERP systems are developed, as discussed in Section 2.4.4.3, there can be significant problems associated with the reengineering of local practices and processes. Furthermore, ERP being capital intensive, is likely to be faced with constrained IT budgets (Heeks & Kenny, 2002) due to poor economic performance in this region. Cultural conflicts escalate implementation cost, and can lead to long implementation period as organisations spend more time and resources in resolving cultural conflicts. This becomes a two fold problem: companies lack the financial resources to gain access to tailored world-class ERP systems; and ERP companies are not prepared to deal effectively with the customisation processes that these markets require. In many cases, the basic infrastructure for supporting ERP may be lacking or insufficient to enable organisations to reap optimum benefits from ERP investments. ERP implementation and usage also require specialised skills which may not be sufficiently available in developing countries.

The arguments above suggest that there is often a gap between the system and specific contexts, practices and requirements of particular user organisations. We can conclude that the underlying business models in-built in ERP have implicit contextual biases such as country (for example, European or American practices), sector (for example, private sector), industry (for example, manufacturing), and even biases in organisational practices (for example, process-oriented workflow). On this note, we argue that where contextual difference between the ERP package vendor and the adopting organisation exist, it is important to explicitly consider the difference and how it may influence the adoption and subsequently the use of the ERP package. Therefore, this research will seek evidence on how the organisational context influences ERP systems implementation and upgrade and how the organisational context is affected by the implementation and use of ERP system using Kenya as a case study.

In spite of all the benefits, implementing ERP can be a risky undertaking (Poba-Nzaou *et al.*, 2008). Ward *et al.* (2005) observe that due to the behavioural and management related challenges in the implementation process many ERP projects have been terminated. Arif *et al.* (2005) and Alshawi *et al.* (2004) assert it is imperative for organisations to be aware of the challenges and the experiences of others, and to learn from their challenges and practices, because of the complex and integrated nature of ERP, and the large investment involved. Identifying challenges relevant to local companies is one way to increase the chances of a successful local ERP implementation (Otieno, 2008; Leopoldo & Otieno, 2005). Therefore, this research will aim to identify challenges faced by Kenyan organisations during ERP systems implementation.

Only one study Ng (2001) details the difference between technical and functional upgrades. The absence of information about ERP upgrades is somewhat surprising given the general consent that upgrading is essential for companies to survive and compete (Fourney, 2007).

As software vendors enhance their products to respond to anticipated business needs, they release upgrades with more features and better performance. Although performance improvements are not necessarily anticipated in an upgrade, it is reasonable to expect organisations to upgrade ERP systems for the purpose of achieving benefits such as greater efficiency and improved functionality that the current ERP system may be lacking (Paine, 2000; Beatty & Williams, 2006b). To the user of ERP systems, deciding whether and when to upgrade from the current version requires an ongoing process of evaluation.

One of the most neglected issues related to ERP systems is the decision to upgrade from one version to another. Although practical guidance to upgrade decisions have begun to appear in the literature (e.g. Beatty & Williams (2006a)), most studies of ERP have focused on initial adoption, and empirical research on ERP upgrade practices and decisions has been limited both in developed and developing countries. Ng (2001) found that maintenance and upgrades were adopted to realise increased business benefits and that cost was a major concern in those decisions. Although valuable, Ng's study combined maintenance and upgrade decisions together making it difficult to understand the upgrade decision process independently. Therefore, this research will investigate ERP upgrade practices and decision-making process among Kenyan organisations.

Based on the suggestions of Friedland & Alford (1991) this research adheres to the need to study organisation as located in their societal contexts and information systems in their organisational setting. Therefore, in general this research investigates the organisational and national context within which ERP is adopted and used in Kenya, and how the context and ERP influence each other. ERP systems with in-built business practices express the

tendency toward standardisation. This research seek to contribute to the controversial issue on the conflict between standardization and localisation of business practices.

1.2 Aims, Objectives and Research Questions

Literature reviewed in Chapter 2 highlights issues that warrant further consideration with respect to the relevance of best practices embedded in ERP systems, their implementation and use in different organisational contexts. This research seeks to contribute to the debate on ERP implementation and upgrade in the context of a less developed country, Kenya. The research aims are stated as:

1. to explore ERP implementation and upgrade decision-making processes among private and public sector organisations in Kenya;
2. to identify challenges faced by Kenyan organisations during ERP implementation;
3. to propose suitable solutions within specific organisational and national contexts.

Against the backdrop of these aims are the following main objectives of this study:

1. to identify contextual factors (organisational and national) that influence ERP systems implementation and upgrade decisions in Kenya;
2. to identify challenges faced by vendors and organisations implementing ERP systems in Kenya;
3. to establish whether there are differences in ERP implementation practices between public and private organisations in Kenya;
4. to propose suitable solutions (contextually) in order to maximise the likelihood of success of future ERP implementations and upgrades

In achieving these objectives the research attempts to answer the main research question:

What organisational and national factors affect ERP implementation in Kenya?

This research question can be refined thus:

1. Does national culture influence ERP system implementation in Kenya?

2. Do organisations that have adopted ERP systems in Kenya encounter challenges in the process of implementing them?
3. What factors influence ERP systems upgrade decisions?
4. Is there a difference between ERP implementation practices among public and private organisations in Kenya?

1.3 Research Rationale

A number of arguments justify the importance of this study. First, despite the promises and the continued popularity of ERP Systems, evidence is accumulating to demonstrate that obtaining benefits from an ERP is not as straightforward as those selling and promoting such systems would like us to believe (Boersma & Kingma, 2005).

Second, although a number of challenges of ERP systems adoption and use have been identified, they are mainly experiences of companies in the developed countries. There is very limited empirical research on ERP implementation focused on developed countries. We presume that the cultural problems in developed countries especially in Europe and North America seem to be marginal and managerial approaches tend to be largely similar, which makes adaptation of ERP software relatively easy. Despite these still many failures have been reported. There is no study, in researcher's knowledge that has been carried out in Sub-Saharan Africa (SSA). Therefore, researchers in the field of Information Systems may be interested in reviewing the findings of this project given the lack of literature covering Sub-Saharan Africa and more so those based in Kenya.

Third, it is arguable that most ERP implementation frameworks and models reported in IS journals are based on ERP studies carried out in developed countries like United States of America, European countries, and Australia. The political, social, and economic uniqueness that SSA presents, Kenyan context being the case study in this thesis, could provide researchers with fertile ground for fresh extensions of existing theoretical paradigms and sometimes development of entirely new and different research frameworks.

Fourth, upgrade of ERP systems appear to be inevitable for several reasons. ERP software vendors typically establish 'sunset dates', after which vendors discontinue support for current versions. Thus, organisations that require vendor support are pressured to upgrade before the vendor's sunset date. Although an organisation may choose to operate unsupported software, ERP products eventually become incompatible with other software or require new functionality. Unless organisations develop their own software or buy new software, their

only option becomes upgrading to a new, vendor-supported version. However, organisations do not need to upgrade to every new version of software because vendors typically support multiple versions at the same time. Thus, choices must be made which, make it important to study how organisations decide to migrate to the next version of ERP software and how the upgrade is carried out.

Lastly, there is a need to investigate the relevance of best practices in the context of developing countries. Soh & Sia (2004b) state that ERP systems reflect Western ways of doing business. Based on the above discussion it can be argued that foreign developers of ERP systems usually make choices of what they personally consider relevant business practices. Their views are focused through their intentions and experiences. In other words, ERP developers understand and model the environment as they perceive it through their personal culture-bound perspective which often do not coincide with the view of the local users.

1.4 Scope and context of the study

According to Creswell (2003) ‘delimitation’ is a parameter defining the “boundaries, exceptions, reservations” in a research, and its inclusion and position in a research proposal or write up varies from one situation to another. The delimitation defines the limit or scope of the research. To research into the entire ERP topic, will not only mean researching into a wide range of issues and assumptions but also researching into every aspect of ERP implementation, especially when viewed from the point of the existing large amount of literature. Therefore, this section is aimed limiting scope and context of this research to in order to make it manageable.

This dissertation is defined by the following boundaries and considerations:

- This study concentrates on both private and public organisations in Kenya. The reason for inclusion of private organisations is that adoption of ERP systems is more widespread in private organisations than in public sector organisations in Kenya. Additionally, the few studies available on ERP adoption in the literature were conducted in public sector organisations (Gable *et al.*, 2003; Sedera & Gable, 2004). Thus by looking at private firms, the study will add to the body of knowledge in the area where it is still lacking. Public sector organisations on the other hand were included in order to allow comparison to be conducted on ERP implementation practices between private and public organisations. Moreover, the operational environments of the public and private sectors differ considerably (Mansour & Watson, 1980; Khandelwal, 2001) and findings from one may provide insights into the other.

- This study discusses ERP systems at a generic level by concentrating on its basic functionality rather than distinguishing between top brands and mid-market ERP products. Empirical evidence exists suggesting that, in some respects the benefits of ERP may be comparable even when systems types differ (Mabert *et al.*, 2003; Laukkanen *et al.*, 2005). ERP systems classified as top brands have been noted to differ to the extent that each might offer different capabilities (Shang & Seddon, 2002); the same is true for mid-market products (Fisher *et al.*, 2004). The foregoing explains the choice of this research to include a variety of ERP systems rather than select only a specific type of ERP. Moreover, in some respect, the inclusion of wide-ranging ERP systems in a particular study may permit the generalisability of results from such a study, for the software.
- This study incorporates both large, medium and small size organisations.
- All the ERP implementation life-cycle phases are studied in this research. This is due to the fact that research area and ERP technology is subject to dynamic change. Organisations after going live with ERP usually embark on actions aimed at achieving the full capabilities and benefits of ERP-enabled processes. The organisational context is also in a state of continuous change in a bid to adapt to the ever changing environmental context such as entry of new competitors, new government regulations, etc. A ‘snapshot’ view of these events could not capture the sweeping changes taking place and the influence they had on case study organisations hence the decision to study all the implementation life-cycle phases.
- Context as used in this dissertation is limited to the three aspects of an organisation’s context which previous studies by Tornatzky & Fleischer (1990) and Rogers (1983) report to influence the process by which organisations adopt, implement, and use technological innovations: (a) Technological context describes both the existing technologies in use and new technologies relevant to the firm, (b) Organisational context refers to descriptive measures about organisation such as scope, size, and the amount of slack resources available internally, (c) Environment context is the arena in which a firm conducts its business—its industry, competitors, and dealings with the government. The choice of the three contexts is consistent with the innovation diffusion theory which emphasises technological characteristics, and both the internal and external characteristics of an organisation, as drivers for technology diffusion.
- Finally, the study’s unit of analysis is at the national and organisational level.

1.5 Expected Contribution to Knowledge

The research aims to make contribution towards the promotion of contextually/culturally valid ERP implementation model. While investigating the limitation of current implementation models with regard to contextual issues, this research aims to enhance effectiveness of these models. Through merging theory and empirical data from the field study organisations, the research seeks to refine the existing models by proposing context sensitive model. The research also aims to make a novel contribution by developing an ERP upgrade decision model which will provide insight on why and when organisations choose to upgrade their ERP systems.

By reviewing literature on culture, and drawing insights into the core dimensions of culture and exploring the theoretical frameworks for understanding culture forms, the study contributes to ERP practice by identifying what organisational factors to look for when initiating ERP implementation and subsequent culture change – how individuals, ERP implementation and organisational change are linked. The findings of the study can help the management of corporations to better support the deployment of ERP in their organizations.

The findings of this research are expected to contribute towards ERP implementation practice. The findings of this research are expected to be of importance to various stakeholders. For example, Vendors who contemplate entering foreign markets can use the proposed models to better understand global ERP markets and develop better strategy. ERP implementers can also recognise the environmental and internal requirements and prepare accordingly. Given the complexity and integrated nature of ERP and large investment involved it is imperative for organisations to study the experiences of others, and learn from their practices and success factors (Umble *et al.*, 2003; Leopoldo & Otieno, 2005). In this light, organisations planning to implement ERP in Kenya can learn from the successes and failures of the case study organisations and therefore, avoid pitfalls which can lead to ERP project failures. Based on the findings of this research, we intend to come up with a set of systematic steps (implementation guideline) and a methodology for helping managers, implementers and organisations adapt to the demands of the environment.

The research also presents avenues for continuing theoretical and empirical research investigations in the field of IS, in particular ERP. By identifying the impact of local context on IS, the research intends to create a better understanding of the limitation technologically deterministic approaches that little account of local conditions and high risks of strategies involved.

In general, this research would contribute towards a theoretical and practical improvement

of ERP adoption, implementation and upgrade in diverse cultural and contextual setting, based on a Kenyan case study.

1.6 Thesis Structure

In this introductory chapter, the impetus to understand the background and motivations towards the undertaking was highlighted, presenting the reader with the research questions, study design and potential contributions from the study. By providing a background to the overall context of the study, the motivations and rationale for the study are put forth.

Chapter 2 presents a review of the relevant background literature. We highlight the development of the research model (that guides the discourse) as well as present the research questions and hypotheses. The inter-relations between the subject areas, related studies and their implications for the study are discussed.

In Chapter 3, the research methodology is presented. The methodology used in the study's context is the multi-paradigm approach, using a combination of techniques including survey, content analysis and multiple case study. Our research design recognises that understandings gained through interpretivist analysis might provide a basis for developing propositions. The Lee (1991) framework is used which integrates qualitative and quantitative research approaches.

In Chapter 4 of the national context where the case studies were drawn. The chapter also provides background information of the five case study organisations.

Chapter 5 presents the results of qualitative data analysis. The preliminary ERP implementation model is presented and used as basis of coding.

Chapter 6 presents and discusses the Extended ERP Implementation Model (EEIM) and Upgrade Decision Model (UDM) derived from qualitative and quantitative data analyses. The models' constructs and dimensions are defined followed by discussion of their interrelations. Finally, the models are verified to ascertain their validity. The chapter also presents the results of validation of the two the models.

In Chapter 7, the findings of the study are summarised. The detailed discussion reflecting on the main findings reported in Chapter 5 is presented. Finally, the chapter concludes the thesis by discussing the research's contribution to the body of knowledge in research, practice and the methodological perspectives, its limitations and directions for future research. Other relevant details not included in the body of the thesis are kept in the appendices.

Chapter 2

Literature Review

2.1 Introduction

This chapter reviews the academic and practitioners literature published on Enterprise Resource Planning (ERP) systems relevant to the focus of this research. Easterby-Smith *et al.* (1991) notes that it is important for researchers to familiarise themselves with existing research prior to collecting their own data . An appreciation of previous work relevant to this research served three further purposes. First, through providing direction in the construction of data collection instruments, it guarded against the risk of overload at the primary data collection stages of the project. Second, working the findings from extent literature into a formal review helped maintain throughout the study a sense of the topic’s perspective. Finally, this activity raised opportunities for articulating a critical analysis of the actual “meaning” of the data collected when the data analysis stages of the research were reached.

As discussed in Chapter 1, the focal point of this study is the influence of context on ERP implementation, spanning all the ERP life-cycle phases. This research broadly classifies current ERP literature in terms of its contribution to understanding the nature of ERP implementation project initiatives. This approach provides a base in which to situate this study. The chapter begins by defining ERP and elaborating how ‘best practices’ embedded in ERP systems lead to organisation restructuring and the likely consequences in the following sections.

2.2 What is ERP?

Klaus *et al.* (2000) and Al-Mashari *et al.* (2003) assert that ERP systems are not easy to define, more so if the stakeholders’ points of view are to be taken seriously. Their assertion

is supported by Boersma & Kingma (2005) who argue that there is no universally accepted definition of ERP. Different stakeholders of ERP will, depending on their position in the organisation, have quite different views of and experiences with ERP (Markus & Tanis, 2000). Therefore, individuals or group definitions vary according to their “awareness context”.

However, Deloitte Consulting ERP Second Wave report published in 1998 provides a useful starting point. According to Deloitte (1998), an ERP system is a packaged business software system that allows a company to:

- automate and integrate the majority of its business processes,
- share common data and practices across the entire enterprise, and
- produce and access information in a real-time environment

Davenport (1998) defines an ERP system as “a packaged software product that can be bought ‘off-the-shelf’ by an organisation in order to integrate and share its information and related business processes within and across functional areas”. His definition emphasises the integration, laid by ERP, between various organisational networks, in particular functional divisions within organisations like finance, marketing, procurement, inventory, sales and distribution, human resources planning and payroll while downplaying the implicit side of the ERP systems, for example business processes embedded in the ERP. Shehab *et al.* (2004) supports Davenport’s perspective that over-emphasises integration aspect of ERP systems by asserting that ERP is more than a software package that seeks to integrate functional departments within an organisation. This perspective is popular with most scholars and researchers who generally consider and define ERP on the basis of its capacity to integrate formerly segregated IT systems.

The second perspective which is fundamental for conceptualising ERP systems in this research, is related to best practices embedded in ERP systems. Umble *et al.* (2003) articulated this less known or, if known, less talked about perspective of ERP systems by asserting that:

... buying an ERP package means much more than purchasing software, it means buying into the software vendor’s view of best practices for many of company’s processes.

ERP systems embody best practices which are supposedly established ways of doing business (Soh *et al.*, 2000; Soh & Sia, 2004a; Boersma & Kingma, 2005; Arif *et al.*, 2005). These ‘best practices’ represent the underlying assumptions and beliefs embedded in the operation of ERP software by the vendors. Akrich (1992) in (Boersma & Kingma, 2005) purports that

best practices embedded in ERP, contain ‘script’ for users, informing them about what actions should be undertaken, when, where, and how. Therefore, it is arguable that ERP is not just a software package to be tailored to an organisation but an organisation business blue-print that affects how people work by “imposing its own logic on a company’s strategy, organisation, and culture” (Davenport, 1998; Lee & Lee, 2002).

An ERP system gives instructions at the workplace about how to organise activities vis-à-vis co-workers, management and other elements in the business cycle. It may be perceived to operate in a similar to self-evident way as roads in the traffic system do, guiding drivers towards their destinations. Unlike custom-built software that must be programmed in traditional ways to meet local needs, ERP software is ‘generic’, targeting multiple industries, and should be configured to predefined business practices before it can be used. Therefore, a company that implements ERP must, for the most part, accept the vendor’s assumptions about the company and change the existing processes and procedures to conform to them.

This notion of best practices has been backed by management consultants and ERP vendors. Technology, in this case ERP, is considered as a driver to organisational change. The ‘best practices’ embedded in these packages are seen as a summary of best practices and standards of operations, but pays no attention to how local context affects the process of implementation, the actual operation and use of the systems, and whether a package is compatible with the organisations’ values and way of doing things.

While ERP vendors try to structure the systems to reflect best practices, it is the vendor not the client, who is defining what ‘best’ means. It implies that there is an objective function against which the ‘best’ can be evaluated. Studies such as (Kosalge, 2005) have proved that there is no single best way of doing business and the context plays a major role in the way business is carried out. For example, SAP AG being a German company following German best practices, international differences can be critical in the successful implementation of their software(Wei *et al.*, 2005). On the premise of the views expressed above, we also argue that ‘best’ is relative and what is best in one organisation, industry, region or country may not apply to others.

ERP is also referred to in the IS literature as enterprise systems (ES) and less frequently as enterprise-wide systems. Davenport (2000) calls for the replacement of these terms with a more generic classification of ERP as ‘business systems’. He argues that the technology has developed to such an extent that it now includes front and back office functionality making it inappropriate to assign an ERP label which is reminiscent of its material requirements planning (MRP) heritage. Whilst we take Davenport’s point, we choose to employ the term ERP throughout the thesis as a reminder of the lineage of the technology in the manufac-

turing context. In other words, the use of the phrase ERP in this study is purposeful and is meant to conjure images of technology that is informed by a traditionally hierarchical view of organising where business functions are clearly delineated (Kumar & Hillegersberg, 2000).

The working definition of ERP system in this study is based on the three major characteristics associated with ERP systems identified in the above literature discussion. Therefore, an ERP system:

1. is a set of packaged application software modules, within an integrated architecture, that can be used by organisations as their primary engine for integrating data, processes, and information technology, in real time, across internal and external value chains;
2. impounds deep knowledge of business practices that vendors have accumulated from implementations in a wide range of client organisations, that can exert considerable influence on the design of processes within new client organisations;
3. is a generic ‘semi-finished’ product with tables and parameters that clients or organisations and their implementation partners must configure, customise, and integrate with other computer-based information systems to meet their business needs.

2.3 Drivers for ERP

As Walsham (2002) states, the 1990s was a decade where companies were turning away from decentralised computing systems in favour of enterprise-wide initiatives for organisational transformation. He argues that company managers began situating their organisations within a global context and in turn they developed a sense of worldwide business solutions. This awareness was supported by international management consultancies whose revenues increase as approaches become more widespread and standardised. Walsham (2002) and Koch (2001) argued that these consultancies were the “driving force” behind both ERP adoption and its precursor, Business Process Re-engineering (BPR) which forms an integral part of most ERP implementations.

In the mid- and late- 1990s, Y2K compliance was a major concern for many companies as well as the wish to replace existing and poor quality systems. Management consultants were touting the global ERP software solutions available from the several vendors as a panacea to the Y2K potential nightmare. Business executives seeking expert advice about operating

in the new millennium were encouraged by management consultants and ERP vendors to replace outdated, home-grown systems with a single integrated solution.

Other major reasons reported in the literature as drivers for ERP adoption relate to: improving firms' performance and decision making, reducing labour costs, bureaucracy and errors. Other reasons are: pressure from the side of the competitors, business partner requirements for faster service, integration between functional units, organisational standardization across different locations and globalisation of businesses. Acquisitions and mergers between the units are forcing companies to change and function as a single system. However, for each company the drivers for implementing ERP are different as well as their priority order depends is likely to be influenced by the organisation's context – internal and external.

O'Leary (2004) grouped the ERP drivers into four categories: technology, business practices, strategy, and competitiveness. Holland *et al.* (1999) recognised three main dimensions: technical, operational and strategic. Some studies such as Markus & Tanis (1999) narrow down the reasons even to broader groups: technological and business performance. Based on the literature review, the foremost reasons that have caused fast growth in the use of ERP systems are summarised in table 2.1.

Table 2.1: Drivers for Adopting ERP systems

Technical	Operational	Strategic
Need for a common platform	Process improvement	Y2K compliance
Replacement of legacy systems	Data visibility	Globalisation of business
Systems incompatibility	Operating cost reduction	Growth of an enterprise Standardisation of business processes Improve customer responsiveness Integration between the units and processes Enhance firm's performance and decision making

Olson (2004) summarises two studies, which have examined the motivations for ERP adoption. One study was carried out on U.S. manufacturing organisations and the other on Swedish firms. Organisations studied in both countries ranked the replacement of legacy systems, and the simplification and standardisation of their systems as their primary rea-

sons. Other reasons that received high ranking were the improvement of interactions with suppliers and customers, the gaining of strategic advantage, and the creation of supply-chain in order to link to global activities. Pressure to keep up with competitors, ease of upgrading systems and restructuring organisation received low ranking from both of these studies. Given that there is increased ERP systems implementation in Kenya among large companies and some mid-sized companies are expected to follow suit. Hence, it is imperative to investigate the motivation towards the increased implementation trend.

2.4 ERP as a change process—Business Process Re-engineering (BPR)

According to Revere (2004) and Light (2005a), a typical ERP implementation often involves some degree of business process re-engineering (BPR) and customisation. Arif *et al.* (2005) assert that if a company is not already conducting business in the manner assumed in the ERP software package they acquire, then the organisation must re-engineer its business processes and practices. Therefore, BPR can be considered as a key practice in ERP implementation. Keller & Teufel (1998) describe BPR as a pre-planning phase of ERP which can be done by either ERP software vendors and consultants or organisations' own in-house team. ERP system analysts carefully examine the existing business procedures and practices in order to propose IS solutions that aimed at introducing radical changes to the business practices.

In BPR the goal is to replace the existing business processes with ones that are much more effective for both the customer and the organisation itself. Therefore, BPR can be conceived as a technique for restructuring business operations to achieve improvements. However, the technique is not new. BPR has deep roots in, and was widely developed by, management consultancy companies in the 1990s. Improvement of business operations can also be achieved through TQM or process improvement, but with BPR the targeted improvements will be more significant and radical. Eardley *et al.* (2008) state that the aim of TQM or process improvement approach is to streamline the process in the organisation's value chain in order to add value incrementally.

Abdolvand *et al.* (2008) caution that inclusion of BPR in the implementation of ERP adds considerably to the risk of implementation failure and also expense of implementation. Problems with BPR occur when the radical or “clean sheet” approach is adopted during ERP implementation. Problems with BPR is further supported by Attaran & Wood (1999) argument that organisations may neither be willing to “obliterate” their present infrastructure

and to implement completely new one, nor be willing to interrupt their business while its core processes are re-engineered.

According to Eardley *et al.* (2008) introduction of ERP systems require organisations to re-think and redesign their processes to fit in with the ERP system. In this case, BPR is driven by IT and seeks to radically alter existing business practices. This IT-driven BPR view and other similar technocentric views of IT call for discarding existing practices and reconstituting an organisation on the basis of completely fresh ideas. This view omits the role of human agents and the existing organisational and social contexts in the introduction of new technologies (Sarker & Lee, 2002), assuming that organisations can be fully redesigned through new technology. There are two possible problems with this view. First, the redesigned process may be less than optimal in terms of process efficiency. Second, strategic misalignment may occur, as the new process may not contribute to the achievement of strategic business objectives. Reijers & Mansar (2005) argue that this in turn can lead to a full or partial “failure” of the BPR effort.

According to Abdolvand *et al.* (2008), better results can be realised if ERP is used as a BPR-enabler, and also as proactive tool for BPR. For organisations to use ERP as BPR-enabler the organisation IT strategy needs to be aligned with the business strategy so that there is no “technology gap”. ERP supported by the IT infrastructure then allows the business strategy to be enacted. In order to use ERP as proactive tool for BPR, the organisation IT strategy and business strategy need to be not only aligned but also interdependent. In the enabling role, the IT strategy supported the business strategy. In the proactive role, the IT strategy is a part of the business strategy. Therefore, it important for organisations implementing ERP to formulate clear vision of the type of organisation that needs to be built, then using ERP as an enabler of change to achieve that vision (Bjorn-Andersen *et al.*, 1994).

2.5 ERP Implementation

ERP implementation is a complex and dynamic process, one that involves a mix of technological and organisational interactions. According to Al-Mashari & Al-Mudimigh (2003) implementing ERP systems in many instances cause dramatic changes that need to be carefully administered to reap the advantages of an ERP solution. In some well-documented cases, spectacular results have been achieved (Johnston, 2002). Failures, on the other hand, have been relatively high (Carlo, n.d.). Zhang *et al.* (2003) report that about 90% of ERP implementations are late or over budget while ERP systems success rate is only about 33%. Our deduction based on the literature review is that this trend has not changed significantly.

In addition, failures are much less extensively documented. As a result the pitfalls to be avoided tend to be less well known. It is aimed that the findings of this research will help in improving ERP implementation success in Kenya and other Sub-Saharan countries.

As Esteves & Pastor (2001) note, the implementation phase of the ERP lifecycle is currently the most widely researched in the IS discipline. They associate this focus with the difficulties of ERP implementations. Esteves & Pastor (2001) subdivide the ERP implementation literature into four topics relating to implementation: case studies, success, approaches, and other issues. Whilst the number of case studies on ERP might be higher than the other three topic areas, we argue that the focal point of these case studies varies.

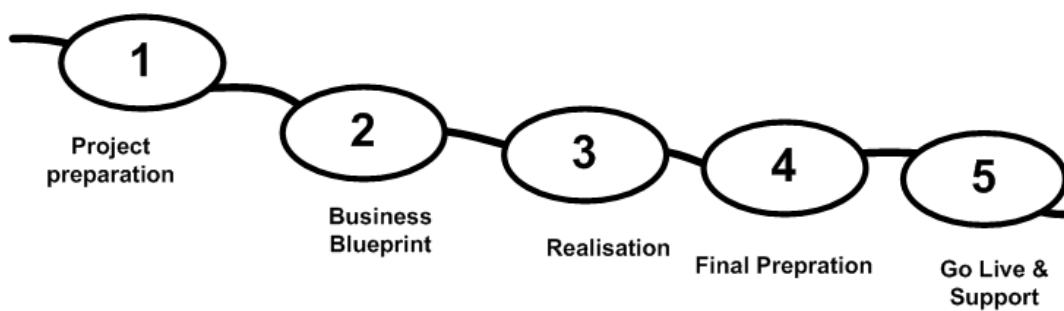
We reclassify the ERP literature in terms of main project foci: implementation strategies; implementation models; ERP system upgrade, implementation challenges, critical success factors (CSFs); and trend and future of ERP systems. These are discussed in the following subsections.

2.5.1 ERP Implementation Strategies

The decisions taken during ERP implementation system are strategic in nature. These decisions relate to: the ERP system to be adopted, the scope of implementation, the implementation strategy, the 'go-live' strategy, the training strategy, whether or not to upgrade and so on. The literature rarely consider this decisions to be strategic.

These decisions are strategic decisions in ERP because they: are normally adopted in organisations to support strategic objectives of organisations; commit a large amount of organisational resources; have a long-term impact on shaping the ERP system and/or organisation processes; are complex because they spurn the entire organisation and involves different stakeholders (Lee & Myers, 2004). Figure 2.1 illustrates the ERP implementation phases and the organisational choices to be made by organisations implementing ERP systems. Project preparation phase of the implementation process consists of getting ready by planning and organising people and tasks. It is a very important and critical stage of the ERP project since it constitutes the basis for the project. Among the decisions organisations have to make are decision on the ERP product, decision on functionalities or modules, decision on the implementation consultant etc. Blueprint phase comprises a detailed analysis that will allow the production of documentation on the business process requirements. In addition, blueprint phase consists of analysing the current business processes and investigating the chances for BPR or customisation. During blueprint phase, organisations need to decide on whether to customise the ERP system or re-engineer the existing business processes. Realisation phase deals with the technical aspect and involves building up a system prototype

based on the processes and procedures investigated in the former stage. Final preparation phase is critical to the success of the implementation project and involves conducting a set of tuning and testing activities related to the configuration, integration, quality, interfaces and reports of the system. Moreover, this phase is concerned with the education and training of the users on the system processes, data discipline and modules. Therefore, organisations must make a decision on personnel training strategy. Lastly, go live and support phase deals with the maintenance and improvement issues to keep the implemented ERP system running and up to date. The Go Live phase includes also the monitoring of the implemented system in order to make sure to make the necessary changes and modifications if problems are to occur and that could affect the performance of the ERP. During this phase, organisations make decision on : go live strategy, maintenance strategy, and bolt-on applications. Figure 2.1 provides a pictorial representation of the ERP life-cycle phases and the implementation decisions organisations are required to make based on the researcher’s conception.



Organisational choices (Strategic decisions)

1. Decide on the evaluation team
2. Decide on the evaluation partner(s)
3. Decide on the vendor(s)
4. Decide on key business processes
5. Decide on functionalities or modules
6. Decide on bolt-on applications
7. Decide on IT infrastructure
8. Decide on the implementation team
9. Decide on the implementation partner(s)
10. Decide on implementation strategy (BPR and software customisation)
11. Decide on go-live strategy (phased, plunge, or parallel)
12. Decide on ES variation strategy (similar or different versions of the same ES)
13. Decide on personnel training strategy
14. Decide on reporting needs
15. Decide on maintenance strategy

Figure 2.1: ERP implementation phases and organisational choices

The fundamental decisions regarding physical scope, BPR scope, technical scope, resource allocation and implementation strategy to be used to implement ERP system is based on such aspects as organisation size, complexity and structure, available resources, attitude towards change among many other organisational characteristics. Each implementation is unique

because different organisations will make different decisions based on their contextual factors. The decisions taken by the ERP implementation project teams significantly influence ERP implementation outcome. Therefore, organisations intending to implement ERP systems need to be aware of the trade-offs involved in making these important decisions in order to minimise the risk of failure and to optimise their ERP implementation. For illustration purpose, we discuss three main ERP strategies that can have profound influence on ERP implementation outcome: enterprise suite vs. best of breed, configuration vs. customisation, and Big-bang vs. phased approach.

Organisations implementing ERP system must decide whether to purchase all the ERP modules from a single vendor or to select ERP modules from different vendors based on their particular needs. These two strategies are referred to as enterprise suite and best of breed respectively. Light (2005a) states that both of these strategies are undoubtedly complex due to their scale, scope and BPR requirements. While highlighting Light (2005a), Mabert *et al.* (2001a) and Mabert *et al.* (2003) postulate that multi-vendor solution can provide the best functionality for each module, but implementing it becomes more complex because of the interfaces that need to be established. A single vendor solution on the other hand may not have all the functionality required, but will be easier to implement.

Similarly, organisations implementing ERP system must decide to either adopt business processes embedded in ERP or to customise the ERP system to make it fit with the existing business processes. The former is referred to as configuration while the later is referred to as customisation. According to Krumbholz & Maiden (2000), ‘misfits’ resulting from differences between system requirements and business requirements normally occurs during ERP implementation due to contextual differences between the package and the implementing organisation, requiring it to either configure or customise their system in order to resolve the ‘misfits’.

Grabski & Leech (2007) and Shehab *et al.* (2004) state that configuration known as ‘Vanilla approach’ can take the form of conscious redesigning of organisational processes and structures to accommodate the functionality of the ERP system accompanied by substantial change management, to more piecemeal, evolutionary workarounds as individuals adapt to the package and their practices become part of the new organisational structure. This means deep changes in long-established ways of doing business (that may provide competitive advantage) and a shake up of important peoples’ roles and responsibilities (Grant *et al.*, 2006; Dewett & Jones, 2001; Koch, 2001). Based on this we argue that organisational setting can facilitate or hamper adaptation to the working principles of an ERP system.

Vendors and consultants tend to promote the ‘Vanilla approach’ with the argument that

the embedded structures in ERP represent best practice, and that customisation will make future upgrades more difficult. Management concerned about the cost and risks associated with customisation, may also support the adoption of package structures with minimal customisation. It tends to assume the persistence of current organisational structures within the organisation that have evolved over time (Grant *et al.*, 2006; Soh & Sia, 2004a; Sheu *et al.*, 2003). However, the researcher's own experience and supported by Light (2005a), Light (2005b), and Wagner *et al.* (2006) indicate that a completely 'Vanilla' implementation is often not feasible.

Nicolaou (2004) describes customisation as the changing of the software to fit the already existing business processes in order to cater for organisation-specific and/or country-specific requirements. In the context of ERP implementation, package modification can range from customising the package code, to interfacing with custom developed modules of other vendors. Many researchers report that (Light, 2005a; Nicolaou, 2004; Nadhakumar *et al.*, 2005; Koch *et al.*, 1999) customisation slows down the project, introduces dangerous bugs into the system and makes upgrading the software to the ERP vendor's next release excruciatingly difficult, because the customisations will need to be torn apart and rewritten to fit with the new version. Conversely, it implies less organisational changes, because it does not require dramatical change in the organisation's best practices (thereby retaining competitive advantage), and the way people work.

Whereas literature on ERP argue that ERP customisation is not rational, it is increasingly clear, as illustrated by authors such as (Arif *et al.*, 2005; Soh *et al.*, 2000; Soh & Sia, 2004a; Huang & Palvia, 2001; Hong & Kim, 2002) that successful implementation does not necessarily mean to adopt standard processes, but requires focusing on the improvements which give competitive advantage to the company. This point is emphasised by Soh & Sia (2004a) who found out that the reasons for customisation may concern the absence of a required functionality in the standard system and also lack of consistence of a standard process with organisational decision making. Therefore, a typical ERP implementation usually involves a mix of organisation and software customisations (Light, 2005a; Ward *et al.*, 2005; Umble *et al.*, 2003; Shehab *et al.*, 2004; Al-Mashari & Al-Mudimigh, 2003).

Therefore, the decision an organisation may take in response to each 'misfit' is the result of a process of interaction and negotiation among various parties including management, users, IS personnel, and consultants. The nature of 'misfit' exerts a strong influence on whether the package structures would be more likely to prevail (i.e. the organisation would adapt the package), or the organisation structures would be more likely to prevail (i.e. the package would be customised via addition of supplementary modules or modification of package code).

Once installed, organisations are required to decide on big-bang or phased-in (modular) as a 'go-live' strategy. The big-bang implementation approach refers to a scenario where the old system is discarded and all modules of the new system are introduced into each business unit over a weekend (Nicolaou, 2004; Motwani *et al.*, 2002; Shehab *et al.*, 2004). Although the big-bang approach presents a number of advantages, as it does not require parallel running of legacy and ERP software, it requires peak resource utilisation in a short period of time with lower resources available to address problems for particular modules, thus increasing the risk of total system failure (O'Leary, 2000).

The modular implementation approach on the other hand refers to a scenario where one module is implemented, and then it is run in parallel with the legacy system until the output results are satisfactory (i.e. reports and data). Although this approach presents a minimal risk of failure, it leads to increased costs of ERP. It is imperative that organisations planning to implement ERP need be aware of inherent trade-offs in different competing strategies so that they can make informed decisions and boost their implementation outcome.

2.5.2 ERP Implementation Models

Implementing an ERP system is generally an extensive challenge, with a typical ERP implementation taking between one and five years (Poston & Grabski, 2001; Robey & Ross, 2002). In addition, the performance of the firm will get worse before it gets better and firms are expected to counter the staff resistance throughout the stages of ERP implementation (Ross, 1999). Several researchers have developed different models for ERP implementations. For instance, Ross (1999) proposed a five-stage model for ERP: implementation, stabilisation, continuous improvement and transformation.

Markus & Tanis (1999) suggested a model named enterprise system experience cycle, which has four phases: charter, project, shakedown and onward and upward. In 2000, Parr and Shanks developed a Process Phase Model (PPM) for ERP implementation, which is an extension of Ross (1999) and Markus & Tanis (1999) models, but integrating CSFs for each implementation stage. In the PPM, an ERP project is divided into three continuous phases: planning, project and enhancement (Shanks, 2000). In the project phase, it includes activities of set-up, re-engineering, design, configuration and testing, and installation.

The ERP implementation models mentioned above contain implicit assumptions with regard to the content, context, and nature of the change process. Like conventional IT implementation models, they rely on linear, staged models which do not take into account the dynamic

interplay and reciprocal interaction between technology and the social process involving its use. Change is seen as Lewinian:

“inertial, linear, progressive, goal seeking, motivated by disequilibrium and requiring outside intervention” and the change manager’s role revolves around “creating and influencing change” with focus on inertia. (Weick & Quinn, 1999, page 366).

We would argue that Parr and Shank’s model (PPM) was a move towards what can be called an implementation model because it attempted to identify the pertinent factors which should be controlled in each phase of implementation in order to achieve a successful implementation. However, the main weakness of the PPM is that it over-emphasises the project management aspect of a ERP implementation project at the expense of other pertinent factors such as organisation itself – its characteristics – and external factors such the environment in which an organisation operates.

Whereas we argue that ERP implementation models can help to improve our understanding of enterprise systems, and also can be a good guide for successful ERP implementation, what has been reported as ERP implementation models are more of ‘possible’ ERP implementation cycles. The question is whether a ‘cycle’ is synonymous to a ‘model’. We argue that a model should go a step further to give guidelines while taking context into consideration with the aim of improving the implementation outcomes. To do so, a good model should provide a rich picture of an implementation scenario and the possible sources of influences on implementation and how these actors interact and interrelate to come up with a working acceptable relation beneficial to both the organisation and the individuals.

However, ERP models discussed above do not include or consider other relevant contextual or environmental influences. In their famous work, DeLone & McLean (1992) caution researchers not only to focus on the dimensions of IT systems success, but to also consider other contingency factors. DeLone & McLean (1992) as well as other researchers, including Saunders & Jones (1992), Myers *et al.* (1997), and Ballantine *et al.* (1997) assert that deeper understanding could emerge when the contextual influences are duly considered in the discourse of IT systems success evaluations or assessment. Duncan (1972) provides a distinction between contexts when he writes, “. . . the internal environment consists of those relevant physical and social factors within the boundaries of the organisation . . . the external environment consists of those relevant physical and social factors outside the boundaries of the organisation. . .” (p. 314). We discuss three models which will inform the development of an ERP implementation model in this study. These three models are important due to

the fact that they take into consideration the influence contextual factors on ERP implementation. Even though Myers *et al.* (1997) and Somers *et al.* (2000) refer to their works as frameworks, we refer to them as models in the discussion.

Saunders and Jones (1992) Model

Saunders & Jones (1992) include contextual variables in their study of the performance of the IS function. The authors investigate both the organisational factors such as top management support, size, mission, industry, and so forth as well as the peculiar dimensions that might improve the effectiveness or success of the IS function. They proposed an evaluation model which they term “IS Function Performance Evaluation Model” (see Figure 2.2).

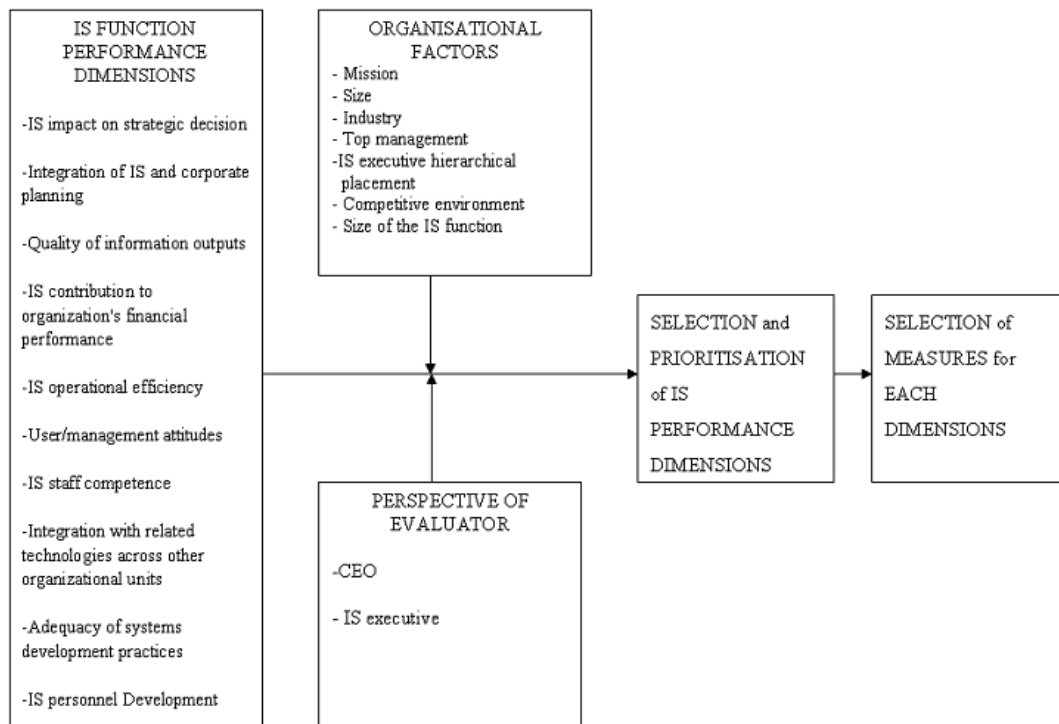


Figure 2.2: IS function performance evaluation model by Saunders & Jones (1992).

The relevance of the Saunders & Jones (1992) to this study rests on the extent to which it provides support to the view that a model can include both the impact of contingency factors and the dimensions of usage or success. In the same vein, Willcocks & Sykes (2000) discussed the role of the IT function in ERP acquisitions and Sedera *et al.* (2002) has also used a combination of the Saunders & Jones (1992), DeLone & McLean (1992), and the Myers *et al.* (1997) frameworks to discuss the impacts and success of ERP systems in Australian public sector organisations.

Myers et al. (1997) framework

Building on the work of Saunders & Jones (1992), the framework of the “contingency theory of IS assessment” was developed by Myers *et al.* (1997). Essentially, the framework extends the Saunders & Jones (1992) framework in the context of the assessment of quality and productivity of the IS function. The Myers *et al.* (1997) framework also recognises the pertinence of both contingency factors. Additionally, Myers *et al.* (1997) clearly delineate “external environmental variables” from the organisational factors, which Saunders & Jones (1992) did not do. Thus, by separating the contextual levels into two main parts, their approach provides insights which would be useful in the development of an ERP implementation model in this study. As briefly stated above, prior literature (e.g. Duncan, 1972) suggests that such delineations are necessary for insights.

Somers et al. (2000) framework

With regard to ERP systems in particular, this research will borrow from the framework proposed by Somers *et al.* (2000) that includes contextual factors such as industry type, size, structure, which these researchers imply are critical in achieving positive outcomes from ERP acquisitions. The Somers *et al.* framework is shown in Figure 2.3. These authors are suggesting that the value that adopting organisations would obtain from their ERP software could depend on the extent to which there is a match between the process, contexts, and contingency factors. We contend that the Somers *et al.* (2000) framework is rooted in the contingency approach, which will inform the development of this study’s model.

In conclusion, the ERP models discussed above are based on studies conducted in developed countries which are significantly different from developing countries. Given the contextual differences between developed and developing countries, we argue that Sub-Saharan Africa, Kenya being the case study, can provide a rich context in terms of diversity which could be used to refine the already existing ERP models or develop new ones.

2.5.3 ERP systems upgrade

One of the least addressed issues related to ERP software is the decision to upgrade from one version to another. According to Microsoft’s support web page, “An upgrade is a software package that replaces installed version of a product with a newer version of the same product. The upgrade process typically leaves existing customer data and preferences intact while replacing existing software with the newer version” (Upgrade, 2006).

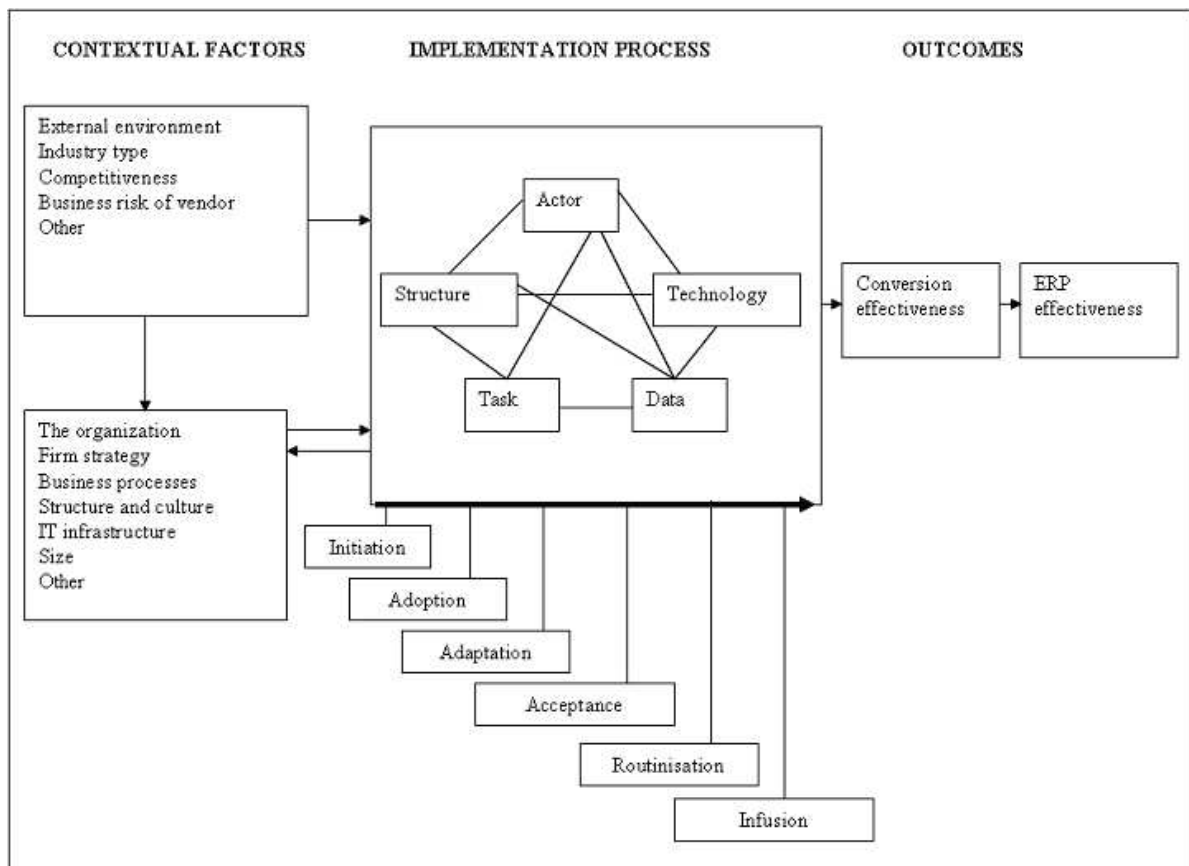


Figure 2.3: Somers et al. (2000) contextual framework

There is extensive research literature on the reasons why organisations adopt ERP systems. However, unlike the more general case of new ERP adoption, upgrading an ERP system is a decision to continue using software that has already been adopted, implemented and used. As a result, factors that are considered crucial for new technology adoption may be less relevant to the decision to upgrade.

The research that is most closely related to ERP system upgrade is software maintenance. Kidd (2001) defines software maintenance as “the activities performed on software after the program have been installed”. The main commonality between maintenance and ERP upgrade decisions is the importance of responding to users’ business needs. Just as user demand for enhancement and extensions is the most important problem of maintenance (Lientz & Swanson, 1978), users may also demand upgrades to obtain functionality that an existing version of an ERP system lacks. Thus IT maintenance and ERP system upgrade serve a similar functional purpose. However, there are major differences between ERP system upgrade and traditional software maintenance. For example, ERP system upgrades usually replace the previous version with a new version, whereas maintenance usually targets specific

functions that need to be corrected or perfected. These differences between ERP system upgrade and traditional software maintenance are likely to make the decision process different.

ERP upgrade decisions may also be influenced by an organisation's strategic orientation toward new technology. Maier *et al.* (1997) show that a firm that prides itself as an exploiter or innovator of technology will probably adopt the latest upgrade as soon as the new software is released in the market. On the other hand, a firm that considers itself as a follower of technology will probably wait to upgrade until migration is absolutely necessary and the new version has been thoroughly tested by earlier adopters.

In addition to a firm's own strategic orientation toward technology, upgrade decisions may be influenced by the environment (Lederer & Mendelow, 1990). It may be important to include environmental factors such as vendors in upgrade decisions. The most obvious relevant environmental influence is ERP vendors, who stand to profit by selling or licensing ERP software. Vendors actively market new versions well before their ability, promising features and functions that have not yet been built or properly tested. Such pre-announcements can affect the timing of customer's decisions to upgrade or purchase. When ERP supports critical processes and the current version of the system is no longer being supported by the vendor, an organisation is forced upgrade to the next version. As a result, upgrade of ERP systems appear to be inevitable for several reasons. ERP software vendors typically establish 'sunset dates', after which vendors discontinue support for a particular version. Thus, organisations that require vendor support are pressured to upgrade before the vendor's sunset date.

Although an organisation may choose to operate unsupported software, ERP products eventually become incompatible with other software or require new functionality. Unless organisations develop their own software or find another source, their only option becomes upgrading to a new, vendor-supported version. However, organisations do not need to upgrade to every new version of software because vendors typically support multiple versions at the same time. Thus, choices must be made, make it important to study how organisation decide to migrate to the next version of ERP software and how the upgrade is carried out.

2.5.4 What makes ERP implementation a nightmare?

ERP systems promise to improve an organisation's key performance indicators such as proficiency, efficiency, profitability, customer satisfaction and other measures of value. On the other hand, ERP systems are highly complex information systems and the implementation of these systems is difficult and a costly process placing tremendous demands on corporate

time and resources (Huang *et al.*, 2004). Shehab *et al.* (2004), point out that although organisations spend millions on ERP packages and implementation process, there is extensive evidence that they experience considerable problems, particularly during the actual implementation.

Studies have reported several failed ERP attempts, and companies lost not only the capital invested in ERP packages and millions paid to outside consultants, but also a major portion of their business. Unisources Worldwide, Inc., a \$7 billion distributor of paper products, wrote off \$168 million in costs related to an abandoned nationwide implementation of SAP R/3 software while FoxMeyer Drug, a former \$5 billion drug distributor, went bankrupt in 1996 and has filed a \$500 million lawsuit against SAP (Monk & Wagner, 2006). FoxMeyer charged the ERP giant that its package was a “a significant factor” that led the firm into financial ruin. Dell Computer Corp. abandoned a much-publicised SAP R/3 following months of delay and cost overruns. Dow Chemical, after spending half a billion dollars over seven years of implementing SAP R/2, the mainframe version, decided to start all over again on the new client/server version (R/3) (Soh & Sia, 2004a).

The next section will give an overview of implementation challenges reported in the ERP literature and the change process resulting from BPR. Given that there is no study on ERP which has been conducted in Sub-Saharan Africa we will look at the challenges faced by organisations in developed countries which have implemented ERP systems, and the challenges faced by organisations in developing countries in implementing information and communication technologies (ICT). We presume that these challenges which can be relevant to ERP systems because ERP is a type of information system. Careful consideration of these challenges will ensure a smooth rollout and realisation of full benefits of the ERP solution.

2.5.4.1 General ERP implementation challenges

Limited research has been conducted about ERP implementation issues: mainly case studies in individual organisations have been reported. A major problem with such ERP case studies is that very few implementation challenges resulting in these failures have been reported in the literature, and thus the reasons implementations failure is not known to practitioners or researchers. That is a motivation towards conducting empirical studies to explore challenges that affect ERP systems implementation. Identifying challenges relevant to local companies is one way to increase the chances of a successful local ERP implementation. A number of challenges to effective implementation and use of ERP systems have been documented, all drawn from US and Western Europe where these systems originate. Some of these are discussed below.

Interconnections/ Integration problems

Al-Mashari (2003) and Markus *et al.* (2000) states integration is often cited as a key goal associated with the implementation of ERP. According to Berente *et al.* (2009), ERP creates many interconnections among various business processes and data flows to ensure that any other unit of the organisation can obtain information in one part of the business. Information that was previously maintained by different departments must be integrated and made available to the company as a whole. Business processes must be tightly integrated, jobs redefined and new procedures created throughout the company. The whole process of change is challenging and employees are often unprepared for new procedures and roles (Rishi & Goyal, 2008; Laudon & Laudon, 2006, 2000).

Berente *et al.* (2009) argues that integration of existing stand-alone information systems with ERP systems is a major problem for many organisations. This is further complicated by the fact that ERP systems also seek to integrate business processes in organisations which were previously function-based. Thus, the process-orientation resulting from process integration is against the functional differentiation which is common in traditional organisations. While client/server and open systems solve some technical difficulties, there are still problems of integrating different types of data and procedures used by functional areas. Also, there is an issue of information sharing, which may contradict existing practices and culture (O'Brien, 1997). Coleman (n.d.) captures the key problems in his article "ERP integration options":

The problem of integrating ERP applications is as old as ERP itself. Not long after ERP suites first debuted in the early 1990s – touted panaceas for corporate integration woes – companies have struggled to improve the level of integration between their ERP packages and other applications such as legacy systems and e-commerce sites.

Technological complexity

According to Lowe & Locke (2008), ERP systems are perhaps the most complex and comprehensive of business information systems. Report by Institute for Data Research report (Aiken, 2002) further asserts that ERP systems are built on new powerful technologies that require very different skill sets than legacy systems. Most large organisations still require use of large scale, main frame legacy systems. Managers find it very challenging to manage the technological complexity of different platforms and to harness the technological power of new enterprise technology. While emphasizing the complexity of ERP systems, Bingi *et al.* (2002) noted that:

An ERP package is so complex and vast that it takes several years and million of dollars.

Sawah *et al.* (2008) concurs with Bingi's claim and states that ERP implementation is so complex that it has proven to be too difficult for many organisations. A study by Rogers (1983) shows that organisations that perceive ERP to be a complex business solution are likely to diffuse it slowly and in limited capacity, and may end up not realising its full benefit.

Lack of proper ERP management

Laudon & Laudon (2006), argue that most managers are trained to manage a product line, a division, or an office. Their argument is supported by Rishi & Goyal (2008). They are rarely trained to optimise the performance of the organisation as a whole. However, Bingi *et al.* (2002) reports that enterprise systems require managers to take a much larger view of their own behaviour, to include other products, divisions, departments and even outside business firms. Therefore, ERP systems must be developed and implemented over time guided by a shared vision of objectives. According to Laudon & Laudon (2000), many organisations find it very difficult to develop a shared, enterprise wide vision to guide systems implementation.

Cost of technology

Even though the price of prewritten software is cheap compared with in-house development, Monk & Wagner (2006) observes that the total cost of implementation could be three to five times the purchase price of the software. This is because ERP is a semi-finished product which needs to be configured and tailored to organisational needs by consultants. The implementation cost is even higher when an organisation decides to undertake major customisation. The cost of hiring consultants and all that goes with it can consume up to 30 percent of the overall budget for the implementation. Therefore, arguably, ERP systems are generally expensive to purchase and implement in organisations. The move to ERP is a project of breath-taking scope and the prices quoted are enough to make any financial manager twitchy. In addition to budgeting for software costs, financial executives should plan to write cheques to cover consulting, process rework, integration testing and a long laundry list of other expenses before the benefits of ERP start to manifest. Koch *et al.* (1999) state that ERP projects have a reputation of draining corporate resources and funds given the massive resources required .

Staff turnover

Many companies simply strive to complete the projects quickly for fear of poaching by head-hunting agencies and other companies. According to Gartner Group, total cost of an outside SAP consultant is around \$1600 per day. Going for in-house SAP-trained technologists creates its own worries. Once the selected employees are trained and after investing a huge sum of money, it is a challenge to retain them, especially in a market that is hungry for skilled SAP consultants (Skok, 2001). Employees could double or triple their salaries by accepting other positions. Retention strategies such as bonus programs, company perks, salary increases, continual training and education, and appeals to company loyalty could work. Other intangible strategies such as flexible work hours, telecommunication options, and opportunities are also being used (Skok, 2001) .

Organisational change

As stated by Umble *et al.* (2003), ERP implementation is not just a software project but an organisational change project. The projects call for co-operation, teamwork, and planning for organisational change are difficult to do when senior management is too busy to give the project adequate attention. Wagner *et al.* (2006) further argue that installing ERP systems successfully is not an easy task because of the major changes to a company's business processes required by ERP software. The projects bring about massive organisational changes as they consist of many functional modules that can span the whole organisation and yet share a database. Because departments are part of a larger organisation, they are forced to share systems and act not as independent units but as a larger organisation, requiring a whole new understanding of their work (O'Brien, 1997).

The introduction of any new technology may result in massive staff layoffs and morale problems. The integration of departments leads to reduced need for many staff to man operation hence leading to staff layoffs. The company may lack resources to compensate employees over their job loses. Therefore, managers must anticipate resistance to ERP systems, especially when combined to BPR (Laudon & Laudon, 2006).

Product quality and vendor unreliability

According to Fourney (2007), although ERP systems are becoming increasingly similar in functionality, they are still different in their quality, ease of implementation and vendor support. The stability of the a new release of an ERP system may not be guaranteed. System developers are changing hardware platforms, sometimes operating systems and database

platforms, and other times overall system architecture. Given that vendors are continually developing new version of their ERP products, one vendor may have several versions of the same system. It may also mean that the version you want to buy is brand new, leading edge, but unstable hence prone to crashing, and full of bugs (Al-Mashari *et al.*, 2003).

2.5.4.2 ERP implementation challenges-Developing countries

The challenges discussed were derived from studies conducted in developed countries where ERP systems emanate. Previous studies state that transfer of information systems like ERP – typically developed in industrialised countries – to developing countries is often marred by problems of mismatch with local cultural, economic and regulatory requirements.

Research has also acknowledged information technology’s potential for helping to promote economic growth in developing countries, but its realisation depends largely on acquiring the ability to appreciate local conditions and develop applications to address them. Local conditions consist of a variety of dimensions, including specific social and economic settings, cultural values, and technical issues such as the availability of equipment, lack of trained and experienced personnel, the reliability of power supplies, and telecommunications infrastructures (Heeks, 2002; Walsham, 1988; Lind, 1991).

Lind (1991) argues that computer-based solutions which work in one organisation in a specific country will not be applicable to another organisation or country if a different rationale prevails. He introduces the concept of ‘computer model fit’, to reflect the applicability of a system within a specific context. An evaluation of the applicability of any information system should therefore consider the cultural characteristics and social values of the environment (Galliers *et al.*, 1998; Robey, 1988), which can reveal the level of risk expected when a system created in the West is implemented in a developing country.

Bingi *et al.* (2002) also identified several issues that developing countries have to face that are not quite important or common in developed countries: human resources, technical concerns, and socio-political challenges. Regarding human resources, technology users in developing countries are limited in their opportunities for career development. Regarding technical issues, there are concerns about quality, security, and availability of data. Socio-politically, there are challenges that arise from illiteracy, language barrier, political instability etc.

As a result, Heeks & Kenny (2002) suggest that there is a strong need to understand the contextual setting of developing countries being studied in order to effectively apply information technologies developed in the west (Europe and North America) to these countries. In the

same light, the following sections examines the likely challenges to be faced by organisations implementing ERP in developing countries.

Incompatibility with work practices

Whilst ERP is a global product, most of the major ERP developers are located either in North America or in Western Europe. As a result, the developers' interpretations of business systems are likely to be reflected in the software (Sia & Soh, 2007; Fenema *et al.*, 2007; Soh & Sia, 2004a). ERP systems thus incorporate values and practices that may not necessarily match all environments. As such organisations face different problems with ERP that customised system development owing to the need to change their organisational practices in order to fit the software 'best practices' (Davenport, 1998; Pollock & Conford, 2004; Wagner & Newell, 2004; Light, 2005b; Chiasson & L.W. Green, 2007).

Since organisations need to change their internal processes in order to match the processes of an ERP system, we argue that in North America and West Europe where most ERP developers are located, this may not be very problematic since the underlying business processes and practices reflect European and US industry practices. The literature reports companies in developed countries which have been forced to discard ERP implementation altogether due to operational rigidity of the systems (e.g., FoxMayer in (Bingi *et al.*, 2002; Soh & Sia, 2004a); Dell Computers, (Bingi *et al.*, 2002)). However, in cultural contexts embodying organisational practices which are different to those encountered in North America and Europe like Sub-Saharan Africa, there can be significant problems associated with re-engineering of local practices and processes. Moreover, ERP companies have moved into providing solutions for vertical industries in many different countries giving way to problems of regional adaptation and customisation.

Many authors (e.g.,(Soh & Sia, 2004a; Wagner & Newell, 2004; Wei *et al.*, 2005; Light, 2005a; Wagner *et al.*, 2006; Sia & Soh, 2007; Chiasson & L.W. Green, 2007)) suggest organisations in countries and industries other than those envisioned by the package developers will often discover many instances of package-organisation misalignment. This, they argue will occur with increasing frequency as emerging economies in other parts of the world adopt ERP system developed largely for the US and Western Europe. For example, Soh *et al.* (2000) surveyed "misfits" observed in ERP implementations and found that these tend to be higher in Asian companies because of differences from European and US business practices. Pursuing a 'vanilla' implementation in such instances will result in significant changes to the processes, structures, roles, and policies of the implementing organisation. Some of these changes may adversely affect operational efficiencies and may even undermine an organisations' customer

service and competitiveness. Davison (2002) also argues that ERP causes significant cultural transformation to the organisation and tends to reset organisational values in terms of discipline, change and processes.

Therefore, ERP systems developed for one set of institutional contexts may not fit organisations operating in different institutional contexts yet social context is an often overlooked or underemphasised influence affecting the success or failure of new technology adoption (Kosalge, 2005). Further evidence from the cultural construction of technology literature indicates that universal applicability of information technology (IT) such as ERP, is more of a myth than a reality (Orlikowski, 2000). In the parlance of (Bijker & Law, 1992, page 13):

... technologies and technological practices are built in a process of social construction and negotiation, a process often seen as driven by the social interests of participants.

In order to create appropriate information systems, there is a need to understand how the social context influences the use of information technology, and how organisations use information technology within their own circumstances (Avgerou, 1991). This is especially relevant for developing countries because:

while there is not a universal ‘culture of developing countries’, local practitioners in developing countries need to devise appropriate ways of coping with features of the local practices (Ojo, 1992, page 108).

This implies that the internal workings of the technology developers and the values of its members affect the technological outcome. By the same token, therefore, local work practice influences the application of IT and transforms technology when it is in use.

ICT Infrastructure and ICT Policy

Bijker & Law (1992) and Mbarika *et al.* (May 2005) reviewed the literature for policy issues that specifically concern ICTS in the least developed countries in Africa. It is often the case that the government exerts excessive control over the national communications operator. The government often operates national communications directly, largely because the private sector is often incapable of operating such an infrastructure (ITU, 1994). Although there has been a move towards deregulation and privatization of telecommunications in many countries, the process is still slow, often being opposed by government telecommunication ministries (Chowdary, 1992) and national security forces (Pisciotta & Kibati, 1994).

In combination with inefficient state-run telecommunications, another major impediment to ICTs in Sub-Saharan Africa come from the onerous tariff structure. It works out that the average telecommunications revenue per subscriber line in SSA is twice as much in Europe, and four to six times as much in North America (Mbarika *et al.*, May 2005).

Other challenges reported by Xue *et al.* (2005) in his study of Chinese organisations which are likely to be applicable to Kenya and other developing countries include: lack of end-user preparedness, resistance to change, lack of user education and training, high turnover of key personnel, lack of communication and support documentation, the layer of consultants in addition to pure technological problems such as software bugs and configuration difficulties. Studies carried out in developed countries (Chen, 2001; Markus *et al.*, 2000; Gulla & Brasethvik, 2002; Kumar *et al.*, 2003) point out people, organisational issues and change management as the biggest obstacles in ERP implementation. Kumar *et al.* (2003) further asserts that people challenges are considered to be more difficult to manage than the technical problems.

In conclusion, given that hard currency is not easily available in most developing countries and unfulfilled social needs compete for resources, it is important for these countries to try to ensure that investments in information technology deliver tangible benefits. Identifying the possible challenges and devising means to mitigate the risks they pose to ERP implementations and usage can greatly improve ERP implementation success and value.

2.5.4.3 National and organisational culture

Most ERP studies point towards organizational culture as the primary factor responsible for the demanding character of ERP technology. In their study, Zhang *et al.* (2002) noted that:

Organisation culture is embedded within national culture and it is regarded as the unique factor affecting ERP systems implementation success (Zhang *et al.*, 2002, page 57).

Research has revealed that when adopting an ERP system, there is a need to recognise the unique social context given that the existing business models typically reflect Western practices (Soh *et al.*, 2000; Davenport, 1998; Umble *et al.*, 2003; Wagner & Newell, 2004; Ward *et al.*, 2005). Moreover, there is a growing evidence that failures to adapt ERP systems to fit different organisational and national cultures leads to projects that are expensive and late.

The environment in which an ERP system is developed, selected, implemented and used constitutes a “social context” (Skok & Legge, 2002). This ecosystem includes several stake-

holders: from the developers of the system, to vendors, the consultants, the project team, and the ultimate users. Each one of these holds a certain cultural assumption towards the ERP implementation and use process. Particularly, the developers' and consultants' cultural assumptions are embedded in the very roots of the software (the technology) itself. We can identify two main sets of culture at work in any ERP situation of development, implementation and use.

On one hand, there is a culture reflecting the views of the ERP developers, vendors and consultants which, as described above, will come to be "embedded" in the ERP system. On the other hand, there is a culture reflecting the views of the implementing organisation's project team, managers and users. We refer to the first as the ERP system culture ('to-be' culture) and to the second as the ERP host organisation culture ('as-is' culture). In summary, ERP is encoded or designed in one particular socio-cultural configuration but decoded or used in another. If cultures of producers and users are different it results in a cultural clash.

According to Davenport (1998) and Davison (2002), ERP system culture represents a certain understanding of problem solving, which is often implicitly promoted in the form of "best of breed" business practices. As a result, ERP vendors and consultants consider that ERP embodies the best universally applicable business processes without taking into consideration potential clients' cultural distinctiveness. Because ERP vendors focus on core competence, low cost strategies and mass production, ERP appears to reflect a universalism culture (Skok & Doeringer, 2001).

Nevertheless, the cultural assumptions within ERP systems and the whole notion of cultural universalism are challenged. For example, the study of ERP implementation in Singapore hospitals by Allen & Kern (2001), revealed a significant misfit in terms of data format, procedures, and legal requirements. Allen & Kern (2001) assert that when ERP systems are implemented in the public sector they are criticised as reflecting a specific "ideology of the private sector". All these point to the importance of organisational context during ERP implementations. To emphasise on the importance of context, Kosalge (2005) argues that:

Context comprises the deeply embedded business models and mindsets that drive organisations ... changes in context must precede any change in content.

Four out of the six leading ERP vendors are from the United States and one is from Europe. The national culture of these countries influences and shapes the organisational culture, thus the so called "best practice processes" integrated in the ERP standard software reflect, to some extent, European and U.S. industry practices (Soh *et al.*, 2000; Kumar & Bjorn-Anderson,

1990). Additionally, as such software packages are relatively inflexible and only to a limited degree modifiable to existing business processes, the re-engineering upon which the new resulting work practices are based, may cause various culture clashes. Moreover, even established Western companies are struggling with their reengineering and business software implementation approaches. Countries in Sub-Saharan Africa for instance that has diverse value and belief system inevitably need substantially longer time for the adaptation and acceptance of such a major organisational change.

This difference in context certainly leads to conflicts, for example ERP systems certainly affect the distribution of power and authority, which is far deeply rooted in some cultures than others (Soh *et al.*, 2000; Wagner & Newell, 2004; Kosalge, 2005). ERP philosophy is process-based, rather than function-based therefore initiating disruptive organisational changes (Hammer, 1990; Marnewick & Labuschagne, 2005). Boersma & Kingma (2005) assert that standard protocols and norms implicit in ERP systems affect power relations within organisations. Precisely internal and external (hierarchical as well as functional) boundaries can be affected by ERP. Marnewick & Labuschagne (2005) further mention that it is often difficult to implement an ERP system in an organisation with strict hierarchical structures and line reporting. “The culture of the organisation must first be changed for the ERP system to be successful” (Marnewick & Labuschagne, 2005). Allen argues that “. . . each functional areas has specialised expertise, specialised tasks, and different affiliations and identities that extend beyond immediate work environment” (Allen, 2005, page 34).

In line with these studies, we contend that no universal ERP system can be implemented in different countries successfully without resolving ‘misfits’ resulting from national differences. The business models, including operating processes underlying most ERP software packages, reflect European and US industry practices. Such operating processes are likely to be different in Sub-Saharan African countries, having evolved in a different cultural, economic, and regulatory environment. Potential ‘misfits’ could arise from areas including data format, operational procedures (e.g., billing and collection), and output format. Resolving such ‘misfits’ has required extra implementation time and expense which adds financial strain to these poor performing economies, whose priority investments is not in information technology (Montealegre, 1999; Wilson & Heeks, 2000).

Research carried out in various African nations such as Nigeria, show that traditional social arrangements prevail in the way organizations operate (Ojo, 1992). This kind of adaptive feature of any human society has led to many researchers to identify the need for flexibility in information systems. Such flexibility is vital if benefits from using information technology are to be achieved in the socio-cultural contexts of organisations in developing countries (Robey,

1988; Robey & Ross, 2002; Walsham, 2002; Khoelif *et al.*, December 2005). Information systems research carried out in developing countries has reinforced the finding that information technology is not value free (Lind, 1991; Woherem, 1992) because it incorporates models of reality derived from the contexts in which information system are developed. These models are generally imbued within Western values, which are not necessarily universal (Lind, 1991, 2000; Walsham, 1988).

Therefore this research study argues that as ERP systems spread into developing countries, it is essential to be aware of the implications of cultural assumptions embedded in ERP software and those reflected in developing country organisations settings. Such awareness can assist in assessing ERP suitability, in devising mechanisms to mitigate the impact of cultural misfit, and in increasing value from relatively expensive ERP investments.

IS authors (see Siakas & Georgiadou, 1999; Davison, 2002, etc) have applied the concept of national culture as proposed by Hofstede (1980, 2001) to explain and predict how people of certain nationalities will interact with information systems. A common aspect of these researchers' work is the application of Hofstede's dimensions to make sense of users' actions. Although Hofstede's work on culture has been widely accepted in the IS literature (Marnewick & Labuschagne, 2005), it has also been equally criticised (Walsham, 2002; Avison & Myers, 1995). In most cases not all his dimensions are found to be relevant. These approaches share ontology of culture in which its manifestations were tested, measured, typified, quantified, and catalogued: from this point of view, culture is already there. These approaches would therefore be useful in capturing organisational and national culture in this research study.

However, this study would not focus solely on the organisational and national culture while disregarding system users within the organisations. The fact that ERP systems are encoded or designed in one particular socio-cultural configuration but is decoded or used in another calls for culture to be studied both at macro-level and micro-level. Recht & Wilderom (1998) seem to support our argument by asserting that the transfer of ERP into developing countries is likely to face the "double-layered acculturation" problem. Hence, it is essential to address cultural dimensions that cover both these two layers. This is consistent with the approach of (Krumbholz *et al.*, 2000, page 269) who argued that "corporate and national cultures can be described using multiple dimensions which give us a set of overlapping characteristics with which to describe aspects of culture".

To address culture at a macro-level, the study will adopt more generalised dimensions that draw from work on national culture, though recognising that national culture impacts norms, beliefs and values at the organisational level (Ciganek *et al.*, 2004). One starting point would

be identification of generalised dimensions of national differences in approaches to problem solving that may create difficulties during ERP implementation (Krumbholz & Maiden, 2000). As a result, this study would also investigate Hofstede's "power distance" and "uncertainty avoidance" national culture dimensions relevance in Kenyan context. This is particularly of interest because Myers & Tan (2002) suggest that the very concept of national culture is problematic. They argue that there is no necessary alignment between culture and the nation-state, and propose a more dynamic view of the relationship between culture and information system in a global context –one that sees culture as contested, temporal and emergent.

Walsham (2002) takes this argument further. He proposes a structural analysis based on Giddens (1984) that can accommodate elements such as the links between structural contradiction and conflict, cultural heterogeneity, an analysis of detailed work patterns, and the dynamic and emergent nature of culture. This research will adopt Myers & Tan (2002) and Walsham (2002) in carrying out micro-level analysis of culture.

2.6 Critical Success Factors (CSFs)

In response to these problems, there has been a developing body of academic and practitioner literature (Bancroft *et al.*, 1998; Holland *et al.*, 1999; Markus & Tanis, 2000; Nah *et al.*, 2001; Motwani *et al.*, 2002; Leopoldo & Otieno, 2005) which addresses the difficulties of ERP implementation by proposing Critical Success Factors (CSFs) of ERP implementation.

It is not a new phenomenon for IS researchers to determine a list of critical success factors' for IT-enabled project initiatives (Reich & Benbasat, 1990; Nadhakumar, 1996). Many researchers (e.g. Nah *et al.*, 2001; Umble *et al.*, 2003; Sarker & Lee, 2000; Leopoldo & Otieno, 2005) have carried out research in this area to identify similar factors specific to ERP implementations. Most recently, authors have employed positivist research approaches to test the validity of these factors as truly necessary conditions for implementation success and then predict the effect of installed ERP technology on organisation performance (Pawlowski *et al.*, 1999).

Research in this area prioritises critical success factors in order to advise managers about which of the factors are most critical for the organization (Parr & Shanks, 2000; Somers & Nelson, 2001). This observation ties with that of Kallinikos (2004) who observes that a managerial outlook dominates the ERP literature, with its focus on successful ERP implementation guidelines. The outcome of this is a number of non-industry-specific CSFs that were introduced as aids to assist ERP projects (Holland *et al.*, 1999; Beard & Summer,

2004). For example, the study by Umble *et al.* (2003) has categorised the key factors under 10 main points namely: clear understanding of strategic goals, commitment by top management, excellent implementation project management, great implementation team, successful coping with technical issues, organisational commitment to change, extensive education and training, data accuracy, focused performance measures, and multi-site issues resolved.

As noted by Robey *et al.* (2002), while these findings are useful in predicting the successful outcome of ERP projects, they offer few insights beyond conventional wisdom because they do not adequately explain why the investigated business outcome occurred. In light with their observation, we argue that these studies are not without benefit because they illuminate important issues for consideration and point to the complexity of software project initiatives. Organisations and researchers may find consulting a list of a priori ‘factors of success’ beneficial, such items are not in-themselves keys to a preferred outcome. Rather, they tend to focus attention on controlling and simplifying innately complex situations.

Studies in ERP when compared to other research in the field of IS, shows that theories on ERP systems implementation have been given less attention (Robey *et al.*, 2002; Esteves & Pastor, 2001; Zhang *et al.*, 2003). Most of the studies carried on critical success factors areas lack theoretical basis that successfully link the critical success factors to implementation outcomes of any kind. Besides, there is no consensus on critical success factors owing to difference in context between implementing organisations (Leopoldo & Otieno, 2005).

2.7 Current ERP trend

ERP systems evolutionary process continues as standard ERP packages are redesigned by vendors seeking to penetrate untapped markets and extend their products to look beyond the four walls of the organisation – intra-organisational integration (Bennett & Timbrell, 2000; Everdingen *et al.*, 2000a; Sprott, 2000; Poba-Nzaou *et al.*, 2008). Huang *et al.* (2004) affirm that:

The ERP vendors are now trying to fight for the new generation of ERP systems and extend their market to companies in developing countries, Small and Medium Sized enterprises, and different kinds of industries.

Davenport, whose academic writings on ERP crossover most readily to a practitioner audience, observes that ERP is a prerequisite for operating in the 21st century (Davenport, 1998, 2000). We interpret Davenport’s perspective as quite powerful especially with the advent of

web-technology which makes an ERP to a ‘must have’ application if an organisation needs to exploit advantages of e-commerce. Beard & Summer (2004) support this argument by commenting that “today, enterprise resource planning (ERP) systems are one of the most significant business software investment made in new era”.

Web-based technology has brought in a new notion. In the last two years or so, the Gartner Group has coined the current ERP systems as ERP II –the next generation of ERP systems, which are based on collaborative principles (Zrimsek *et al.*, 2001). ERP has acquired a new look by including more “front-office” functions, such as sales force and marketing automation, Customer Relationship Management (CRM) and Supply chain Management Systems (SCM).

With the advent of e-commerce, there were fears that ERP would rest in peace. However, it is beginning to emerge that ERP is a prerequisite to a sound e-commerce infrastructure hence the former is viewed as a supplement. Norris *et al.* (2000), reports from their works with clients that properly implementing e-commerce and ERP technologies in harmony truly creates a situation where one plus one is more than two. They argue that web-based technology puts life and breadth into ERP technology that is large, technologically cumbersome, and does not always easily reveal its value. At the same time, ERP allows e-business to come into full flower, by putting real substance behind the organisations’ e-commerce websites. While ERP organises information within the enterprise, e-commerce disseminates that information far and wide. In short, ERP and e-commerce technologies supercharge each other (Norris *et al.*, 2000).

Today, the drivers behind ERP implementation are most likely to focus on maximizing strategic flexibility and improving business operations by reducing operational costs, enabling business integration, support customer responsiveness, improving data visibility and making better business decisions. For these reasons, enterprise systems remain a vital part of the Kenyan business scene.

2.8 Summary

Literature presented in this chapter indicates there are emerging interests in the impacts of ERP systems. Literature reviewed highlights issues that warrant further consideration with respect to effect of context on ERP adoption, implementation and upgrade. The insights gained from the literature should be interpreted in the light of a number of limitations.

Firstly, to the researcher’s knowledge, there is a limited number of studies that have been conducted in less developed countries, particularly in Kenya, to address ERP implementation

issues. This points to the urgent need for understanding ERP adoption, implementation and usage issues in developing countries since ERP systems are still in early stages in these countries and face additional challenges related to economic, cultural and basic infrastructure issues.

Secondly, although research into ERP systems has recognised the need to address indigenous local conditions in terms of social aspects, generally it is limited in the identification of how the social conditions and cultural aspects actually influence the use of this technology.

Thirdly, prior research suffers from either not using an analytic framework or only focusing on one aspect of ERP impacts. Most of the studies as pointed out adopted a perspective of technological determinism offering little help in terms of understanding and interpreting the effect context has on ERP systems adoption, implementation and usage.

Fourthly, literature reviewed points a gap between theory and practice by the inability of research to produce integrative and representation framework for implementation, as well as “reliable” generalisations on ERP.

Lastly, it is obvious that ERP consciously introduces vendor organisation or vendor national culture into an organisation. This can have a significant effect, cultural conflict, given that there is no single universal business practice as assumed by the ERP vendors, due to contextual differences among nations, regions, organisations, and industries.

In light of the gaps identified in literature, this research aims at filling the gap by studying ERP implementation and upgrade in the local context – the context of Kenya.

Chapter 3

Research Methodology

3.1 Introduction

The aim of this chapter is to provide the pathway through which the objective of this study is achieved. It presents the philosophical assumptions underpinning this research, as well as introduces the research strategy and the empirical techniques applied. The chapter defines the scope and limitations of the research design, and situates the research amongst existing traditions in information systems.

The research assumptions are important for the reader to understand the research analysis and findings contained in further chapters. These assumptions were developed with respect to the research topic, environmental constraints and the uniqueness of the research sites. In choosing appropriate research methods, we took into consideration the fact that: 1) the research method influences the way of data collection; 2) specific methods also imply different skills, assumptions and research practices.

3.2 Relevant Research Methods/Approaches

Research methods can be classified in various ways; however there is a major distinction between qualitative and quantitative research. Myers & Avison (2002) state that quantitative research methods were originally developed in the natural sciences to study natural phenomena. Example of quantitative research methods now well accepted in the social sciences include survey methods, laboratory experiments, formal methods (e.g. econometrics) and numerical methods such as mathematical modeling.

Qualitative research methods on the other hand were developed in the social sciences to

enable researchers to study social and cultural phenomena. Examples of qualitative research are action research, grounded theory, ethnography, and case study research.

Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable framework (Rapport, 1970 as cited in (Myers, 1997)). Ethnographic research comes from the discipline of social and cultural anthropology where an ethnographer is required to spend a significant amount of time in the field. Ethnographers immerse themselves in the lives of people they study and seek to place phenomena studied in their social and cultural context. Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analysed. Case study research is the most common qualitative method used in information systems (Myers, 1997).

According to Myers & Avison (2002), qualitative research methods are aligned to the interpretive paradigm whereas quantitative research methods are aligned to the positivist paradigm. The issue of whether these two paradigms can be accommodated within one study has been a subject of considerable schism among academics.

Multi-paradigm Approach

Lee (1991) developed a framework which can be used to combine qualitative and quantitative research in a study. It is referred to as multi-paradigm approach. In his framework, Lee (1991) identifies three levels of understanding discussed below (p. 35).

- *Understanding at the first level (subjective understanding)* belongs to the observed human objects. This understanding is the making of sense of everyday behaviour which manifests itself in social settings.
- *Understanding at second level (interpretive understanding)* belongs to the observer (researcher). This understanding is the reading or interpretation of the first level, common sense understanding.
- *Understanding at the third level (positivistic understanding)* belongs to the researcher. This understanding involves the researcher creating and testing propositions in order to explain the empirical reality that he or she is investigating.

Lee (1991) suggests that methodologies associated with interpretive research (e.g. case study, action research, ethnography, grounded theory etc.) can be used to develop the researcher's second level of understanding. The second level, interpretive understanding then informs

the development of testable propositions addressing institutional/structural aspects of the social phenomenon being investigated. The patterns or themes identified in the second level are represented by testable propositions to constitute a third level of understanding. These testable proposition can then be subjected to more conventional methods of scientific testing. The objective of this additional method is to achieve data triangulation. The advantage of Lee's (1991) multi-paradigm approach is that it recognises that understandings gained through interpretivist analysis might provide a basis for developing testable propositions.

3.3 Selected Research Method

This study will adopt the multi-paradigm approach discussed above. Multi-paradigm research involves mixing of methods from different paradigms. In general, research methods develop within a particular paradigm, but the relationship is far from clear. Pragmatists believe that methods can be mixed and matched to best answer the research questions (Petkov *et al.*, 2006). Mingers (2001) claims that "multimethodology, or critical pluralism as he calls it, may be seen as a new paradigm which can encompass multi-paradigm research combinations without taking the extant paradigm's assumptions at face value". While promoting the use of multi-paradigm approach, Mingers (2001) argues that "studies will get the greatest benefit from multi-paradigm as an approach in managing complex problems by mixing of methods to take maximum advantage of benefits gained from using methodologies premised upon alternative paradigms". Mingers (2001) further states that research results will be richer and more reliable if different research methods, preferably from different paradigms, are routinely combined together.

Fernandez *et al.* (2006) adopted multi-paradigm approach to grounded theory while studying ICT in Australia. Their study was designed to have three phases each including data collection and analysis: phase one in which the survey instrument was developed, phase two in which the survey was conducted and analysed, and phase three which involved the conduct and analysis of the interviews and the final integration of conceptualisations. They used statistical methods to discover patterns, and interviews and focus group to obtain rich data. The approach taken by Fernandez *et al.* (2006) is similar to the approach applied in this research except for the difference in the sequence of the phases. Whereas Fernandez *et al.* (2006) started by conducting a survey in phase two and then interviews in phase three, our study conducted interviews in phase two and concluded by carrying survey in phase three. The underlying principle is that methods aligned to different paradigms can be employed in the study of information systems.

In addition to the merits of multi-paradigm approach discussed above, it is well-suited for this research because it provides an opportunity to exhaustively study the phenomenon of interest, i.e. ERP implementation and upgrade in Kenya. The approach allows for the design of a study that capitalises on the advantages and minimises on the disadvantages of qualitative and quantitative research methods even though they are aligned to different paradigms. The multi-paradigmatic approach promises to provide a richer understanding of what constitutes ERP systems implementation given the relative lack of theory relevant to the subject. Therefore, multi-paradigm approach is attractive in this research in terms of its richness and increased validity (Mingers, 2003). Another justification for combining two research methods from different paradigms in this study is based on the research carried out by Siakas (2002) who combined qualitative and quantitative research methods to study the effect of culture on quality of information systems in her doctoral research.

The case study research method will be used for carrying out the qualitative (interpretive paradigm) part of this research – Lee’s second level understanding – while the survey will be used for the quantitative (positivistic) part of this research – Lee’s third level understanding.

3.3.1 Case Study Research

Yin (1984) defines the scope of a case study as follows:

A case study is an inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

The case study research method is particularly well-suited to IS research, since the object of the information system discipline is the study of information systems in organisations, and “interest has shifted to organizational rather than technical issues” (Benbasat *et al.*, 1987). Benbasat *et al.* (1987) point out three reasons why case study research is a practical IS strategy:

1. The IS researcher can study the IS in a natural setting, learn about the state of the art, and generate theories from practice
2. Case method allows the IS researcher to answer “how” and “why” questions, that is to understand the nature and complexity of IS processes
3. Since there is a rapid pace of change in the IS field, many new topics emerge each year for which valuable insights can be gained through the use of case research.

In addition, for situations when

- the research and theory are at their early and establishment stages (e.g. in ERP research); and
- the actors and context are important and the researcher wants to understand the practice based on problems;

case study research method gives the best results.

The use of a case study in this research may be validated by assessing the research against the criteria necessary for case study research developed by (Benbasat *et al.*, 1987). The answering of the following questions in the affirmative can validate these criteria.

1. Can the phenomenon of interest be studied outside its natural setting?
2. Must the study focus on contemporary events?
3. Is control or manipulation of subjects or events necessary?
4. Does the phenomenon of interest enjoy an established theoretical base?

Yin (1994) argues that “The case study allows an investigation to retain holistic and meaningful characteristics of real-life events such as life cycles, organisational and managerial processes, neighbourhood change, international relations and the maturation of industries”. Therefore, the case study approach is especially useful in situations where contextual conditions of the events being studied are critical and where the researcher has no control over the events as they unfold. The adoption, implementation and use of ERP are contextually dependent. There is a need to study organisations in their social contexts (Friedland & Alford, 1991) and information systems (more so ERP systems) in their organisational settings (Orlikowski, 2000; Ojo, 1992) reason being that different countries have national differences such as national culture, language, management style, politics, regulations, customs, etc. which affect “the way of doing business” (Huang & Palvia, 2001; Siakas & Georgiadou, 1999; Shore & Venkatachalam, 1996; Hofstede, 1980).

The need for this study to be undertaken historically in order to capture the opinions of the implementation staff and users at different stages of ERP implementation also justifies the use of case study. This was to ensure the coverage of post-implementation activities being undertaken by organisations to optimise performance of their ERP systems. There exists a plethora of literature on ERP implementation and to a less extent literature on effect of culture on ERP implementation, based on studies carried out in developed countries.

However, studies conducted in developing countries are still minimal and non-existent in African countries.

3.3.2 Survey

Case study research has been subject to criticism on the grounds of non-representativeness and lack of statistical generalisability. The research design for this study aims to address this limitation by incorporating a survey in the second phase of the research. Survey is one of the most prevalent research methodologies used in information system (IS) research (Vogel & Wetherbe, 1984; Pinsonneault & Kremer, 1993). The benefit of using surveys is that the researcher can easily cover large populations quickly at a relatively low cost especially with the availability of modern communication technologies.

3.4 Research Design and Techniques

The research questions to be answered in this research influenced the research design. This research is aiming to answer the questions listed in Section 1.2 of Chapter 1. This section describes the research design which outlines the intended research activities to be undertaken. The research will be carried out in four phases. The phases 1, 2, and 3 correspond to Lee's first, second, and third level understanding respectively, while phase 4 will be used for validating the models to be developed from the research findings.

3.4.1 Phase One: Pilot Study

The pilot study phase will consist of five steps discussed below. This phase corresponds to Lee's first level understanding and is aimed at gaining subjective understanding of the research topic.

Step 1: Preliminary Literature Review

Preliminary literature review will be conducted in order to familiarise with the previous research work on ERP systems. Preliminary literature review will aim at providing direction in the construction of data collection instruments in addition to guarding against the risk of overloading the primary data collection stages of the project.

Step 2: Development of the Data Collection Instrument

An initial questionnaire will be developed based on insights gained from the preliminary literature review. This instrument will be used to gather data relating to ERP implementation project management practices among Kenyan organisations.

Step 3: Questionnaire Administration

The questionnaire and a letter outlining the motive of this research will be distributed by email to organisations which have implemented, or are in the process of implementing ERP systems in Kenya. The data gathered will be used for pilot study.

Step 4: Pilot Data Analysis and Interpretation

The pilot study findings will be analysed by means of comparisons in order to identify similarities, differences, and patterns in the data. The insights gained from the preliminary findings will be used to refine the questionnaire and to develop interview protocols in preparation for the first field study.

Step 5: Revision of Data Collection Instrument

Based on the pilot study findings, the questionnaire will be refined to enable data collection during field study to be focused on the insights gained. In addition, the refining of the questionnaire would aim at avoiding ambiguity and misunderstanding.

3.4.2 Phase Two: Qualitative Research

The phase two of this research will involve an in-depth case study of the chosen Kenyan case study organisations with the aim of gaining richer understanding of the environmental and organisational context in which the ERP systems are deployed, and how the contexts influence ERP systems adoption, implementation and upgrade. The role of field study within the qualitative methodology is to locate practice in its historical, as well as its economic, social and organisational contexts in order to help in understanding the social structures which shape current practices.

Step 1: Further Literature Review

Literature review carried in phase two will be focused on the subject of study. It will be informed by the preliminary research findings from the pilot study. The in-depth literature review will aim at helping to maintain, throughout the study, a sense of the topic's perspective

by working the research findings in the following phases from extensive literature. The review will also aim at raising opportunities for articulating a critical analysis of the actual “meaning” of the data collected when the data analysis stages of the research were reached. In addition, the insights gained from the review will be useful in the development of this research’s conceptual model discussed in section of Chapter 5.

Step 2: Development of a Preliminary Conceptual Model

A preliminary conceptual model will be developed based on the insights gained from the in-depth literature review and the pilot study findings. The preliminary will guide data analysis and provide foundation for an empirical model to be developed later.

Step 3: Development of Data Collection Instrument

Based on the insights from the preliminary findings, a semi-structured questionnaire (interview protocol) to be used for conducting interviews during the first field study will be designed and developed.

Step 4: Choice of Case Study Organisations

In this study, the case study organisations will be sampled based on the Glaser & Strauss (1967) technique of theoretical sampling. While sampling, attention will be given to the differences and similarities of the organisations.

Step 5: Data Collection – First field study

The first field study will be conducted in Kenya (in situ) between July 2004 and February 2005. In line with Benbasat *et al.* (1987) and Pozzebon (2004) recommendations, various types of data will be collected from the case study organisations. Data will be collected through various routes which include participant observation, semi-structured interviews, document analysis of the ERP project documents and company official documents such as reports, bulletins, and minutes of meeting. The electronic and scanned documents on the internet that contain company policies, newsletters, emails, document templates, letters from customers, and customers’ surveys will also be used as data sources.

Step 6: Qualitative Data Analysis

Case study research has been subject to criticism that it lacks a detailed step-by-step data analysis of the case data (Miles & Huberman, 1994). To address this concern, this study will

use data analysis methodology formulated by (Glaser & Strauss, 1967), which is widely used not only by grounded theory researchers, but also by researchers whose primary research methods lack detailed data analysis procedures. Recent evidence shows that the use of Grounded Theory analysis techniques in case studies has been rewarding for IS researchers. For example Lehmann (2001) claims that:

Applying Grounded Theory to Case Study was very successful. It produced a prolific amount and yielded a great richness of information...The case settings, furthermore, contained more varied data than could be expected from individual, purely homocentric studies. Efficiency and abundance combined to make this method an exceedingly fruitful one.

The methodology of data analysis in grounded theory is iterative, requiring a steady movement between concept and data, as well as requiring constant comparison across types of evidence to control the conceptual level and scope of the emerging theory. As Pettigrew (1985) notes, this “provides an opportunity to examine continuous processes in context in order to draw out the significance of various levels of analysis and thereby reveal the multiple sources of loops of causation and connectivity so crucial to identifying and explaining patterns in the process of change” (p. 14). To facilitate this iteration and comparison, multiple field sites will be studied and analysed in this research.

Coding represents “the analytic process through which data are fractured, conceptualised, and integrated to form theory” (Strauss & Corbin, 1998). Glaser & Strauss (1967) and Glaser (1992) make mention of open coding and selective coding, while Strauss & Corbin (1998), suggest three coding activities – open, axial, and selective in sequence. This study adopted the Strauss & Corbin (1998) three coding activities. Nvivo which is a Computer Aided Qualitative Data Analysis Software (CAQDAS), was used to facilitate the three coding activities – open, axial, and selective coding.

Open coding is “the analytic process through which concepts and categories are identified as their properties and dimensions are discovered” (Strauss & Corbin, 1998). While undertaking the suggested three coding activities, Strauss & Corbin (1998) recommend coding by “microanalysis which consist of analysing data word-by-word” and “coding the meaning found in words or groups of words”. The microanalysis of the data word-by-word and line-by-line can be time consuming given the amount data generated by qualitative research. Nvivo was used to facilitate the process of open coding. Nvivo allows for the text or groups of texts perceived to be representing concepts to be identified, marked, grouped, and labeled into categories. The grouping of similar concepts is represented by nodes in Nvivo. The transcripts, electronic project documents, and journals were uploaded into Nvivo. Once they

were upload, the coding process started by reading the documents to gain familiarity. As the uploaded documents were read, texts and sentences were identified, marked, grouped, and labeled to form nodes, whenever they are considered to be describing concepts, actions, and events, which answer our research questions. Concepts, in grounded theory denote conceptual labels placed on discrete happenings, events, and other instances of phenomena. The names given to the concepts were derived directly from the data or from an awareness and familiarity with the ERP literature. Concepts derived directly from the data are referred to as *in vivo* codes. The properties and dimensions were identified, marked, and labeled. It is important to emphasise that the use of Nvivo still require intensive input of the researcher in identification of the concepts as they emerge from the data. In other words, the use of Nvivo only reduces the time and effort required by the researcher to carry out coding. The researcher must still make sense of the coded data. The software significantly increases the rate at which data can be accessed, retrieved and viewed while undertaking the three coding activities.

Axial coding is “defined as the process of relating categories to their sub-categories, termed “axial” because coding occurs around the axis of a category, linking categories at the level of properties and dimensions” (Strauss & Corbin, 1998). Category refers to the classification of concepts. This classification is discovered when concepts are compared one against another and appear to pertain to a similar phenomenon. The advanced data handling and manipulation features of Nvivo which aids in data management allowing text to be edited, coded, annotated, hyperlinked to other texts, and queried using user-defined parameters is the reason for using Nvivo to conduct axial and selecting coding. The ability of Nvivo to calculate the frequency of concepts is also important in judging the importance of the identified concepts. As concepts emerge from organisational context, they can be contrasted, elaborated, and qualified with case studies in different organisational contexts. The two field studies across five different organisations enabled the collection of rich data which required data handling software for effective manipulation. The role of field sites within the interpretive methodology, which is based on a belief that business practices and processes are socially constructed, is to locate practice in its historical, as well as its economic, social and organisational contexts. This helps in understanding the social structures which shape current practices.

3.4.3 Phase Three: Quantitative Research

The third phase of the research will involve formulating testable propositions based on phase two and the development of a survey instrument. The aim of this phase will be statistical

generalisation of phase one research findings. The research method to be used in phase three will be survey, which is the most common research method used to measure dependent and independent variables of an environment without any controls on the environment. Testable propositions will be formulated upon completion of analysis of quantitative data. By conducting a survey, this study acknowledges that gathering evidence that can support the validity of the hypothesis in other organisational settings can provide useful insights or suggest changes in behaviour beneficial to an organisation and its stakeholders. Additionally, methods associated with positivism lend credibility to an assertion that insights obtained in one context might be usefully generalised or transferred, thus increasing the relevancy of those research findings to the practitioner community. Phase three of this study corresponds to understanding at the third level in Lee's framework.

Step 1: Development of Testable Propositions

Based on the research findings in phase two of this research, testable propositions will be developed which will then be tested using statistical methods.

Step 2: Questionnaire Development

A questionnaire will be designed by following the Churchill (1979) guideline to ensure consistency and internal validity.

Step 3: Sample Selection

This study's sample population will be limited to organisations which have implemented ERP systems in Kenya. The organisations used for case study will also be included in the survey. There is no clear data on the total number of organisations which have implemented ERP systems in Kenya. However, an indicative figure will be obtained from ERP implementation consultants based in Kenya. The respondents to be targeted will include top managers, project managers and system end users as they were identified as the most appropriate informants for this study.

Step 4: Questionnaire Administering – Field Study 2

The questionnaire and the cover letter will be emailed to a list of organisations which have implemented ERP systems in Kenya. For case study organisations, the questionnaires will be administered by hand during the second field study. Administering the questionnaires personally will provide the researcher with an opportunity to conduct follow-up interviews. The

study will also employ structured interviews as a data collection technique during the second field study for case study organisations.

Step 5: Quantitative Data Analysis

Quantitative analysis will be carried out using SPSS. Both descriptive and inferential statistical analyses will be used in data analyses. The inferential statistical analysis will be carried out using both parametric techniques such as independent t-test; and non-parametric such as factor analysis and chi-square test to determine the significance of the formulated propositions using p values.

3.4.4 Phase Four: Model Development and Validation

Based on both the qualitative and the quantitative research findings, an ERP implementation and ERP upgrade decision models will be developed.

Grounded theory model validation technique will be used to validate the two models. Validation phase in grounded theory validates the emerged model through comparison with extant literature. This inductive model building research method is often criticised because of its weaknesses with respect to objectivity, consistency and transferability (Gasson, 2004b). Validation will be carried out by comparing the developed models with similar and conflicting models.

The developed model will be compared with the existing models discussed in section 2.4.2 Chapter 2 to find out similarities and differences. In line with Pinsonneault & Kremer (1993), carrying out comparison of the developed model with conflicting models will improve the internal validity whilst comparison with similar frameworks will improvement of external validity.

3.5 Summary

Methodology is seen as the cornerstone in every research project; the way it is understood and handled in a research project determines its (project) credibility or validity. It is argued that methodology is an important yardstick used to measure the scientific nature of research. The main argument or dividing line between qualitative and quantitative research largely lies on the methodological orientation. This research combines both qualitative and quantitative research methods—multi-paradigmatic approach.

The chapter identified the different data sources that will be utilised in this research and the proposed overall research plan aimed at answering the research questions.

Chapter 4

Kenya and Case Study Organisations

4.1 Introduction

This chapter provides the reader with a description of the Kenyan context and background information of the case study organisations. Organisations operate within the boundaries of a nation and therefore the national context within which they operate is likely to influence the way they conduct business. This chapter examines Kenya in its socio-cultural environment and also provides an overview of the case study organisations. The main objective of this chapter is to describe the generic factors related to the country, which impact on decisions, processes, and adoption of IT.

4.1.1 Overall Background

The Republic of Kenya is situated in Eastern Africa, with an eastern coastline on the Indian ocean and cradled within Somalia, Ethiopia, Sudan, Uganda, and Tanzania (see Figure 4.1). Its major seaport is in Mombasa. Kenya covers an area of 582 650 sq km, of which 13 400 sq km is covered by water, mainly located in the Great Rift Valley on the western side of the country. Its direct neighbours are Tanzania, Somalia, Ethiopia, Uganda and Sudan. Kenya's population of 34.3 Million (July 2005 UN estimate) is largely young, with over 40% of its population being under the age of 14 years. The population growth rate is estimated at 1.14% (GoK, 2004). Literacy rates are high at 85.1% although there is a gender discrepancy between men (90.6%) and women (79.7%) (Library of Congress, 2007).



Figure 4.1: Kenyan Map

4.1.2 Economic environment

The Kenya economy has not been performing well in the last 10 years. The poor state of infrastructure, roads, railways, and airports. Bad weather, poor maintenance and neglect also contribute to the poor performance of the economy. The effects of the HIV AIDS epidemic have added to the problems as it hits hard more on the productive members society in the age group 19-49. The country's GDP growth stood at 0.4 % in 2003 and improved to 5.6 % in 2008 under the new government which came to power in 2002 general elections (WHO, 2005). However, the situation deteriorated in the first and second quarter of the year 2008 due to the post-election violence which followed the disputed presidential general-election

results.

Poverty data indicate that more than 50% of the population live below the poverty line. Unemployment figures are estimated at over 40%. Although only 19.1 % of GDP is contributed by agriculture, it employs about 75% of the labour force (2007 est.). The main agricultural products are tea, coffee, corn, wheat, sugarcane, fruit, vegetables; dairy products, beef, pork, poultry, eggs. Industry contributes 18.3% with the remainder provided through services. The major industrial activity is based on the production of small-scale consumer goods (plastic, furniture, batteries, textiles, soap, cigarettes, flour), agricultural products processing; oil refining, cement; and tourism. The main export products are tea, horticultural products, coffee, petroleum products, fish, and cement. Inflation rates have fluctuated over the past five years but have generally been in the single digit range, accompanied by an almost constant USD/KES exchange rate (78-81) (WHO, 2005).

Concerns about continued corruption within the government were mentioned on numerous occasions, particularly relating to a number of large government-initiated ICT projects e.g. the passport issuing system has delivered little, with very large financial payments made (Ochuodho & Matunga, 2005). Most opportunities for large ICT project exist through government ICT contracts and e-government initiatives along with some banking and petroleum industry projects. Due to the high levels of corruption in the awarding of government IT tenders, there is general suspicion towards the IT sector for non-delivery. This is an important factor affecting ERP implementation given the fact that they are expensive ventures. The industry is not regulated and competition is driven by market forces. One of the major issues raised by both the industry players and ICT users is the lack of ICT standards and/or accreditation. This has resulted in a poor perception of the ICT industry with service quality being a major obstacle. The penetration of IT services into rural areas is generally very low, and offices tend to be concentrated in Nairobi and Mombasa.

Given the prevailing economic condition, most ICT access and use is prohibitively expensive for the majority of individual and organisations. Ochuodho & Matunga (2005) cited cost as the greatest obstacle to widespread access and use of ICT in Kenya. Therefore, lack of readily available capital and finances is regarded as one of the major barriers to ICT adoption, particularly in the ERP system adoption.

4.1.3 Information and Communication Technology (ICT) in Kenya

The growth of ICT in Kenya has been relatively slow over the past five years, except for mobile telephony which shows the same remarkable growth as in the rest of Africa. 2007 figures show that 82.9% of all phone subscriptions are mobile (ITU, 2004).

Three e-readiness studies were carried out in Kenya during the period 2001- 2006 (bridges.org). The assessment study was conducted by the government-led IT Sector Working Group and Netcom Information Systems. The results are presented in Table 4.1.

Table 4.1: E-readiness Assessment in Kenya (Source: bridges.org)

Indicator	Stage	Indicator	Stage
Network Access			
1. Information Infrastructure	2.0	11. Locally Relevant Content	2.5
2. Internet Availability	2.0	12. ICTs in Everyday Life	2.0
3. Internet Affordability	2.0	13. ICTs in Workplace	2.5
4. Network Speed and Quality	2.0	Networked Economy	
5. Hardware and Software	3.0	14. ICTs Employment Opportunities	2.5
6. Service and Support	2.5	15. B2C Electronic Commerce	2.0
Networked Learning		16. B2B Electronic Commerce	2.0
7. Schools Access to ICTs	2.0	17. E-Government	1.5
8. Enhancing Education with ICTs	2.0	Network Policy	
9. Developing ICT Workforce	3.0	18. Telecommunication Regulation	2.5
Network Society		19. ICT Trade Policy	2.0
10. People and Organisations Online	2.5		

Internet usage in Kenya greatly increased in the year 2007. This is attributed to the availability of relevant local content which is believed to drive Internet growth all over the world. For example, when the Ministry of Education released the Kenya Certificate of Secondary Education results via the web in March 2007 the Internet traffic increased drastically.

However, major deficiencies are notable in the areas of infrastructure availability and Internet affordability. This situation does not seem to have changed much and the fieldwork visit of July 2007 revealed much of the same problem. Internet availability, as judged by the growth in the ISP sector since 2002, seems to have stagnated when assessed in 2007 and it is unlikely that the e-readiness score would be as high if the survey was carried out in the present. The stagnation can be attributed to the difficult climate in which ISPs have been functioning under the TelKom monopoly, which provided the only international gateway in the country.

Even though higher values for ICT employment and development of skills for the ICT sector were scored (3.0), the relevance and appropriateness of ICT skills development for the industry needs a closer scrutiny. The ICT sector is one of the fastest growing sectors in the Kenyan economy. The ICT industry is generally well-educated, although perceptions are

that the level of engineering and technical training is not sufficient to meet industry demand. According to several sources in the industry, there is a general lack of project management and general management skills in the ICT sector, which has resulted in low levels of delivery on ICT projects. The success rate of government and parastatals ICT projects is low. Institutional memory is poor and new projects need to be started from scratch due to lack of recorded experiences from prior projects (WHO, 2005).

The scrutiny relevance and appropriateness of ICT skills would especially be relevant in the case of ERP skills where there are immensely insufficient skills to support the needs of organisations. This had led to high turnover of staff with ERP skills and higher salaries for their expertise. In addition, organisations are paying hefty costs by sending their staff to South Africa for training.

A good ICT skills base exists in the private sector, but skills levels in the government are low and exacerbated by the low salaries paid to civil servants. This has resulted in an exodus of ICT staff to the private sector. ICT curricula in universities are regarded as too theoretical and not synchronised with the needs of a fast-changing ICT sector. Increased ICT literacy levels are required in the general public to grow the demand for ICT products and services, and monitoring of government ICT projects. The generally low levels of understanding of ICT (e.g. ERP systems) in government were raised as a cause for concern. One of the major interventions identified by those interviewed and those who participated in the interviews, was the need to establish broad ranging awareness initiatives targeted at specific Ministries and the broader public. Specific recommended interventions include the development of an ongoing exhibition facility where new technologies could be showcased for government and the industry, IT seminars, and the promotion of ICT to the public through cybercafés, and popular TV programs (Obura *et al.*, 2005).

The areas showing least progress are in the introduction of ICT into schools and the establishment of e-government systems. Both have shown progress since 2002, with the expansion of school networking and e-government projects. The government has set up a programme for providing computers to schools in Kenya – Computers for Schools in Kenya (CFSK), which was established in 2003. This initiative is likely to increase schools access to ICT. CFSK intends to place 20 computers per school into all secondary schools in Kenya. Their 2007 target was to provide 20,000 PCs in schools, 2,300 PCs in community centres, 3,000 in ICT trained teachers, 230 to community centre officials and 2,000 board members trained in ICT awareness (Obura *et al.*, 2005).

The low score on service support is due to the fact that the IT industry in Kenya is characterised by a few large companies, the majority being smaller IT companies of 3–10 staff.

There are very few medium-sized companies. Most of the large IT companies are represented through appointed dealers e.g. HP, IBM, Microsoft, Oracle, SAP, Sybase and Samsung. Some of the larger local companies include Symphony (the second largest IT company), Fintech Group and ICL East Africa. These are involved in hardware, software and related IT consulting and training services with staff complements of more than 250. The national and regional offices tend to be small and characterised as distributors and resellers of products and services.

Little local innovation and development takes place, except in specific industry applications e.g. insurance, healthcare, financial services and web development services. There are a number of companies interested in developing industry wide healthcare information systems, which include the development of industry databases and systems to interconnect healthcare providers using a variety of technologies. These initiatives are driven by the need to improve services in an industry characterised by payment spread over long time and by verification lead times and high costs.

4.1.4 Policy and Regulatory Frameworks

The present policy and regulatory environment can best be described as restrictive, with a weak independent regulator. During the fieldwork period in January 2005, the general sentiment from industry players was that Kenya was experiencing a restrictive policy and regulatory environment not conducive to the growth of the industry. Subsequent interactions with key ICT experts in Kenya show that numerous changes have taken place and that the environment is perceived as more positive than that experienced during our fieldwork. The positive change could be attributed to the establishment of the new Ministry of Information and Communications in July 2004.

For example, until the end of June 2004, Jambonet which is operated by state-owned Telecommunications of Kenya (TelKom) as internet gateway and backbone operator in Kenya (CSK, 2003). Due to this monopoly, the quality of fixed-line infrastructure is poor and the proportion of non-operational lines is significant. Congestion of the international gateway is a problem for many companies, and for international firms, which rely largely on online applications for their operations. System downtime is a serious problem more especially with the companies which want to embrace ERP systems. The high cost of telecommunications, as well as the lack of penetration of connectivity into the rural areas has been a major stumbling block in improving access to basic telephony and the internet for organisations which operate nationally.

However, plans are underway where additional internet gateway and backbone operators will be able to apply for licenses on a first-come, first-serve basis. All mobile operators will be allowed to construct and operate international gateways. All these additional operators will be able to carry Voice over Internet Protocol (VoIP) and other forms of multimedia. Following the recent ending of the five-year exclusivity period for the monopoly operator, TelKom, the CCK anticipates complete liberalisation of the sector by 2009 (Waema, 2004). In addition, the regulator intends to move, within the next two to five years, towards a technology-neutral market restructuring which will make provision for three categories of service providers in Network Facilities (NFPs), Application Services (ASPs) and Content Services (CSPs). This measure will highly reduce the cost incurred in setting WAN using V-Sat technology by organisations implementing ERP systems in all their dispersed branches.

The country still lacks policies to govern e-business and e-commerce trading. As a result only a handful of organisations and individuals indulge in e-business and e-commerce. This acts as an impediment to enterprise systems implementation, especially the current second-wave which extend beyond the four walls of the organisations by utilising the Internet. This probably explains the low score obtained with the regard to B2B e-business and B2C e-commerce e-readiness measures (Table 4.1).

Another area where there is lack of policy is in the regulation of tariffs on ICT products. Tariffs range from 5% to 30%, with uncertainty as to what tariffs will be charged, due to lack of ICT knowledge among Kenyan customs officials. Software tariffs are unpredictable and can range from a zero-rating to tariffs being charged. This makes it a difficult climate for ERP vendors and their distributors (Ochudho & Matunga, 2005).

4.2 ERP Adoption in Kenya

In the past five years, a number of companies in Kenya have implemented Enterprise Resource Planning systems in their organisations. Since Kenya Power and Lighting Company (KPLC) implemented the SAP R/3 system in 1997, a number of other companies have also implemented similar products. In 2006, three government corporations namely: Kenya Ports Authority, TelKom Kenya Ltd., and Kenya Pipeline embarked on ERP implementation. There are many others that also may be planning to implement these systems for their operations. The major focus is on large ERP and inventory management systems. JD Edwards has carried out a few ERP implementations in Kenyan companies, primarily in the petroleum, soft drinks and manufacturing sectors. SAP has been implemented in a large

number of companies primarily in the power, transport and petroleum sectors.

The smaller ERP systems include Navision, Accpac, Great Plains, and Sun Accounts systems. There is no clear data on the total installed base but the Table 4.2 is an indication of the market.

Table 4.2: ERP Installations in the Kenyan Market (source: symphony consulting)

ERP	Target	Comments
SAP R/3	Large enterprises and governments	Current installations include: KPLC, KEN-GEN, Kenya Ports Authority, Kenya Pipe Line, Caltex
Oracle Financials	Large enterprises and governments	Government of Kenya-Treasury
Baan	Large enterprises	Bidco, Firestone, Unga
Sage Line	Small and Medium sized enterprises	KWAL, General Motors
Ebizframe	Small and Medium sized enterprises	ACFC, Kenya Tea Development Authority
ACCPAC	Small and Medium sized enterprises	James Finley, BASF EA
Sun Systems	Small and Medium sized enterprises	Uniliver Kenya, EABL
JD Edwards	Large/ Medium enterprises	Shell & BP

4.3 Introduction to Case Study Organisations

As mentioned in Chapter 3, this study adopted a multiple case study approach. The following sections provides an overview of the case study organisations.

4.3.1 Bidco Oil Refineries Company Background

Established in 1985 and with yearly sales of more than Ksh.9.2 billion (\$128 million), Bidco Oil refineries has grown to become the biggest processor of edible oils in Eastern Africa. The company currently has four factories – in Nakuru and Thika (Kenya), Dar es Salaam

(Tanzania), and in Jinja (Uganda). As a large enterprise manufacturing mass goods, the firm's turnover has grown to more than Ksh. 14.4 billion (\$200 million) annually. It has more than 3,500 employees on its payroll and it produces 28 brands across 14 African countries.

The pinnacle of Bidco management policy is to use technology as a tool for reducing the cost of production as well as penetrating the emerging African market. The company's vision is to deliver products to the market at a speed few of its competitors can match.

When Bidco Oil refineries made its debut in the edible oils, fat and soaps market in 1985, the market was dominated by multinationals. Unilever was then the largest player in the fast moving consumer goods (FCMG) sector in the East Africa region at that time with its headquarters based in Kenya. In order to survive the competitive environment, the company's challenge was to provide quality product at affordable prices.

The company went regional in 1998, when it acquired Elianto and expanded its capacity by 500 per cent to meet an increasing demand for the brand in the region. In addition, Bidco acquired edible oil business from Unilever a move which bolstered its drive to dominate the regional market after purchasing Kimbo, the oldest brand of cooking fat in the region, with an estimated turnover US \$ 25.9 million and other brands. As part of its extension program, Bidco entered the Tanzanian market in 2001 when it established a refinery in Dar es Salaam. In 2004 in a move aimed at meeting its long-term plan of dominating East and Central Africa, Bidco ventured into Uganda where it is undertaking an integrated palm oil project involving the development of palm oil plantations, a state-of-art refinery and a soap plant to utilise the by products.

Despite the sluggish economic growth in Kenya over the past decade, the Bidco group has grown to become the largest manufacturer of edible oils and fats, and soaps in East and Central Africa. The company currently exports its brands to Tanzania, Uganda, Rwanda, Burundi, Ethiopia, Sudan, Eritrea, Zambia, Malawi, Madagascar, Democratic republic of Congo, Zanzibar and Somalia.

4.3.2 Bamburi Cement Limited (BCL) Background

Bamburi Cement Limited (BCL) is the largest cement manufacturing company in East and Central Africa region. The company's Mombasa plant in Kenya is the second largest cement plant in Sub-Saharan Africa. It is also one of the largest manufacturing export earners in Kenya. Its export markets include Reunion, Uganda and Mayotle. In the past, they have also included Mauritius, Sri Lanka, The Comoros, Madagascar, Seychelles and the Congo. Bamburi Cement Limited was founded in 1951 by Felix Mandl – a director of Cementia Holding

A.G. Zurich in conjunction with the Kenyan government. Following successful privatisation—under the umbrella of Structural Adjustment Programme – in 1992 which saw foreign investors (Cementa, Lafarge, and Blue Circle) increase their shareholding, BCL transformed from being a government corporation to a limited local public company quoted in the stock market. Cementa later went into partnership with Blue Circle PLC (UK).

In 1989, Lafarge, the world’s largest building materials group, acquired Cementa, and thus became an equal shareholder with Blue Circle. Lafarge bought Blue Circle in 2001 to become the largest building materials company in the world and Bamburi Cement Limited principle shareholder. In terms of shareholding Lafarge is leading with 73% of issued share capital, followed by National Social Security Fund (Kenyan government trust) 15.8% and other private investors through stock market, holding 17% issued shares. The majority shareholding by Lafarge in BCL makes it more of a foreign company.

In order to supply the Ugandan market better, and also capture the Democratic Republic of Congo market, it acquired 100% shareholding of Hima Cement Limited when the Ugandan government privatised the company. Today, Hima cement is owned by BCL and ultimately Lafarge. BCL has seven sites; three in Kenya and four in Uganda. The seven sites are linked via a V-sat. In addition, BCL benefits from Lafarge Net, an Internet system that interconnects Lafarge personnel globally and provides secured Internet access.

4.3.3 Agro-chemical and Food Company (ACFC) Background

ACFC was incorporated in 1978 as a joint venture between government of Kenya through Industrial and Commercial Development Corporation (ICDC), Agricultural Development Corporation (ADC), and Private Investors namely International Investment Corporation (Mehta Group). The government is the majority shareholder with 54% of the total shares. ACFC refines molasses (primary raw material) to produce Rectified spirit, Neutral spirit, Kenya methyllated spirit, Industrial spirit, Active dry yeast, compressed wet yeast (bakers’ yeast), technical alcohol and fodder yeast. The company employs 300 full-time employees and has a turnover of Ksh 5 million (US\$100,000).

4.3.4 KPLC and KenGen Company

Kenya Power and Lighting Company (KPLC) is a limited liability company responsible for the transmission, distribution and retail of electricity in Kenya. KPLC’s core business activities include the transmission, distribution and retailing of electricity purchased in bulk from the Kenya Electricity Generating Company Limited (KenGen), Independent Power

Producers (IPPs) and the Uganda Electricity Transmission Company Limited (UETCL). The company owns and operates the national transmission and distribution grid. It is responsible for scheduling and dispatching of electricity to more than 500,000 customers throughout Kenya. The company employs 7,000 employees and has an annual turnover of Ksh. 28 billion (US\$ 350 million).

The vision of KPLC is “To achieve world class status as a quality service business enterprise so as to be the first choice supplier of electrical energy in a competitive environment”.

The mission of KPLC is “To efficiently transmit and distribute high quality electricity in Kenya at a cost effective tariffs; to achieve the highest standards of customer service; and to ensure the company’s long term technical and financial viability” .

The government of Kenya owns 40 per cent of the shares at KPLC. The National Social Security Fund (NSSF), a government trust, owns 12 per cent of the company’s shares. The government of Kenya has been exercising authority in the company as if it has a 52 per cent majority stake—by purporting to own NSSF’s 12 per cent shares. As a result, ownership of KPLC has been along standing dispute.

Kenya Electricity Generation Company (KeGen) is a public limited company. It has an annual turnover of KSh. 14 billion (US\$ 20 million). The organisation has a workforce of 1,480 employees. KenGen is the leading electric power generation company in Kenya, producing about 80 per cent of electricity consumed in the country. The company utilises various sources to generate electricity. However, in future, there may be stiff competition among and between KenGen and the IPPs.

The vision of KenGen is “Provision of reliable, safe, quality and competitively priced electric energy in East Africa”. Its mission is “To efficiently generate competitively priced electrical energy using state of the art technology, and skilled and motivated human resources to ensure financial success.” The organisation has adopted Balanced Score Card in defining its vision, mission, and objectives.

The company has 20 sites located in remote areas where the dams used to generate hydroelectricity are located. In addition, it has few geothermal stations used for generating geothermal electricity. The sites are linked via Very Small Aperture Terminal (VSAT). Most of the places where the dams are located are deserted and are uninhabitable.

KenGen was carved out of KPLC to undertake in the power/electricity generation in 1998 as part of Structural Adjustment Program which was sweeping across Africa. Before its separation, the task of power generation was being carried out by KPLC. Structural Adjustment Programme was initiated in 1980 by the World Bank and IMF as a prerequisite

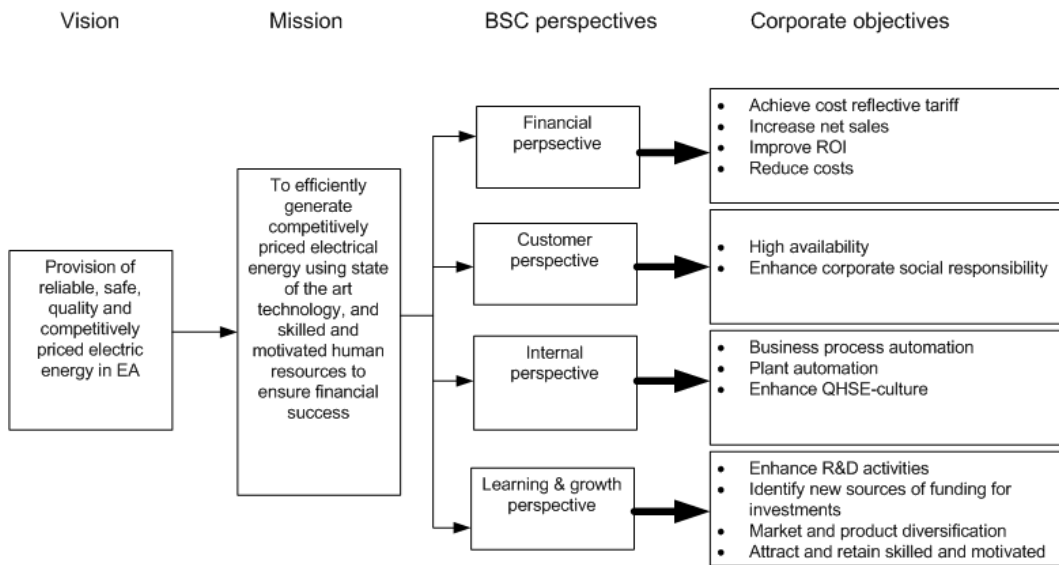


Figure 4.2: KenGen corporate objectives (KenGen Newsletter)

to be met by governments seeking donor funding. The programme provided an economic and social framework by the governments in Sub-Saharan Africa to embrace reforms in the public sector. Even though the programme was initiated in 1980, majority of the reforms in the public sector took effect the early and mid 1990s.

The two main policy objectives of the structural adjustment programme was to 1) improve the efficiency of the public sector by accelerating and streamlining reform in the civil service and public enterprises, and improving the delivery of infrastructural services; 2) enhance external and domestic competitiveness of the economy through further liberalisation of markets.

Public sector reform aimed to form a basis for sustainable long term economic growth. In order to achieve public sector reform imposed by the Bretton Wood institutions, the Government had to progressively reduce the role of public sector in the economy through rationalisation of public sector firms and an accelerated programme of privatisation. In 1994, the government embarked on privatisation of 211 non-strategic enterprises. In addition, the Government was required to divest its shareholding in six key government corporations including Kenya Airways, Kenya Commercial Bank (KCB), Kenya Ports Authority, Kenya Power and Lighting Company (KPLC), and Kenya Posts and Telecommunication Corporation (KPTC). In the case of KPLC, the government was also required to segregate the power generation business, and transmission and distribution business.

In July 1997, as part of the continued reform, legislation passed in parliament that split KPLC into three separate entities: Kenya Electricity Generating Company (KenGen), Electricity Regulatory Board (ERB), and Kenya Power and Lighting Company (KPLC). Al-

though KPLC retained its name, the power generation business was transferred to the newly formed KENGEN

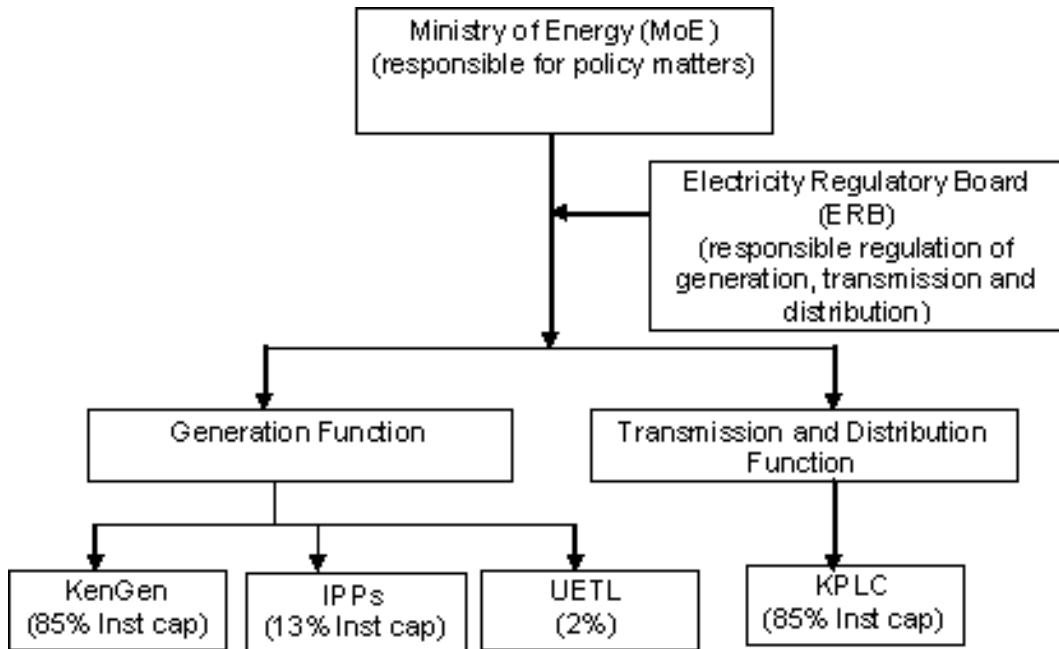


Figure 4.3: Power generation, transmission and distribution bodies in Kenya

4.4 Summary

This chapter provided an insight into the Kenyan context where this study is situated. The chapter also introduced the case study organisations. This understanding is needed in order to identify the relations between the national and organisational context, and ERP implementation. The chapter serves as a preamble to the Qualitative Data Presentation and Analysis chapter.

Chapter 5

Qualitative Data Presentation and Analysis

5.1 Introduction

This chapter presents data analyses and interpretations of phase 1 and phase 2 of this research. Phase 1 of this study involved conducting a pilot study with the aim of gaining subjective understanding of ERP implementation practices in Kenya, and the contextual factors that are likely to influence ERP implementation and upgrade decisions.

Phase 2 of this research aimed at gaining a richer understanding of ERP system implementation and upgrade practices among the case study organisations. It also aimed at identifying the contextual factors and their interrelationships, and how these factors influence ERP implementation and upgrade. The steps followed during all the phases of this research were presented in the previous chapter. The Sections that follow highlights the activities which were carried out in both phase 1 and 2. Finally data analyses and interpretation is presented.

5.2 Phase 1: Pilot Study

As mentioned in section 3.4.1 of Chapter 3, preliminary research phase coincides with the Lee's first level understanding. A pilot study was instrumental in preparation for the phase 2 of this research. The pilot study consisted of five steps discussed in Section 3.4.1 namely, preliminary literature review, development of the data collection instrument, questionnaire administration, pilot data analysis and interpretation, and revision of data collection instrument. The activities carried out in the steps mentioned mentioned above are discussed in this section. This section also presents the summary of the findings of the pilot study phase

of this study.

5.2.1 Preliminary Literature Review

During this phase the researcher conducted a preliminary literature review in order to identify the gaps and limitations of the previous work. Given that quantitative research belongs to the interpretive research paradigm, literature review was minimised to avoid compromising the interpretation of data during analysis.

5.2.2 Questionnaire Design

After identification of the areas that needed to be studied and explored further, the researcher developed a structured questionnaire (Appendix C) addressing ERP system implementation practices in Kenya. The questionnaire was pre-piloted with colleagues before being sent out in order to ensure that the questions were clear and well formulated.

5.2.3 Questionnaire Administration

A letter together with the pilot study questionnaire was posted to 10 Kenyan organisations requesting their participation in the research project. The letter outlined the aim of the research project. Confidentiality of the data provided was guaranteed and the organisations were given choice of discontinuing their participation in the project at any time if they wanted to. These organisations were known to have implemented or to be in the process of implementing ERP systems. All the organisations accepted to participate in the project. However, five of the organisations were in the processes of implementing ERP and therefore could not respond to most of the questions. As a result, their data were discarded. The remaining five organisations had implemented ERP and had used ERP for at least 5 years. Two had upgraded their ERP systems to the latest version provided by their vendors while one was planning to upgrade.

5.2.4 Pilot Study, Analysis, and Interpretation

We carefully examined the data gathered, identified patterns, similarities, differences, and relations, made interpretations and finally drew conclusions. The result from pilot study analyses is presented as a summary in Table 5.1. The preliminary results provided an insight into the ERP system implementation practices among the case study organisations. The study yielded factual data with regards to organisational size, ownership, and an estimate of ERP system implementation cost that was provided by the case organisations. In addition,

the study provided an indication of challenges faced by Kenyan organisations during ERP implementation. The study also provided preliminary results on factors which influence ERP upgrade decisions. These results were useful in refining the questionnaire and interview protocol for use during the first field study. In addition, the results informed the selection of these organisations as case study organisations.

Table 5.1: Summary of Pilot Study Findings

Category	Bidco	Bamburi	KenGen	KPLC	ACFC
Industry	Manufacturing	Manufacturing	Electric Power generation	Electricity distribution	Manufacturing
No. of staff	1,500	1,800	3,800	7,000	300
Ownership	Private(family)	Private Ltd (Lafarge)	Public Ltd	Public Ltd	State 51%, Private 49%
Turnover	US\$ 150 M	US\$ 208.7 M	US\$ 175 M	US\$ 350 M	US\$ 0.1 M
ERP Start Date	1999	1999	1998	1998	2001
ERP implemented	Baan	SAP R/3	SAP R/3	SAP R/3	Ebizframe
Service provider	ERP Vendor	Vendor and Consultants	Vendor and Consultants	Consultants	Consultants
Driver	Stiff competition Integrate Internal processes Buy-in from users	Integration Buy-in from users	SAPs Improve Management control	SAPs Improve Management control	Not clearly defined
Module implemented	Finance Sales & distribution Planning & production HR & Payroll	Financial Material Management Sales & Distribution	Finance Material Management HR & Payroll	Finance Material Management HR & Payroll	Finance Inventory Management Sales
Implementation Strategy	Vanilla	Light customisation	Heavy customisation	Heavy customisation	Heavy customisation
Estimate budget	US\$ 550,000	US\$ 2M	US\$ 3.75 M		US\$ 30,000
Actual budget	US\$ 500,000	US\$ 3.75	US\$ 5 M		US\$ 60,000
Continued on next page					

Table 5.1 – continued from previous page

Category	Bidco	Bamburi	KenGen	KPLC	ACFC
Module(s) added	Business Intelligence CRM SCM	Treasury Business Intelligence	None	None null	None
Project structure	Vendor project manager 3rd project manager Key users End users	3rd project manager Key users End users	3rd project manager Key users End users	3rd project manager Key users End users	3rd project manager Key users End users
Challenges	Computer illiteracy Lack of trust National IT infrastructure	Cost overrun Schedule overrun Data inconsistency High staff turnover Integration with legacy National IT infrastructure	Cost overrun Schedule overrun Data inconsistency Computer illiteracy Productivity dip National IT infrastructure Procurement legislation	Cost overrun Schedule overrun High staff turnover Computer illiteracy Productivity dip National IT infrastructure Procurement legislation	Cost overrun Schedule overrun User resistance Data inconsistency Vendor unreliability National IT infrastructure Procurement legislation
Choice of ERP	Cost Integrated package Geographical support	Cost Integrated package Local implementation	Adopted from KPLC	Cost Live runs feedback	Cost
Continued on next page					

Table 5.1 – continued from previous page

Category	Bidco	Bamburi	KenGen	KPLC	ACFC
Upgrade history	None	2002: 3.1G to 4.5B	2002: 2.11G to 4.7 2004: 4.5B to 4.6C	None	
Reason for upgrade	N/A	New functionality Withdrawal of vendor support IT policy	New functionality Withdrawal of vendor support	New functionality Withdrawal of vendor support	N/A

5.2.5 Revision of Data Collection Instrument

Based on the preliminary findings, the questionnaire (from here henceforth will be referred to as interview protocol) was revised in order to capture data which were regarded as missing. For example, initially organisations were required to state whether they had carried out ERP upgrade and the number of times the upgrade has been carried out. On discovering that some of the organisations had carried out two upgrades within a span of two years whereas others had not carried out ERP upgrade for about 8 years, the interview protocol was revised to capture factors which influence ERP upgrade decisions. Preliminary analyses showed that public organisations were unwilling to disclose the cost of their ERP implementation. There the question was reversed such that the cost of implementation was segmented into ranges which just required the organisations to choose predefined ranges.

5.3 Phase 2: Qualitative Research

The remaining sections present data analyses relating to first field study conducted between July 2004 and February 2005. This research phase corresponds to Lee's second level understanding which calls for interpretive understanding of the phenomenon under investigation using qualitative research methods.

5.3.1 Further Literature Review and Conceptual Model Development

The preliminary conceptual model presented in Figure 5.1 was developed based on the insights gained from the literature review. Specific contexts in which ERP is used are worthy of investigation, because the same technology may be used differently in different environments. Tornatzky & Fleischer (1990) argue that the TOE framework serves as an important theoretical perspective for studying contextual factors. The TOE framework identifies three aspects that may influence organisational usage of technological innovation: (1) the technological context describes the existing technologies in use and relevant technical skills available in the organisation; (2) the organisational context refers to internal measures of the organisation such as its size; and (3) the environmental context is the external arena in which a company conducts its business – its industry, competitors and trading partners (Tornatzky & Fleischer, 1990).

The aim of the proposed preliminary model was to aid in data analysis and provide theoretical grounding for empirical ERP implementation model to be developed in later. The preliminary conceptual model will be used to offer illustrative rather than exhaustive examples, based on the empirical data collected, the bi-directional influence between contingencies and ERP implementation and upgrade.

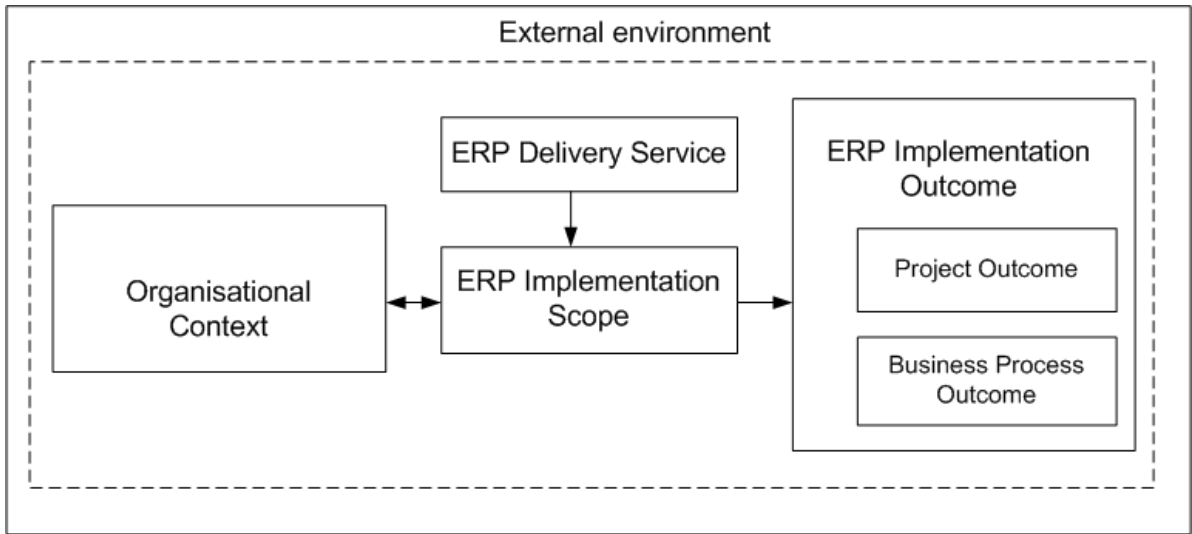


Figure 5.1: Preliminary ERP implementation conceptual model

The preliminary conceptual model highlights the bi-directional influence of the contextual factors on ERP project outcome and business outcome. The dotted lines are used to separate the environmental contexts (i.e., external and internal). The ERP delivery service is used to denote the ERP project management activities and their influence on ERP scope. The arrows show the influence of organisational context on ERP implementation scope, and in turn the influence of ERP scope on ERP implementation outcome.

5.3.2 Selection of Case Study Organisations

Five organisations were selected based on their similarities as well as their differences (Table 5.2). Theoretical sampling requires paying attention to theoretical relevance and purpose. With respect to relevance, this selection process ensures that a substantive area is addressed –in this study adoption, implementation and use of ERP systems –is kept similar, or as Eisenhardt (1989) notes, “is likely to replicate or extend the emergent theory” (p. 537). Thus, all the organisations chosen for this study had within the past few years implemented ERP systems.

Differences were sought in organisational conditions, such as the nature and scope of ERP implementation with the aim of generating findings applicable to various organisational contexts. As a result, the five organisations selected also differ in other organisational dimensions, such as industry, location, size, structure, and culture. Willingness to participate also formed part of the selection criterion. In brief, the organisations had the following characteristics: (1) ERP had been implemented and was being used, and had triggered misalignments in all of them; (2) each of them presented different cultures and contexts of use. Three of the organisations are state-owned with two running SAP R/3, and the other Ebizframe. The remaining two organisations are privately owned with one running SAP R/3, and the other Baan. So, whilst commonalities of the sites gave

Table 5.2: Summary of five case organisations

Case	Public/Private	Business sector	ERP system implemented
ACFC	Public	Manufacturing	Ebizframe
Bidco	Private	Manufacturing	Baan
Bamburi	Private	Mining	SAP R/3
KENGEN	Public	Power generation	SAP R/3
KPLC	Public	Service/Utility	SAP R/3

a baseline for valid comparisons, the different aspects of each site enriched the understanding of the social construction of ERP systems.

5.3.3 Data Collection

The first field study was conducted at the sites between July 2004 and February 2005, after which a steady correspondence has been maintained with different informants at the sites. The focus of data collection in this research was congruent with what was suggested by Harper (2002), that focus should be given to the ways in which organisations produce and work with technology.

Data was collected using the revised questionnaire (interview protocol) found in Appendix D. Table 5.3 provides a summary of how the data was collected and the interview topics. Primary data was gathered via project documentation analysis, and interview. A total of 39 interviews were conducted with 17 end users, 12 ERP project team members, and 10 senior/mid-level managers at the case study organisations. The interviews lasted an average of 1 hour each. In addition, two consultants were interviewed; one from PricewaterhouseCoopers and one from Symphony.

In addition, to the data collection techniques in Table 5.3, participant observation was employed. Data gathered through participant observation and document analysis allowed the researcher to corroborate what was heard in the interviews with what was observed on the site or read in the documents. The project documents that were selected and analysed were *project schedule*, *project tasks*, *bug reports*, *functional changes*, *suggestions*, and *checked tasks*. The first two categories of project documents were helpful in describing ERP adoption and implementation practices. The last four categories of project documents were important for this research since it was in these that the organisational contexts influence was manifested and the relevance of ERP systems were questioned, negotiated and re-constructed. Bug reports registered what users considered to be problems in ERP system which we inferred to result from organisational characteristics. While bug reports referred to glitches in the program code making it unstable, others were related to unmet expectations of users about functionality issues. Normally, the bug reports were rejected and re-entered as functional changes. Only bug reports reporting functionality issues –and not genuine code problems –were collected and analysed since it was in these documents that the interpretive

Table 5.3: Summary of data collection, techniques and sources from case studies

Level of data collection	Actor		
	End users	Project team	Senior/mid-level managers
Data collection	Semi-structured interviews, unstructured interviews, documentation	Semi-structured interviews, unstructured interviews, documentation review	Semi-structured interviews
Interview topics	<p>Work organisation before and after ERP adoption (the way work was organised, task, and process integration)</p> <p>Use of ERP (functionality, access to data, main benefits and problem faced with ERP; etc.);</p> <p>Interactions and work; interdependencies, cross-functionality</p>	<p>Review of project history</p> <p>Organisational and technical background of the project</p> <p>Impact of some factors on adoption and usage</p>	<p>Review of project history</p> <p>Managers' perception of ERP</p> <p>Usage and benefits overview</p>
Number of respondents			
ACFC	5	2	3
KenGen	3	2	2
KPLC	3	3	2
Bamburi	3	2	1
Bidco	3	3	2

flexibility of ERP embedded best practices was manifest. Another type of project document was suggestions, which were based on recommendations about system improvements.

5.3.4 Data Analysis

According to the qualitative research literature, the relationship between data collection and the data analysis phases are either “disconnected” or “integrated” (Ezzy, 2002). “Disconnected” analysis commences only after data collection is completed. In this study, data collection and data analysis was disconnected in the sense that data analysis began once data collection had been completed. Data analysis began by transcribing all the verbatim. The transcripts were transcribed sequentially in a organisation based order –that is, transcripts of interviews within the same case study organisation were coded before proceeding to another case study organisation.

Data analysis followed the three steps prescribed in grounded theory. These steps are open coding, axial coding, and selective coding. The coding process is the central mechanism through which data is analysed. Concepts, categories and properties are identified and developed.

Open Coding

The first step in open coding involved conceptualising. The data was broken into actions, events, incidents, and ideas by asking questions such as what, where, when, and how much. The unit of analysis used was the lines of text. The smallest unit of analysis is word. Lines, paragraphs and sections come next. There is no hard and fast rule on how to carve up a document: we chose lines simply because this choice preserves a degree of flexibility as to how far to go in categorising a chunk of text. This choice enabled us to operate at the level of paragraph or section while at the same time preserving the option of embedding finer-grade codes in lines or set of lines.

Inferences from careful reading of all interview transcripts and other documentary sources, namely project documents, minutes of meetings and company reports enabled identification of phenomena which are important central ideas and represented as concepts to describe issues, problems, and concerns. Given that the qualitative research phase was aimed at interpretive understanding, we took social identities, interactions, and processes of sense-making as our object of analysis. The emphasis in data collection was on discourses and narratives about interplay between organisational setting and the ERP system during its implementation and upgrade. We also focused on project description to identify ERP implementation practices by the case study organisations with aim of understanding ERP implementation practices in Kenya.

Figure 5.2 provides a sample excerpt taken from Nvivo. From that excerpt the phenomena shown in Table 5.4 can be identified. These concepts can then be corroborated with other excerpts from users in different case study organisations. As mentioned, coding involves attaching meaning to

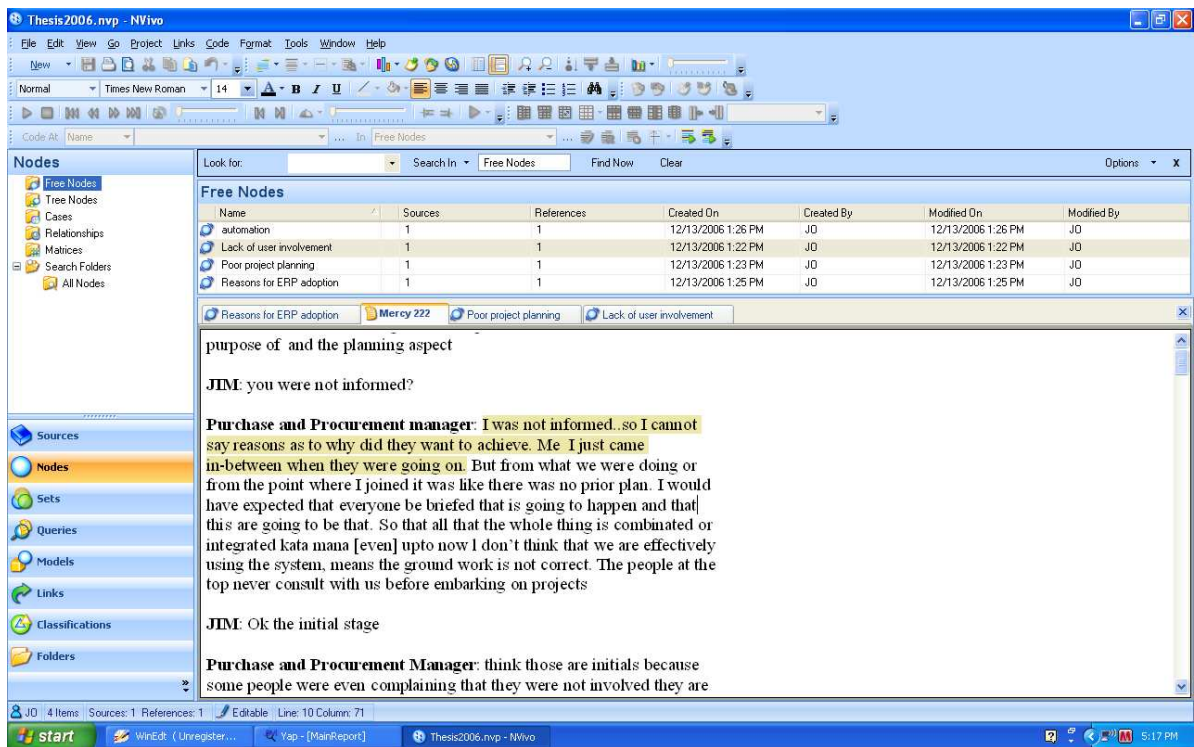


Figure 5.2: Sample Excerpt from Nvivo software

events, actions, observations, and verbatim. For example, the phenomena listed below were derived as follows:

“...so that all the whole thing is combined or integrated ‘kata mana’ [even] up to now...” This excerpt is a user’s description of the state of integration of the implemented ERP system hence the label “integration”.

“..the people at the top never consult with us before embarking on projects...” This excerpt is an indication of lack of user involvement and also depicts a top-down organisational structure and hence labels “lack of user involvement” and “organisational structure”.

“Me I just came in-between when they were going on. But from what we were doing or from where I joined, it was like there was no prior plan”. This excerpt was used by a user to describe how the ERP system implementation was carried out. It indicates how poorly the initial and subsequent planning was carried out hence the label “project planning”.

The second step in open coding involved abstraction process to organise concepts into categories. Categories are concepts derived from the process of grouping concepts at a higher and more abstract level. The preliminary model discussed in Section 5.3.1 provided predefined categories namely, organisational context, external environment, ERP implementation scope, ERP implementation outcome, and ERP delivery service. Concepts encountered in the literature especially the models discussed in section 2.5.2, ERP implementation strategies discussed section 2.5.1, and ERP imple-

Table 5.4: Sample identification of concepts

No	Phenomena
1	Integration
2	Lack of user involvement
3	Project planning
4	Organisation structure
5	ERP adoption Decision

mentation drivers discussed in section 2.3, provided pre-existing categories which were adopted in the coding process. It is not desirable for the researcher to invent new names for concepts and categories that are well known in the field of interest. Statements were identified and marked up as describing other concepts, categories, and properties that the researcher interpreted as being raised by the interviewees as important. This process enabled easy access to the data that was ascribed to any particular category. Reasons for the coding pieces of data were documented on the research memo to ensure consistency and efficiency in coding, and to avoid overlap in coding.

Axial Coding

Axial coding aimed at finding relationships between categories and subcategories by identifying properties and dimensions related to the subcategories. Properties a) define the meanings of a category, and b) explain the general or specific characteristics and attributes of a category. Dimensions a) define the varying range of general properties of a category, b) give the specification to a category, and c) identify the location of a property. A subcategory is a category that has properties and dimensions, and stands for phenomenon which is a happening, an event, an issue or a problem. Focus was placed on statements that were deemed to form a rationale whether it expressed an opinion (positive or negative) or if it expressed objectives sought or located in ERP adoption, implementation and upgrade. The results are summarised in Table 5.5.

Table 5.5: Categories, properties and dimensions derived from data analysis

Category	Property	Dimension	KenGen	KPLC	ACFC	BCL	Bidco	
ERP Implementation Scope	ERP breadth	Single Site			✓			
		Nationally	✓	✓				
	ERP depth	Internationally				✓	✓	
		No. of users of ERP	640	420	46	450	800	
	BPR breadth	Small No in a department			✓			
		Department			✓			
		More than one department	✓	✓				
	BPR depth	Region				✓	✓	
		Employees whose work changed	800	840	80	1200	1008	
	BPR Magnitude	Extent of modification	13%	25%	25%	60%	75%	
Process efficiency		✓	✓	✓	✓	✓		
ERP Implementation Outcome	Business Process Outcome	Process effectiveness	Min	Min	Min	Max	Max	
		Process flexibility	Min	Min	Min	Max	Max	
	Project Outcome	Duration	3 years	3 years	4 years	1.5 years	3 months	
		Budget	Over	Over	Over	Above	Within	
	ERP Delivery Service	Project responsibility	Vendor			✓		
			Consultancy	✓	✓		✓	✓
ERP Configuration		Enterprise	✓	✓	✓		✓	
		BOB				✓		
Upgrade and Improvement	IT champion	Present	✓	✓		✓	✓	
		Absent				✓		
	Top Management Involvement	Present	✓	✓	✓		✓	
		Absent		✓				
	Training	Simple	✓	✓	✓		✓	
		Extensive				✓	✓	
Organisational Context	Upgrade cycle	Long cycle		✓	✓		✓	
		Short cycle	✓			✓		
	Upgrade decisions	Risk mitigation					✓	
		External dependence on vendor	✓	✓				
Orientation to change	Resource availability	Resource availability		✓				
		Business and IT needs	✓	✓				
	Change Rigid	Towards	Towards	Towards	✓	✓	✓	
		Rigid						

continued on next page

Table 5.5 – continued from previous page

Category	Property	Dimension	KenGen	KPLC	ACFC	BCL	Bidco
Organisational Context	Basis of Truth & Rationality	Hard data				✓	
		Personal experience	✓	✓	✓		Blend
	Information Sharing Perception	Willing				✓	✓
		Unwilling	✓	✓	✓		
	Orientation to Collaboration	Isolation	✓	✓	✓		
		Collaboration				✓	✓
	Organisational structure	Centralised	✓	✓			
		Decentralised				✓	✓
	Orientation to work	Process				✓	✓
		Result	✓	✓	✓		
	Decision-making style	Centralised/bureaucratic	✓	✓			
		Decentralised				✓	
		Consensus/voteless					✓
		National		✓	✓		
		Regional					✓
Market Area	International				✓		
	Knowledge resources				✓	✓	
Organisation IS resources	IT infrastructure resources		✓	✓			
	Present				✓	✓	
Professional culture	Absent		✓	✓			
	Present				✓	✓	
Competitive environment	Absent		✓	✓			
	Poor		✓	✓		✓	
National IT infrastructure	Good						
	Favourable					Somehow	
Government legislation	Unfavourable		✓	✓	✓	Little	
	Low		✓	✓	✓		
National Culture	High					✓	

Selective Coding

Selective coding involved integrating the categories identified open and axial coding to develop an empirical ERP implementation model, and ERP decision model discussed in Chapter 7. The above data analysis steps were carried out within the case study organisations (within-case analysis) and across the case study organisations (cross-case analysis). The following sections present the research findings and interpretation of the within-case and cross-case analyses.

5.3.5 Within-Case Analysis and Interpretation of Findings

Appendix A presents the ERP project description, data analyses and interpretation for each case study organisation. The analysis was based on the categories identified during the open coding stage of data analysis. The definition of the categories are given below.

ERP Implementation Practices

This category refers to the manner in which ERP implementation was carried out from project preparation phase to ‘go-live’ and support phase. It is debatable whether ERP implementation practice is a category or not. However, in order to enable the description of ERP implementation practices, of the case study organisations in a structured manner, it was coded as a category. Therefore, ERP implementation practice is discussed along these properties: ERP background and drivers, ERP implementation scope, level of integration, level of customisation, training, and post-implementation activities. These six properties were considered because they affect ERP implementation success.

ERP background is intended to provide the general background of activities leading to ERP adoption and implementation. The ERP drivers are meant to enable the discernment of factors which catalysed the adoption and implementation of ERP systems. The pattern from data showing disparity in the number and the nature of modules implemented provided the basis for the inclusion of the ERP implementation scope. Level of integration is intended at finding out if the claim that ERP systems lead to seamless integration was achieved by the case study organisations. Training on the other hand was considered to be effecting ERP usage hence the reason for inclusion in ERP implementation practices. Finally, the post-implementation activities aimed at identifying measures being taken by organisations to optimise their ERP system once it is operational.

Organisational context

This category refers to the structural establishment of the organisations as a whole, based on its management and functional divisions. This category was derived from the preliminary research model discussed in section 5.3.1 of this chapter. Given that coding recommends using known terminologies in the literature to label categories and their dimensions, we used some of the dimensions of organisational culture in the Detert *et al.* (2000) framework. The organisational context properties derived from the empirical data and their definition in this research is presented next.

Orientation to change refers to the extent to which organisations have a propensity to maintain a stable level of performance that is 'good enough' or a propensity to seek to always do better through innovation and change.

Organisation Structure refers to the extent to which organisations have decision making structures centred around a few vs. decision making structures centred around dissemination of decision making responsibilities throughout the organisation.

Orientation to Collaboration refers to the extent to which organisations encourage collaboration among individuals and across tasks or encourage individual efforts over team-based efforts.

Basis of Truth and Rationality refers to the extent to which organisations seek truth through systemic, scientific study using hard data or through personal experience and intuition.

Orientation to Work refers to the extent to which individuals in organisations focus on functional areas or to which they focus on the processes which cuts across functional areas.

Nature of Time Horizon refers to the extent to which organisations focus on the long-term or the short-term.

Organisation and IT Strategy Alignment refers to the extent to which organisations' IT strategy support the organisations' both short-term and long-term plans.

ERP Challenges

This category refers to factors which were identified to be having direct adverse effect on ERP implementation and upgrade, and usage. While investigating challenges among the case study organisations, special attention was given to incompatibility issues. This was aimed at espousing the effect of local context on ERP implementation. In the case study description in Sections A.1.3, A.2.3, and A.3.3 of Appendix A, we identify incidences of ERP system and organisational business process misalignment occurred in the case study organisations in the case study organisations.

Refer to Appendix A for detailed data analyses of the case study organisations along the categories discussed above. The following section provide cross-case analyses findings and interpretation.

5.3.6 Cross-Case Analysis and Interpretation of Findings

This Section draws comparison from the case studies with the aim of identifying similarities and differences in ERP implementation practices and organisational characteristics. The findings in this section were derived from the axial coding procedure discussed in section 5.3.4. Additional categories were identified and are discussed towards the end of this Section. By carrying out comparison among the case study organisations properties and dimensions associated with each category were identified. In addition, values for each dimension were identified and scored against each case study organisation. The summary of the results is presented Table 5.5. The following sections present the narrative of the cross-case findings and interpretation of the results.

5.3.6.1 ERP Implementation Scope

Four properties of this category emerged namely ERP breadth, ERP depth, BPR breadth, BPR depth, and BPR magnitude. These properties were further subjected to quantitative data analysis in Appendix B, section B.6.2.7. This section discusses ERP implementation scope in general based on the observation from case study organisations. The organisations differed greatly in their ERP implementation scope. Bidco and BCL are both private sector organisations in comparison to KenGen, KPLC, and ACFC – all public organisations. Both Bidco and BCL which had greater ERP breadth were regarded in Kenya as premier organisations and market leaders. For example, Bidco was voted the most respected manufacturing company in East Africa by PricewaterhouseCoopers and the Nation Media Group 2004 CEO's survey. Both proactively deployed ERP, often being the first in their industry to develop particular applications. Both Bidco and BCL “have taken care of their ERP needs and are now extending to CRM, and SCM”. ERP is adopted to allow the extension of the capabilities of technology and the work environment. For example at Bidco, all the modules of Baan ERP (Manufacturing and non-manufacturing) are running including the latest installation of the Baan E-business module. Both Bidco and BCL have implemented Intelligent Resource Planning and business intelligent systems in a venture aimed at optimising the use of ERP. On the other hand, KenGen, KPLC, and ACFC have implemented just the core ERP modules (finance and material management modules). These organisations have not made any attempt to extend their ERP systems beyond the four walls of their organisations.

Empirical data indicated that ERP implementation scope is significantly influenced by the *ERP implementation drivers*, i.e. the motivation for implementing ERP in an organisation. For example, Bidco, BCL, KenGen, and KPLC were strategically proactive and at the same time reactive to the environment and the needs of their customers. Bidco was continuing to grow and expand and therefore realised that it needed an enterprise system to support its wide range of its operation and to support its expansion strategy in Africa. BCL on the other hand needed to streamline its operations and align them with its parent company – Lafarge – operations. Both Bidco and BCL are market leaders in their respective business areas not only in Kenya, but in the entire East Africa. As a result, the justification for ERP at BCL and Bidco were based on strong business case. Therefore, motivations for adopting and implementing ERP by Bidco and BCL were business oriented. They were more focused on adding value to business in order to provide them with competitive edge. Both the organisations were proactive in adopting and implementing ERP.

KenGen and KPLC on the other hand were reacting to sweeping global change which required deregulation of a formerly regulated market and the donor initiated structural adjustment programmes (SAPs) which required state corporations to streamline their operation in order to make them more productive. In contrast, ACFC realised the problems with their legacy systems and therefore, were more reactive in their desire for ERP systems. Therefore, the main motivation for

implementing ERP systems at KenGen, KPLC, and ACFC, was to resolve the technical problems related to their legacy systems, and the change in the regulatory environment. ERP implementation in these organisations was reactive.

The four case studies differed in the strategy used for ERP implementation. Bidco's approach to implementing the ERP in retrospect seemed to have been hurried and not strategically thought out. The company introduced Baan "all-at-once" within a time frame of only 3 months of preparation (January 1998 through to March 1998). They took into account that disruptions to the information systems in their peak production season of September through December could prove fatal and therefore time the implementation to be immediately afterwards. BCL, KenGen and KPLC, on the other hand devised a strategic plan that tied in with their ERP and Business Process Change (BPC) efforts that focused on incremental improvements.

For example, the project leader in BCL was tasked with developing the master plan and implementation deadline. The first step was to determine which modules of Business Process Change System (BPCS) to implement. BPCS is like many ERP systems in that it has a modular design. The project team determined that the finance function (Configurable Enterprise Financials including sub-modules for accounts payable, accounts receivable, general ledger and fixed assets) would be the first to be converted to the new system, giving users time to get used to the new system. Converting the operations function of the ERP system was carried out in this order: Sales and Distribution including sub-modules for configurable order management and out-bound logistics management, Manufacturing Data Management, Shop Floor Control, Master Production Scheduling, Manufacturing Resource Management, Distribution Resource Planning, Purchasing, Inventory Control, and various other implied support modules.

The modules were selected in conjunction with the determination of which facilities would be implemented first. Senior management further determined that BPCS would be installed concurrently in the main components division plant in the Bamburi plant in Mombasa. This plant was selected because of the unique business needs of this plant compared to the Athi River plant. The Athi river plant relied on centralised distribution facilities for the material control functions and shipped finished goods to centralised customer service centers. The legacy system was designed to support wire harness needs and was a poor fit for the components division plant.

Empirical data also revealed that ERP implementation scope is a great determinant of *level of ERP integration*. The organisations differed on the level of integration achieved as a result of ERP adoption and implementation. This research findings revealed that despite the growing dominance of integrated ERP very little is known about what impact ERP is having on the integration of functional areas within business, what levels of integration companies are achieving with integrated business solutions, and what benefits are being realised through software, data and information integration.

Our prior belief was that it would be difficult if not impossible to measure integration. However,

after consultation and interview with ERP consultants, a number of ideas were floated as to how to assess integration. Suggestions included: Developing a checklist of items that represents integration and scoring against the checklist to determine the percentage which would translate to the degree of integration; measuring how information is shared among departments...electronically; measuring the relationship between departments; look at how many interfaces you have between individual component systems. The less you have, the better you are integrated; degree of automation i.e. number of [data] transformation. In this study, we looked at the number of interfaces between the modules and the number of modules implemented to determine the level of integration. Bidco scored the highest in terms of level of integration given that it had implemented all the Baan modules thereby achieving internal integration. In addition, Bidco has integrated its ERP system with that of its suppliers and customers through its SCM and CRM extensions. BCL was also regarded as having a high level of integration. Even though BCL retained some of its legacy systems, the organisation made an effort to create an interface between legacy systems and the ERP system. These interfaces allow for batch transfer of data from the legacy systems to the ERP system. For KenGen, KPLC, and ACFC most of the legacy systems were retained after ERP implementation. Little effort has been taken in all the companies to create an interface between the ERP systems the legacy systems. As a result, most of the legacy systems are still running as stand-alone. This requires periodical manual entry of data into the ERP system.

Another factor which significantly influence ERP implementation scope was the *level of customisation*. Level of customisation refers to the extent to which the ERP software needs to be modified in order to conform to an organisation's business processes. It is important to understand the difference between customisation and configuration. The crux of the difference is complexity. Customisation involves code changes to create functionality that is not available through configuration. Configuration on the other hand involves setting ERP in-built parameters to meet organisation business requirements. Configuration relies on inherent flexibility of ERP systems to add fields, change field names, modify drop-down lists, or add buttons. Most of the case study organisations customised the base system but the degree of customisation varied from minor to major rewrite of code for certain functionalities.

Again two dimensions which are congruent with literature were identified namely major customisation and minor. Major customisation depicts a strategy that assumes that the best practice of the ERP software does not satisfy business needs, therefore many and sometimes major changes to the software are needed to derive value from the implemented ERP. On the contrary, the minor alternative assumes that the value of ERP application is derived from the integration capabilities and the best practices built into the software. Therefore if a misfit exists, the business process and not the software need to change. Decision to adopt either of the strategies by the cases was influenced by a range of organisational and external factors discussed in sections 5.3.6.2 and 5.3.6.3 respectively. The level of customisation had a direct effect on BPR breadth and BPR depth as two dimensions of ERP implementation scope. This consequently influence the business process and

the project outcome.

The case study organisations elicited varying levels of customisation. The level of customisation was based on ERP implementation project team respondent's own rating. Customisation has a significant effect on the cost of ERP implementation and business processes outcome. Among the case study organisations, the human resource and payroll module was heavily customised in most of the case study organisations where it was implemented, i.e. at KenGen, KPLC, and ACFC, except at Bidco. In all the cases where customisation was involved, a generic copy of ERP provided the starting point for customisation. For SAP adopters, the starting point was a special version of SAP called Industry Solutions, which had already been customised and preconfigured for particular industries. In addition, SAP R/3 provided a special country version for human resource and management module. Organisations proceeded with customisation when unique requirements of the business were not met by either the generic version or the Industry Solutions. Even though SAP R/3 offers country versions for Human resource and payroll modules, this research found that only one African country's version (South Africa) existed. Therefore, consultants implementing SAP R/3 at Bamburi, KPLC and KenGen while configuring the human resource module used the South Africa's configuration presumably because they assumed that Africa is homogeneous which is far from the truth.

Customisation can also involve writing extensions to ERP also called "Add-ons", using the in-built programming language to create new programs, screens, interfaces and other adaptations. In the case of our case study organisations, add-ons were mainly used to address needs that were not adequately met by implemented ERP systems particularly in the areas of reporting, specific system functionality, and flexibility. Respondents in all the five case study organisations do not feel that the available reports are adequate. KenGen and KPLC trained one user each on ABAP programming to be responsible for creating parametised reports. BCL and Bidco on the other hand have deployed business / data Warehouse technologies to solve many specific reporting inadequacies. And while this function and others can also extend the capabilities of an ERP system, the inability to meet reporting and specific organisational needs is clearly a key reason why most organisations writing add-on extensions to their ERP systems.

However, there are potential drawbacks to customising ERP in this way – for example KPLC had 300 add-on programs which made upgrade to be very difficult and expensive. In addition, it adds to the ERP cost because basis users' who are mandated to carryout this role in the SAP system are very expensive to license.

This research findings indicate that because of high cost and complexity of the major customisation approach, the final choice may not be an issue of assumptions but issues of cost, risk and the amount of complexity the business can afford. Cost in particular is a major driver towards minor customisation amongst the case study organisations. Choosing either of the two approaches has major implications on the change management strategy that accompanies the implementation of

ERP, because:

when best practice is chosen, people issues become top priorities. When the implementation strategy is geared towards customisation, it is more of a technical challenge” (Consultant, PricewaterhouseCoopers).

5.3.6.2 Organisational Context

This category was defined in section 5.3.5 as the structural establishment of the organisations as a whole, based on its management and functional divisions. The data analyses and interpretations along the properties of this category are presented next.

Orientation to Change

In terms of orientation to change, KenGen, KPLC, and ACFC operate in a relatively stable industry and enjoy monopoly as a result of market regulation by the government, and are thus traditionally more stability-oriented than change-oriented. Bidco and BCL on the other hand were operating in a competitive market requiring them to put in place strategies which could keep them in business in order to survive. Therefore, Bidco and BCL were more agile in changing processes during and after implementation, whereas KenGen, KPLC, and ACFC were faced with resistance. Although KenGen, KPLC, and ACFC were making efforts to change, they seemed unable to sufficiently overcome their orientation to stability to do so. The differences in this orientation between the two sets of organisations offer further insight into the differences in ERP implementation between the two sets. Organisations that are more stability-oriented may wish to maintain the status quo, and thus are reluctant to engage in the BPR which requires radical changes in the current business processes within the organisation. They instead prefer piecemeal changes and extensive customisation during ERP implementation which is likely to increase the cost and ERP implementation time. Furthermore, organisations that are more change oriented may not only be more willing to implement ERP for the sake of it, but because they desire change, they may better understand what it takes to do so. Because sharing knowledge is part of what it takes, they may be better at, or more aggressive about facilitating knowledge sharing. Thus, the contextual configuration value on this dimension that best facilitates ERP implementation is an orientation towards Change.

Basis of Truth and Rationality

Bidco, KenGen, KPLC, and ACFC differ from BCL in their basis of truth and rationality. Bidco, KenGen, KPLC, and ACFC emphasise personal experience and tacit knowledge in addition to hard data, whereas BCL relies primarily on hard data. The likely reason for reliance on hard data by BCL is the influence Lafarge has on its operations. Lafarge is a large reputable company operating in the West where hard data forms the basis of rationale in decision making. On the other hand, the remaining organisations were home grown companies which are known to rely on employees

personal experience. In Kenyan home grown companies, data reside in soft form in the minds of top managers who do not rely on information much even though information systems have been implemented. They rely more on extrapolations from experience and intuition.

For example, the claim that decision making rationale is hinged on personal experience is supported by discourse with one of the senior employees at Bidco. Specifically, data analysis and our observation of work and work processes suggest that decision making in the company was not focused on quantification but was linked to the qualitative experience and hunches of long-serving managers. As the director explained:

We like to talk to people... I mean data is one thing but nothing beats experience. We have people here who are born entrepreneurs and who would be running other businesses if they were not here. They give us a feel for the market and this helps us... (Team leader and Family member).

This had two effects on ERP implementation: (1) knowledge sharing, (2) ERP usage. BCL's reliance on hard data alone affected ERP implementation in that it often discouraged members from sharing "softer" knowledge which is essential at the requirements elicitation stage of ERP implementation. Reliance on personal experience also had a negative effect during ERP usage in that ERP was reduced to transaction processing software. That could explain why KenGen, KPLC, and ACFC have not taken measures to enhance their ERP system reporting capabilities. Because users relied more on their personal experience, the reports produced by ERP were not used to inform decision making. This suggests that, although sharing hard data is important, this alone is not sufficient for the type of knowledge sharing that is needed for a cross-functional, enterprise wide system such as ERP. Thus, the contextual configuration value that is most appropriate for ERP implementation is a combination of hard data and personal experience.

Information Sharing Perception

With regard to information sharing, some case study organisations were enthusiastic about sharing information during ERP implementation whereas others were not. At ACFC, KenGen, and KPLC information was perceived to be a personal asset rather than an organisational resource. This can be explained from the fact that the legacy systems in use before ERP implementation were restricted to managers. Discretionary power is maintained by careful control on key information. Information is selectively released to subordinates and co-workers instead of being widely shared across the whole organisation. The managers at ACFC, KenGen, and KPLC did not cooperate with the consultants and did not share all information with them. They preferred to minimise the amount of information that would be processed by the system, because they did not want to lose control over information that they previously controlled. This observation coincide with Burns & Turnipseed (1991) claim that the way in which information is accepted is central to the way information systems are used within an organisation. This had a significant effect on information sharing amongst team members

and across project teams. Through senior management involvement, KenGen and KPLC managed to inculcate information sharing attitude amongst employees. Therefore, the project managed to pick up well in the initial implementation stages with senior managers working along junior employees sharing knowledge.

However, it is important to note that information sharing broke down in KenGen and KPLC as the project progressed. Senior people began to resent the knowledge that junior people had gained and the power the environment provided the junior people. They began to retreat to the old culture of isolation by not listening to or not valuing the input of the junior people in the team. Although the project managers had implemented successful interventions in the beginning of the project to facilitate knowledge sharing, they did nothing to reestablish an environment of collaboration when it broke down, even though they recognised that it occurred. One possible explanation may lie in the influence of the traditional culture of isolation ; perhaps the intervention was viewed as an effort to overcome an orientation to isolation, and the break down was viewed as evidence that this dimension of the culture could not be overcome. Hofstede's power distance culture dimension can also be used to explain the events which unfolded at KPLC and KenGen. Both organisations were regarded in this study as being oriented towards high power distance.

At BCL and Bidco, information was perceived as an organisational resource and project team members were more than willing to share the information. ERP implementation requires extensive knowledge sharing during the installation stage. In addition, once installed the system requires collaboration among the organisation functional units given that the processes runs across the functional silos of the organisation.

Orientation to Collaboration

The case study organisations differed in terms of their orientation to collaboration during work. Bidco and BCL favoured working on collaboration whereas ACFC, KenGen and KPLC favoured working in isolation. Due to the process-based nature of ERP, it tends to promote collaboration in carrying out tasks and activities in information systems. Therefore, work culture that favours collaboration fits well with the ERP trajectory. While orientation to collaboration is important for ERP implementation and usage as evidenced in Bidco and BCL, our findings suggest that a culture oriented towards collaboration alone is also not sufficient to facilitate ERP implementation and usage. For example, even though ACFC's culture was one of collaboration and the implementation team members were accustomed to working in teams prior to the implementation, they found knowledge sharing during ERP implementation to be difficult because the environment of the ERP implementation team was not conducive to knowledge sharing. Thus, a prior orientation to collaboration does not ensure that knowledge sharing will occur in any given new context. The environment of the team must be addressed and managed from the beginning of the implementation.

The research findings also indicate that whereas orientation to collaboration is advantageous during

ERP implementation, it also poses a great challenge during the appropriation of the ERP system. Orientation to collaboration predisposes the culture against computer based communications because these media mutate the group effect. Workers in highly collaborative environments favour high personal meetings and phone calls to IT communication technologies resulting from ERP system usage.

In addition, the research findings show that prior orientation to isolation does not necessarily impede knowledge sharing in ERP implementation. For example, KenGen and KPLC facilitated ERP implementation through knowledge sharing early on in the implementation even though their existing culture valued isolation more than collaboration. It did so by structuring the team so that barriers to collaboration such as seniority and functional distinctions were removed. This structure helped create an environment of collaboration. Teams can take proactive steps or initiatives to overcome the isolation orientation that is rooted in the broader organisational culture. Thus, team environment and structure can overcome a culture of isolation.

Although traditional orientation to isolation is not sufficient to impede ERP implementation and its subsequent usage, the interventions to overcome this must be carefully managed and monitored throughout the project to maintain their impact. The preferred cultural configuration value that can lead to successful ERP implementation as witnessed in Bidco and BCL is collaboration.

Organisational Structure

Interestingly, Bidco and BCL differed from each other on two dimensions, centralised and decentralised, which defines the control and coordination of responsibility in an organisational setup. Motivation. Bidco's control, coordination and responsibility was manifest in decentralised silos making autonomous decisions; whereas, BCL was largely centralised with concentrated decision making. The planning and decision making at ACFC, KenGen, and KPLC was hierarchical, with the CEOs initiating the search for the ERP package without intensive interaction with other functional managers. In ACFC, one employee who opposed the implementation of Ebizframe was warned that if he did not cooperate, he would lose his job. Later on, the employee was transferred from the IT department to the purchasing department and the move was as punishment for his opposition to the project.

All the case study organisations had functional-oriented structure prior to their ERP implementation. They are built over solid, rigid and isolated organisational foundations. In some cases e.g. ACFC, the functional units were pitted against each and regarded each other as competitors. More emphasis is put on in-group relationships built over long time. The in-group relationships are stable and difficult for outsiders' access. This rigid structure inhibited cooperation across different functional areas where ERP was in use. The organisations therefore had to put extra measures to break down the functional-oriented structures before and after ERP implementation. The functional oriented structure also inhibited information sharing amongst the team members and across project teams during ERP implementation.

KenGen, KPLC, and ACFC are managed in a highly hierarchical, authoritarian and centralised manner relative to their Bidco and BCL counterparts. This restricts the need for information exchange among managers. Thus, ERP is used to reinforce hierarchical (vertical) control instead of peer-to-peer (horizontal) communication and cross functional integration which is the distinguishing characteristic of ERP.

Orientation to Work

The case study organisations varied in terms of their orientation to work with some putting more emphasis on processes and employees, and others emphasizing on project deadlines. At ACFC, there was strong emphasis on efficiency for the company and much lesser emphasis on quality of life issues for employees. On the other hand Bidco, BCL, KenGen, and KPLC placed emphasis on employees' well being and processes. For example, Bidco's employees were reassured that as a result of implementation, their life would be more enjoyable. Even though some employees (particularly in the IT unit) were concerned that the new system would result in extra work for them, the majority of employees were enthusiastic about the system and that was one of the reasons for their support of the project. The project team at KenGen and KPLC were more concerned with getting things right as opposed to meeting deadlines. Therefore, if things were not right, they preferred to delay the project until the problem was sorted out before moving to the next phase. As a result of this, the projects at Bidco and BCL were highly successful – they both remained within the expected budget and were completed before their deadlines. The organisations were thus more inclined towards process than towards deadline. In contrast, ACFC was more interested in meeting deadlines as opposed to having things done right. It is for this reason that the system was hastily completed when it was evident that the deadline set for the project completion was nearing. The system was therefore 'completed' without adequate testing and without some modules and features being implemented.

The research findings suggest that an orientation to the process – focused on process and employees rather than on deadlines – is generally more conducive to ERP implementation. Bidco and BCL both had a process and employees orientation, yet so did KenGen and KPLC. However, the influence of this dimension on ERP implementation at KenGen and KPLC may have been minimised by factors within other dimensions discussed above. Thus, the impact of orientation to work on ERP implementation may be contingent upon the presence of, or lack of other factors, such as external change agents, in the organisation's environment.

Decision-making Style

Another area where case study organisations exhibited significant differences was on the decision-making style. By this we refer to the decision-making hierarchy in the organisation and the manner in which decisions are made within the organisation. When decisions are kept at the top then that organisation is said to be centralised, whereas in decentralised organisations, decisions are delegated to lower organisational levels. Our case studies exhibited a varying degree to which the

structure of decision making is concentrated or shared. Top-down decision was eminent in public organisations (i.e. KPLC, ACFC, and KENGEN) in which case these organisations were required to take directives from the permanent secretaries in their respective ministries. Seniority was highly observed in these organisations. The work norm was highly structured with control system in place.

Bottom-up was more prevalent in private companies (i.e. Bamburi and Bidco). For example, even though the major shareholder at Bamburi is Lafarge, the decision on which ERP system to implement was entirely left for the Bamburi management to decide. In addition, users were widely consulted in finding a suitable ERP solution. Bidco on the other hand exhibited a very unique decision making culture ingrained in the family culture called ‘voteless’ decision making. An overriding norm in many of our case study organisations is silo behaviour where individual divisions, units, or functional areas operate as independent agents within the organisation.

KPLC, KenGen, and ACFC have a strong, top-down, bureaucratic organisational arrangement, as shown by many respondents’ comments. We attributed this observation to the fact these organisations are partly controlled by the government given that the government is the majority shareholder and the government corporations have traditionally been very bureaucratic, slow to change, and have also been a technology laggard rather than an early adopter of new technologies, compared to other organisations (Henderson and Lentz, 1996). Even though KPLC, KenGen and ACFC have some decisions decentralised some functions in the business units, there are still strong elements of centralisation within the IS division.

While the term ‘bureaucratic’ often suggests negative connotations, research suggests there are some positive aspects associated with it. Being “bureaucratic” may mean that an organisation plans thoroughly, commits the necessary resources from the top, is attuned to detail, and follows through on its commitments. All of these positive attributes are reflected in KPLC, KenGen and ACFC approach to implementing ERP. In this regard KPLC, KenGen and ACFC’s centralised approach for managing ERP adoption and implementation was an asset, since it was well-funded and deliberately managed. As a result, KPLC and KenGen progressed much faster in the acquisition of their ERP system and in the early phases of implementation than other case organisations – Bidco and Bamburi.

While the centralised organisational arrangement at KPLC, KenGen and ACFC ensured a high level of structure, resources, and follow-through to the ERP adoption and implementation effort, this also posed some obstacles for achieving many of the changes required to fully exploit the benefits of ERP at the usage stage.

At Bidco, user buy-in was important because it inferred a sense of ownership by the user community of the chosen software. In effect, this sense of ownership translated into the solution being more readily accepted by the users. As for the other case organisations, ERP was a project initiated by the top management and sold to them. The organisation’s ownership and profit making status

appeared to influence the way adoption decisions are made. For example, in an ERP implementation where the business is owned by family, the way decisions are made is more personal. Furthermore, whether the organisation is a business organisation or public sector would impose major differences in the way the business operates, thus affecting the ERP implementation decision-making. The excerpt below confirms this claim:

The ERP project was a recommendation from the French holding company – Lafarge – to implement a good information system following an audit report by PriceWaterhouseCoopers. The objective was the existence of common integrated database for the whole company to facilitate communications and the availability of information to decision-makers in real time. The holding company wanted to modernise information systems. However, the decision on which system to implement was entirely left on Bamburi’s management.

Research findings suggest that many of the founding philosophies and values have become enshrined in the culture of the organisation in a way that these have become accepted modes of behaviour. Indeed, the history of paternalism and harmony has influenced the way Bidco has developed in many respects. For example, the organisation is heavily focused on people rather than systems, with an attendant desire for encouraging a happy work environment and consensus ‘voteless’ decision making. One family member confirms this point:

Every branch has a family member who is there as an avuncular, partner and who shows an interest in the members of staff, knows the supervisors and managers well and who is there to help on matters relating to business or even personal family problems. . . we try to ensure that people who work for us are as happy as they can be (Managing Director).

In addition, consensus was seen as an important aspect decision making in the organisation. Various interviewees highlighted this issue in different ways. For example:

It is very much a culture of if we want to do something we have to persuade everyone and if someone really digs their heels in and goes to a member of the family who takes an interest and says this is an absolutely lousy idea, it is not rejected but it doesn’t progress. So, until everyone is switched on, nothing goes forward. We have a very Japanese way of making decisions, but although it takes long to make a decision, by the time you make the decision, everybody would have signed up to it (Team leader, Sales and Distribution).

The sales and distribution team leader further linked the company’s approach to communication and its consensus style of decision making to the history of the firm. As he observed:

We have a very collective approach to communication and this relies heavily on trust and constant talking and persuasion. When the business started, it was the family members running the stores directly and you couldn't tell a family member what to do; you had to persuade them. The managers have largely adopted the same philosophy (Team leader, Sales and Distribution).

Market Area

Market area refers to the geographical market segment in which the organisation operates served by the organisation. Both BCL and Bidco were found to be operating at regional and international level. In the case of Bidco, the company went regional in 1998, when it acquired Elianto and expanded its capacity by 500 per cent to meet increasing demand for the brand in the region. In addition, Bidco acquired edible oil business from Unilever a move which bolstered its drive to dominate the regional market after purchasing Kimbo, the oldest brand of cooking fat in the region, with an estimated turnover US \$ 25.9 million and other brands. As part of its extension program, Bidco entered Tanzanian market in 2001 when it established a refinery in Dares Salaam. In 2004 in a move aimed at meeting its long-term plan of dominating East and Central Africa, Bidco ventured into Uganda where it is undertaking an integrated palm oil project involving the development of palm oil plantations, a state-of-art refinery and a soap plant to utilise the by products.

Despite the sluggish economic growth in Kenya over the past decade, the Bidco group has grown to become the largest manufacture of edible oils and fats and soaps in East and Central Africa. The company currently exports its brands to Tanzania, Uganda, Rwanda, Burundi, Ethiopia, Sudan, Eriteria, Zambia, Malawi, Madagascar, Democratic republic of Congo, Zanzibar and Somalia.

The Bidco's geographical and financial growth had led to an increasing distributed environment, resulting in considerable demands for collaboration within the organisation. Bidco purchased additional 30 licenses in 2002 in order to facilitate business growth in Kenya and expansion into Tanzania. Bidco's also indulged in e-commerce initiative by buying iBaan eBusiness suite with an aim of creating collaboration amongst its dispersed regional offices, customers, and suppliers.

For BCL, in order to supply the Ugandan market better and also capture the Democratic Republic of Congo market, the company acquired 100% shareholding of Hima Cement Limited when the Ugandan government privatised the company. Today, Hima cement is owned by BCL and ultimately Lafarge. BCL has seven sites; three in Kenya and four in Uganda. The seven sites are linked via a V-sat. In addition, BCL benefits from Lafarge Net, an Internet system that interconnects Lafarge personnel globally and provides secured Internet access. Its export markets include Reunion, Uganda and Mayotle. In the past, they have also included Mauritius, Sri Lanka, The Comoros, Madagascar, Seychelles and the Congo. KenGen and KPLC market is restricted to Kenya. Electricity produced by KenGen is consumed locally. However, occasionally when the electricity production deteriorates due to low level of water in the dams during drought to a level that it cannot meet national demand, KPLC do import electricity from Uganda.

Organisation IS Resources

This property refers to resources in terms of people, money and time available to the organisations to determine priority allocations and ,hence, resources available for the ERP project. Two dimensions of organisation IS resources were identified from the empirical data that influence ERP implementation. These resources were heterogeneously distributed across case study organisations and their presence or absence explained the difference in ERP implementation scope and outcome among the case study organisations. Two dimensions were identified namely: knowledge resources and IT infrastructure resources.

(i) Knowledge Resources

Knowledge resources refers to the unique skills, expertise, insights, experience, and intellectual capital that are required during ERP implementation. Two types of knowledge resources emerged in the data and that are specifically relevant in ERP implementation. These are *business process and computer usage* and *project management* knowledge.

The *Business process* knowledge refer to know-how associated with a given application domain which is the target for ERP implementation. Business process knowledge is essential for accurate elicitation of system requirements and integrating of data. There was widespread lack of knowledge of business processes amongst the respondents in all the case study organisations. Three of the case study organisations (KenGen, KPLC, and ACFC) had no documentation of their business processes. Therefore, this knowledge was difficult to elicit during the business blueprint stage of ERP implementation. Bamburi and Bidco had documented their business processes.

For example, one important reason for the prolonged ERP system implementation (actually the longest of 5 years) in ACFC can be attributed to the non-existence of well-qualified employees within the company to manage the implementation process of the system. The ERP project was supervised by the Chief Finance officer (the ERP Project Manager) and the heads of departments (the key users). None of them had any knowledge about how ERP software could support or improve their business processes.

An IT officer said:

All of the company's leaders were not qualified to use the computer. Many of them do not also understand the business processes governing the operations of the company. They only trained on the beginnings of Windows and DOS... Training was internal in Finance Department for one week. One week was not enough. It was just background information.

The ERP Project Manager did not have any IT background or prior experience on the project. The ERP Project Manager managed the project from a managerial perspective not from a technical perspective. The mistrust for the ERP project manager's capability and the lack of confidence in his

leadership were reflected in the comments on his performance. The Purchasing and Procurement manager said:

The project manager did not know anything about computers and has not got any training courses. He was responsible for co-ordinating people's efforts. Understanding the company's processes did not mean that he understood the ERP system. He was one reason for ERP failure...

The steering committee members in ACFC also did not know anything about computers. Each head of a sector or administrative unit was responsible for the co-ordination between the implementing team from the ERP Company and the company's employees. However, they were not adequately qualified to do so. Other ERP users did not have computer culture either. They were not familiar with computers. The IT officer explained:

Users were in need for upgrading their computer knowledge levels before starting ERP implementation. They took a lot of time in entering the data of only a month from a prior year. People were all upset. They always told each other "it was a failed project".

The lack of computer knowledge on the part of almost all of organisations employees (ERP Project Manager, Key Users and End Users) is a missing resource in ACFC. The management accountant explained the absence of motives to increase the accountants' knowledge of IT:

Over-staffing, the lack of skills in using computer and the age of employees (approaching retirement age) hindered the ability to learn.

The average age of employees at ACFC (the respondents interviewed) was 50 years with two-thirds of the employees being above 45 years. On the other hand, the average age of employees at Bidco and Bidoc was 45 and 40 respectively with majority of those interviewed being below 35 years. That this somewhat youthful group was more willing to change is likely influenced by the fact that they have spent less time in using legacy systems and have lower investment in the status quo – in either their personal skill portfolios or traditional system practices – than would employees who have spent more years building up a set of skills and establishing cognitive and behavioural habits around legacy systems usage. The negative relationship between age and computer skills suggests that more education and training may be required for the older person if he or she is to master needed computer skills successfully. Organisations should realise that older employees missed out on the "personal computer" revolution.

Bidco was at the same level with ACFC before implementing ERP. The IT literacy among users was low as expressed in the below excerpt.

Many of the administrative staff had to be introduced to the concepts of a mouse and a desktop when the company kicked off the ERP implementation (IT officer, ACFC).

However, Bidco's implementation proved to be most successful. This observation makes a strong that the manner in which ERP project is managed and delivered have a great influence on the outcome.

Project Management knowledge refers to expertise, experience, skills, rules, and standards that are needed to develop applications, manage system development activities, "bind" IT infrastructure components into reliable services, and manage the ERP implementation life cycle. Amongst the case study organisations KENGEN, KPLC, ACFC and Bidco had a limited experience in IT projects and IT management. Only Bamburi had some prior experience with IT project management. For example at KenGen and KPLC, prior to adoption of the SAP ERP system. Both organisations had mainframe computer system [IBM 2904 and ME29 of ICL] for data processing (DP) respectively. Access to computer terminals was limited to IT (DP) technical staff. Information was stored in magnetic tapes, cassettes, and punch cards and was kept in a library. Data processing depended on batch processing at particular times of the month. As a result the majority of the users were computer illiterate since the use of mainframe was confined to data processing staff at KPLC and KenGen.

In contrast, users at BCL were experienced with IT project management, and the use of computers. Prior to implementing the ERP system, BCL had just completed implementing a production planning system and a plant maintenance system.

The organisation was also using several bespoke system in various functional areas mainly in the Finance and Purchase departments. As a result, BCL had substantial project management knowledge at the start of ERP implementation which could explain the wider ERP capability scope and better business process outcome. The Information Systems manager said:

Fortunately; the people in Bamburi were very good in their thinking. They were able to absorb the concept of ERP. Most of them had used information systems and participated in big IT projects. ERP was as a result of their initiative to improve their internal satisfaction by having better credit management, more functionality with asset management and many more. I mean, all of them have good background. Therefore, the implementation of ERP was easy.

The project management knowledge contributed to the success of ERP implementation and upgrade at BCL. In fact, the company did not hire consultants during the implementation of ERP system at their Hima Cement subsidiary.

BCL uses the project management knowledge acquired overtime to offer consultancy services to other organisations implementing ERP system.

(ii) IT Infrastructure Resources

Infrastructure resources refer to an organisation's shared IT assets (e.g., hardware, software tools, networks, databases, and data centers). They were found to be the foundations of an organisation's IT architecture, which is the blueprint or design that supports multiple applications and user groups across the organisation. IT infrastructure resources constitute the basic prerequisite for ERP implementation. ERP cuts across several functions, including internal operations of the organisation and its suppliers, customers, banks, etc. The soundness of the entire infrastructure is necessary if organisations have to extend the ERP system outside the four walls of the organisation which is characterised by a complete value chain management enabled by ERP. IT infrastructure is greatly influenced by the organisation's size, in that big organisations can afford to spend more on IT and, hence, put in place a sound IT infrastructure. For example, BCL, KenGen, KPLC, and Bidco due to their financial strength managed to put in place V-Sat network to connect their national and regional offices. The cost was prohibitive for ACFC, and therefore, ERP was being used at the main site only i.e. at the plant site and not at the headquarters in Nairobi.

5.3.6.3 External Environment

This category refers to the environmental setting and associated influences that directly affect perceptions, decisions, operations, and outcomes. Five properties emerged from the data namely: competitive environment, government legislation, economic environment, professional culture, and national IT infrastructure.

Competitive environment

This property refers to peer pressure on using a new technology. In this research, it is defined as the percentage of competitors in the industry. Competitive pressure has long been recognised as a driving force for new technology usage; it tends to press companies to seek competitive edge by using the latest innovations. This explains why BCL and Bidco which were operating in a competitive environment were more proactive in ERP adoption while KenGen, KPLC, and ACFC which had a considerable degree of monopoly in their sectors were reluctant and reactive in adopting ERP system (Gatignon & Robertson, 1989).

The presence of competitive factors also was witnessed in both cases of BCL and Bidco. For instance, when Bidco Oil refineries made its debut in the edible oils, fat and soaps market in 1985, the market was dominated by multinationals. Unilever was then the largest player in the fast moving consumer goods (FCMG) sector in the East Africa region at that time with its headquarters based in Kenya. When Bidco started its business, customer preferences were for Unilever products, a multinational competitor, which entered the Kenyan market in 1976 making it a family owned medium sized organisation in a competitive, cost driven market. In order to survive this competitive environment, the company's challenge was to provide quality products at affordable prices.

As mentioned in Bidco's case study description in Appendix A, the pinnacle of Bidco management policy is to use technology as a tool for reducing the cost of production as well as penetrating the emerging African market. The company's vision is to deliver products to the market at a speed few of its competitors can match.

Bamburi Cement Limited was founded in 1951 by Felix Mandl – a director of Cementia Holding A.G. Zurich in conjunction with the Kenyan government. Until 1992, the government of Kenya was the majority shareholder and BCL operated in a regulated environment. Following successful privatisation in 1992, under the umbrella of structural adjustment programme initiated by the World Bank and IMF, foreign investors (Cementa, Lafarge, and Blue Circle) increased their shareholding effectively transforming BCL from being a government corporation to a limited local public company quoted in the stock market. Cementia later went into partnership with Blue Circle PLC (UK). Privatisation opened the door for competitors among them being East Africa Portland Cement. The desire for ERP was inspired by audit report by PricewaterhouseCoopers commissioned by Lafarge, the principal shareholder. The term of reference for the auditors was to audit the BCL's business process and practices and to streamline the processes to common language and best practices developed by Lafarge for its operational units. The aim was give BCL a competitive advantage of its competitors.

Service and manufacturing businesses are generally considered to operate in dynamic environments and are seen to be at the forefront of technological innovation. As commonly argued in the strategic management literature (for example Rumelt, 1991), sectors in which there is a small degree of competitive rivalry are less likely to be innovative. Two of the case organisation (Kengen and KPLC), experienced relatively stable business conditions wherein the control of the energy sector rested with the government as it was with other essential services such as telecommunications. However, control of the energy sector and telecommunications was largely eradicated with the Structural Adjustment Programmes in the Kenyan economy before and after the recession of the early 1990s. When the ERP system was implemented in 1997, KPLC and Kengen were one company under the umbrella body of KPLC. At that time KPLC solely operated the business of generating, transmitting and distributing electricity to retailers in Kenya. It was during this period that the energy market was liberalised which saw the emergence of small independent power producers to compete with KenGen in electricity generation. ERP was adopted with the aim of modernising critical activities, as a reaction to these pressures. Indeed, the industry has changed considerably in recent years. One manager talked of the long-term industry changes:

I think that because of the fact that particularly in the 80s and 90s, we were the key player in the industry... I mean, we didn't really have competition and we didn't modernise.

Thus, the economic recession of the early 1990s heralded changes (discussed in Chapter 4) that transformed the nature of the sector. Of particular significance was deregulation of market the

which ushered in competitors. Thus competitive factors were absent in the early stages but became present in both KenGen and KPLC later. In both organisations Structural Adjustment Programmes aimed at modernising government corporations to enable them compete in a liberalised market were the primary driver of IT deployment. The IT manager at KenGen said:

In 1992–1993, we and other similar organizations were instructed by the government to modernize and introduce computers into our operations.

It was during this period that both KENGEN and KPLC adopted an ERP package and developed the supporting network infrastructure. The ERP package adopted was similar to the one being used by the multi-national corporation CALTEX, operating in a different industry. Later in 1998, KPLC was split into KENGEN and KPLC. KENGEN took the business of generating electricity while KPLC was left with the business of transmitting and distributing electricity to retail consumers. During our field work, KENGEN was facing stiff competition from independent power producers while KPLC had no competitors. The lack of competitors in the case of KPLC can be explained by the fact that electricity transmission and distribution is capital intensive requiring laying down of national transmission grids. Due to competition, KENGEN has been continually involved in post-implementation enhancement. The company conducted two technical upgrades in a span of two years (i.e. 2002 and 2004) and it is also planning to implement SAP ECC6 which is the latest product from SAP Germany.

In the case of ACFC, at the start of the ERP project in 2001 competitive factors were absent. ACFC was the sole company in the entire East Africa manufacturing. However, Spectre International, came into the lime light after being granted license to operate the same business in 2005. This brought considerable competition for market niche and raw materials. This was because ACFC had a long product cycle time, and poor marketing and demand forecasting which forced customers to wait for long time after purchasing goods for the goods to be delivered.

Government Legislation

This property refers to the influence government has on the organisations either directly by issuing directives to state-owned organisations or indirectly through legislation. Government legislation can encourage or remove barriers to adoption and usage of ERP. Government regulation was more eminent in state-owned corporations which are governed by the State Corporation Act of Kenya. For private organisations, government taxation policy had an influence on ERP implementation in that organisations had to ensure that their ERP system complies with taxation policy set by the government. The ERP functionalities most affected are finance, procurement, and payroll.

For example, Kenyan Revenue Authorities refuse to accept excise returns in formats other than manual registers. In addition, the government has a predefined format to which all excise returns must comply. This necessitated customisation of the ERP system in all the case study organisations in order to comply with Kenya Revenue requirements.

ACFC presents a perfect showcase of the influence of government legislation on ERP adoption and usage. The multiplicity of Kenyan taxes, especially on transactions between governmental units or public sector companies, represented another obstacle to implementing ERP system in ACFC. When ACFC sells goods to a governmental unit, the governmental customer deducts income tax from the company and ACFC collects sales tax from the customer. The consultants found strange that there are more than one tax that has to be collected on the same transaction. They introduced intermediate accounts to record taxes in non-tax accounts. However, the mediation of tax accounts, suggested by consultants, in the ERP system were perceived by accountants as tax evasion, which would lead to legal responsibility when tax officials examine the company's accounts.

The Financial Accountant pointed out:

Tax officials closely monitor the invoice. I cannot tell them that the computer software requires another form for the invoice. This would cause a lot of tax problems. . . Tax officials examine our documents and what we reimbursed. It should be specific accounts for this purpose. If we used intermediate accounts, it would be tax evasion. . . I cannot change the state tax system in order to implement the ERP system but my system can be modified. . . As an international system, Ebizframe should leave this part for each country. Furthermore, taxes change from year to year.

Government corporations in Kenya are governed by the State Corporation Act which stipulates that its annual budget must be approved by the Ministry of Energy in consultation with the Treasury budget by end of February every year. Three of the case study organisations which are government corporations – ACFC, KenGen, and KPLC – operate under restrictive procurement rules under (a) individual orders and contracts over Ksh500,000 (\$6,750) must go through the central tender committee, and (b) if any single source procurement of over Ksh300, 000 (\$4,050) is desired, prior approval from the Directorate of Public Procurement at the Treasury must be sought. In addition, a tender for local procurement must be advertised in the media for 28 days and an international tender for 42 days, and prior approval of the Directorate of Public Procurement has to be sought to bypass the limits. Finally, vendors have a right to appeal to the Directorate of Public Procurement over any alleged malpractice or unfairness in the procurement process, at which time that procurement activity is set aside pending a hearing.

Given that procurement activities at ACFC, KenGen, and KPLC must comply with the public procurement regulations, this had a negative effect on ERP adoption initiatives and benefits, specifically on purchase lead time and delivery lead time. This effect was more conspicuous at KPLC where the material management module is implemented and operational, but due to tedious and rigid procurement legislation led to delay in procurement of important maintenance materials causing major problems in connection of new customers. The procurement officer had this to say:

Right now, the number of customers who applied for electricity connections several months ago and are yet to get service has reached an unprecedented level. . . at least

170,000 applications for new connections, half of them already paid for, are gathering dust in KPLC's offices countrywide due to delays in procurement of poles, conductors, transformers, cables and other materials. . . the procurement of poles for network expansion has been especially problematic. The tender was floated some time last year and won by a South African firm, only for it to be disputed by the losers.

Professional Culture

This property refers to the standards which need to be followed in various sectors or professions and they relate to how tasks should be carried out. However, they are voluntary with a bearing on the organisation's reputation if it is to be accredited by a standard organisation or a professional body. This culture manifested an influence on ERP implementation and use. We noted that SAP R/3 provides a facility for reconciling wrong postings in the general ledger. However, accounting standards requires that such corrections be done by posting a journal voucher of the same amount resulting in a net effect of zero. Most of the end users we observed do not use the reconciliation tool provided by SAP and instead correct errors in posting by using journal vouchers.

All the organisations displayed various professional culture which adversely affected ERP implementation. Bidco used two separate, personal computer-based systems for tracking additional lot tracking information which could be done with the Baan ERP system. In manufacturing, products with safety requirements face much stricter demands for traceability that the ERP system could not provide. The following discourse supports the issue of professional culture:

...has its own incoming lot number. It's kind of complicated. It's the last three digits of the product number, plus a letter for the month, three digits for the year, the tooling number, and the quantity... [Why do you need a separate lot number?] It's different... [Why not use the ERP lot number?] The ERP auto assigns. We can't change that number

In the case of BCL, the accountants insisted on using journal vouchers to correct wrong postings instead of using SAP R/3 posting reversal tool. The reason for insistence was that the accounting convention requires the passing of journal vouchers as a means of correcting wrong transaction postings. As discussed under the government legislation section, the accounting officials termed the proposal by consultants of introducing intermediate accounts to record taxes in non-tax accounts as tax evasion.

National IT Infrastructure

This property is used to refer to the effectiveness of transportation and local telecommunication in Kenya. Kenyan national infrastructure had an adverse effect on all the case case study organisations. Research findings suggest that poor transportation, telecommunications, internet and intranet, and mobile coverage affect negatively affected ERP implementation implementation in

the case study organisations forcing most of them to narrow their ERP implementation scope or to incur additional implementation costs. The stage of Kenyan national infrastructure is discussed in Chapter 4.

Due to poor and unreliable local telecommunication network in Kenya, organisations which were operating at national (i.e. KenGen and Bamburi) and regional (i.e. Bidco and Bamburi) were forced to install their own communication backbone for all their sites. As a result, KenGen, KPLC, Bidco and Bamburi installed private networks with satellite communications, Very Small Aperture Networks (V-Sat). This was expensive by Kenyan standards, but this was the only way to go about it. A sample of KenGen backbone is presented on Figure 5.3 However, the drawback with the V-Sat system as mentioned by the IT manager at KenGen was that “it would support only batch data transfer (via FTP), which caused significant delays... up to one-and-a-half seconds per keystroke... that is not acceptable for online transactions”.

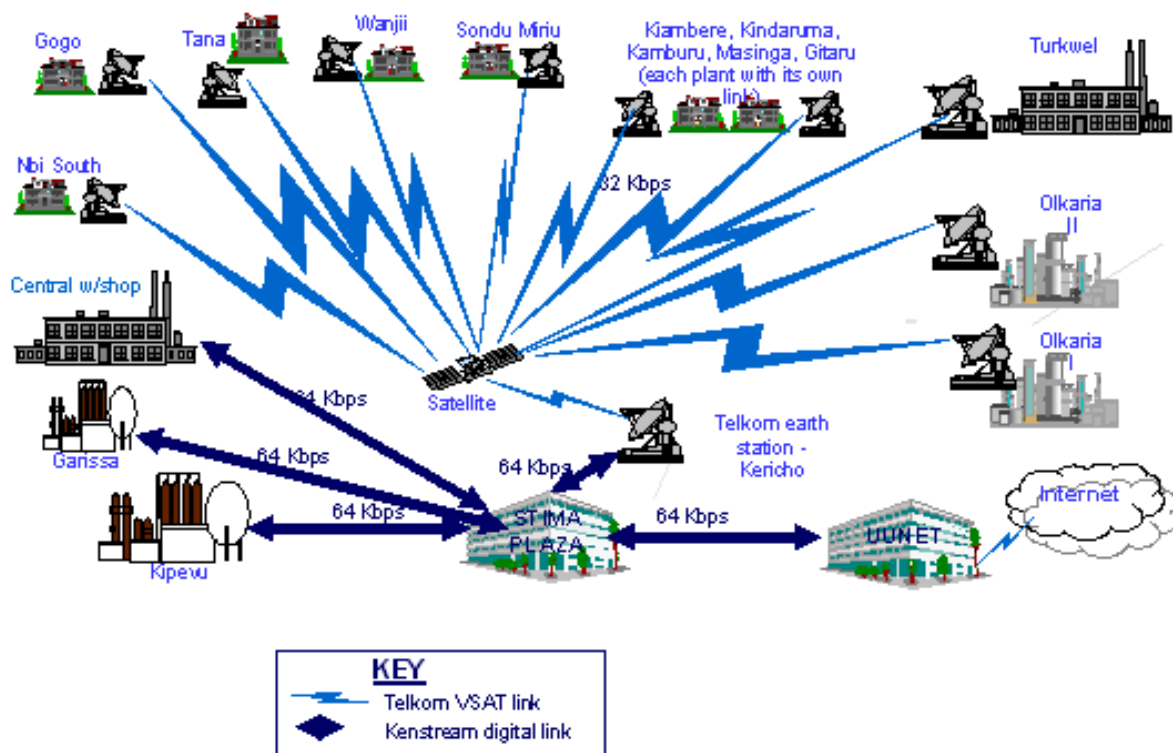


Figure 5.3: KenGen Wide Area Network (Source: Project Document)

Even with current networks communication is quite slow. For example all KenGen sites are connected, however speed and availability seems to be an issue (see Figure 5.4). Two main aspects of ERP system by infrastructure are the system availability and speed as commented by a end-user at KenGen “The system cannot run full month without breaking” and when the system is available

it is likely to be slow.

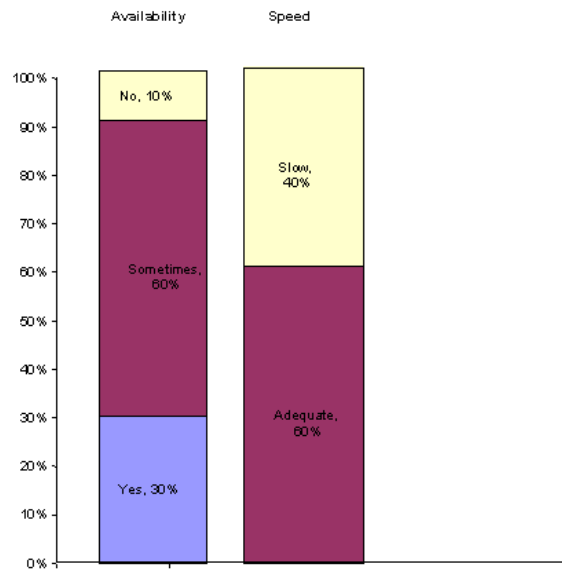


Figure 5.4: ERP system availability and speed at KenGen

In the case of ACFC, the company was forced to completely abandon implementing web-portal in their ERP due to lack of internet connectivity in Muhoroni. The cost of setting up a private WAN using V-Sat was exorbitant for the company to afford. Poor internet connectivity is also hindrance to complete value chain management and customer relationship management.

In addition, KPLC, KenGen, and ACFC (all government corporations) mentioned that corruption in awarding government tenders immensely contributed cost escalation. To confirm this claim, none of government corporation case study organisations (KenGen and KPLC) were willing disclose the cost of their ERP implementation.

Additional environmental factors having influence of ERP implementation in Kenya include lack of adequate ERP skills, low level of awareness of ERP applications and ICT benefits, and high and unpredictable tariffs on software due to lack of national ICT policy. These factors are described in Section 4.1.3 and 4.1.4 of Chapter 4.

5.3.6.4 ERP Delivery Service

This category describes the means by which ERP implementation was supported, managed, and nurtured. Five dimensions were identified which describes ERP delivery system among the case study organisations namely: project responsibility, ERP configuration, IT champion, top management involvement, and training.

This study's findings showed that organisations that have better delivery system are expected to innovate more economically with greater probability of success.

Project responsibility

This property refers to who is responsible for managing the ERP project. Two dimensions which are congruent with the literature were identified. These dimensions are: vendor and consultants. Implementation which were carried out by consultants were more successful amongst our case studies suggesting that project responsibility influence ERP implementation outcome. Only ACFC used a third party consultant. The rest of the case study organisations used vendor consultants. Consultants compensate the lack of skills amongst in-house staff in addition to bringing in experiences from their past implementations. However, the party consultants may lack the in-depth knowledge of a given ERP system to successfully configure the system to meet an organisation's business requirements. There are cases where third party consultants have been sued for ERP implementation failures, the most notable one being the case where Deloitte and Touch was sued by Fox Myer for the implementation failure of its ERP system.

ERP configuration

This property refers to whether a single ERP package or a combination of selected modules from different ERP packages are implemented. Configuration of systems implemented by the case study organisations varied. Some organisations implemented a single ERP package from a single vendor (enterprise suite) while others selected modules from different ERP packages (best-of-breed). The enterprise suite is an implementation that includes a group of modules that has been integrated by the vendor, a kind of 'ready to use' set up for most functions/processes. Best-of-breed or portfolio implementation, on the other hand involves a mixture of different vendors' modules. In the case of the best-of-breed strategy, the modules need to 'talk' to each other hence interfaces need to be developed. The consultant noted that that enterprise suite and best-of-breed approach has a great influence on: maintenance cost, complexity of integration with new or existing application, implementation cost, and flexibility to meet business requirements. Therefore, ERP configuration had an effect on ERP implementation scope and subsequently business and process outcome. These concepts are covered in section 2.5.1 of Chapter 2.

All the case study organisations adopted the enterprise suite approach during the initial implementation. However, most organisations which have implemented additional modules have chosen to implement modules from different vendors. Findings revealed that enterprise suite ERP implementations have stopped making headlines. One consultant from PricewaterhouseCoopers contended that:

Throughout the last 12 months, ERP has not been a popular subject. It dropped off people's radar screen. Best-of-breed implementations are becoming more common now, especially in large organisations, which are looking at implementing CRM, data warehousing and business intelligence systems that sit on top of their ERP systems.

The above discourse holds in the light of our case study organisations. For example Bamburi which is running SAP R/3 4.5B implemented Oracle Business Intelligence and PeopleSoft Human Resource Management in 2007. Another showcase that there is a move towards best-of-breed strategy is by Bidco which although it runs Baan, it has implemented Siebel CRM and SCM. Another consultant further stated that “big ERP systems are done. There are more of add-ons and bolt-on implementations now”.

This was especially true for ERP systems that needed to satisfy specific Kenyan industries such as Power Generation and Electricity distribution at KENGEN and KPLC. However, in the medium-size case organisations –ACFC and Bidco –traditional “ERP systems meet most of their business requirements”. The type of modules in a typical implementation differs depending on the implementation phase and stage. In general, enterprise suite strategy was found to be common in the initial ERP adoption and implementation.

IT champion

This property refers to the absence or presence of personnel to advocate for adoption and use of ERP in a department or in the organisation. In organisations and functional areas where there was presence of IT champions they encouraged the use of ERP in those particular organisations and functional areas. Organisations which had presence of IT champions in different functional units has a wider ERP implementation scope. They directed ERP adoption and implementation efforts, and encouraged employees to use applications. In addition they interacted with IS managers and senior managers to identify requirements for resources and end user training.

In both BCL and Bidco, for example, even though there were many semi-skilled employees working in the factories, production managers encouraged them to use production scheduling applications. A senior functional manager at Bidco described that:

The senior departmental managers, especially the production managers in the factories were personally involved in fostering user acceptance.

Top Management Involvement

This property is used to refer to the awareness of the value of IT among the top management and the level of their involvement in ERP adoption and implementation. Bidco and BCL attracted some of the best technical and managerial talent in the country. Their CEO’s are prominent members of industry associations and are well educated. For instance, the CEO of Bidco is a graduate of the prestigious United States International University (USIU) in Nairobi while the CEO is a renown manager. They regularly interacted with their peers at other multinational/progressive companies in Kenya and abroad. The CEO of Bidco had won a number of industry leadership awards. In 2005, the MD of Bidco was awarded the CEO of the year from Kenya Institute of Management.

The CEO of Bamburi has a lot of exposure in management at the International arena having served Lafarge in various positions in Europe before taking over as the managing director of Bamburi. In

addition, top management at BCL consisted of a board of directors drawn from prominent members of banks and financial institutions in Kenya. They considered IT to be critical to their business success and were keen about maintaining IT leadership in the industry. The IS manager at BCL mentioned that:

Our CEO considers IT to be a [central] part of [our business]. He knows where the industry is moving internationally, in terms of the use of IT. He communicates frequently with the head of IS and exchanges ideas about functions where IT can be adopted (IS Manager).

At Bidco, the CEO was personally involved in planning and monitoring IT projects and attended committee meetings. According to a senior manager there:

Our [CEO] sees to it that he is updated on major IT projects. He also attends some of the committee meetings. When he is touring regional offices, he talks to the IS people, asks about their plans and makes sure that they have what they need.

Top management at KENGEN and KPLC were political appointees. The ministers appoint the managing directors who in turn greatly influence employees' recruitment of middle level managers. As a result, managers were not professional, did not see the strategic significance of ERP and were not enthusiastic about IT leadership in their industries.

During the former president's regime, appointing individuals to government corporations' board was a tightly-controlled affair. You need the support of either the Chief Secretary or State House to the appointed. By and large, the situation under current president government has not changed in any radical way. It is easy to discern a clear pattern between the ethnic background of a cabinet minister and the ethnic backgrounds of managing directors and directors of State corporations under their ministries. Where a minister tried to maintain an ethnic balance in his corporations under his/her ministry, it is only because he/she had tried to 'barter' trade with his/her colleague in another ministry under an arrangement where the colleague absorbs his/her tribesmen and vice versa.

According to one of the respondent's who declined to be named:

In my view, it has been an unmitigated disaster. We have ministers who insist on micro-managing parastatals and permanent secretaries who meddle in the day-to-day affairs of parastatals... we have ministers writing letters to managing directors directing them to fire middle-level managers and promote the people they want... we have ministers who write letters to managing directors ordering them to suspend any procurement of good and services and any dealing with clients until they return from abroad.

However, most of the managers at KenGen and KPLC were aware of the operational usefulness of IT and were willing to follow other organisations in their industries, in adopting ERP systems in key processes especially after visiting the Ibera Africa installation site in Spain.

The IT head at KPLC explained:

The Managing Director (MD) of the company...is not averse to the use of IT per se, but his awareness of IT applications [is] limited to traditional payroll and accounting software. He does not think that we should be investing a lot of money in buying expensive software unless we can justify the costs.

Top management at KenGen and KPLC were not proactive about ERP adoption. This had influence of allocation resources for ERP acquisition and implementation. At KenGen and KPLC, the availability of financial and human resources with regard to ERP adoption was dependent on top management's judgment of whether or not a system was required. It also depended on resource allocation directives and policies of the government, and budgets for the particular financial year.

Top management at KENGEN and KPLC were political appointees. They consisted of public sector bureaucrats who had functioned in a protected environment for a long time. They did not consider IS to be important in any way, except in automating financial and accounting transactions.

Training

All the case study organisations had conducted education during ERP implementation. However, education and training activities took place in different ways and within different time frames. At ACFC, training was focused simply on how to use the system whereas in the remaining case studies, training not only involved learning on how to use the system but also learning how the new processes and new ways of doing things impacted operations in other departments.

From the observation made during the field study, it is evident that sufficient education and training contribute positively to ERP implementation and use. These findings should underscore the importance of education and training in order to enable the ERP implementation to go forward. For instance, the most simple example is that the training teaches the users how to operate with the new system. The extensive education and training on ERP knowledge and know-how has also positive influences on the ERP implementation in the long run. The findings in the cases indicate that sufficient education and training impact the ERP implementation in a positive way.

5.3.6.5 Upgrade and Improvement

This category refers to activities undertaken to by organisation to optimise ERP systems and the decision leading to ERP system upgrade.

Two properties were identified namely: upgrade cycle and upgrade decisions.

Upgrade cycle

This refers to the length of period between ERP system upgrade in an organisation. The period can be short (less than 2 years) or long (more than 3 years). KPLC's long upgrade cycle can be explained in terms of the high barrier to entry for competitors (Table 5.6). The sector's significant investment requirements preclude much competition at the moment. On the other hand, KenGen has faced stiff competition from Independent power producers and Uganda Electricity since the deregulation of electricity generation. As a result, IT in this case ERP, is seen as a 'must have' tool in order to thrive in the free market.

Table 5.6: Business factors influencing upgrade strategies and schedules

Characteristics driving relatively short upgrade cycles and quick deployment of new functionality	Characteristics driving relatively long upgrade cycles and slower adoption of new functionality
Leading-edge, market-driven environments	Mature markets and mature organisations
Low barriers to entry for competitors	High barriers to entry for competitors
First-mover advantages	Stable product lines and distribution channels

The research findings reveal that long upgrade cycles are likely to add additional risks. Upgrades tend to be more difficult, more complex, and have a greater impact on the user environment when long period of time has elapsed. It is even more troubling when the ERP vendor stops supporting the version in use because it is out of date like in the case of KPLC. SAP stopped supporting version 2.11G being used by KPLC in 2002. Even though the organisation was not receiving support from SAP, it still continued paying annual maintenance contract as per the contract agreement with the vendor. Historically, if a single, functional package needed replacement because it became unsupported or obsolete, its impact on the company as a whole was limited. With an integrated ERP environment, the entire business is at risk if the ERP system becomes de-supported. For instance, when KPLC decided to upgrade from version 2.11H to the latest version SAP R/3 version 4.7, the organisation was informed that it was impossible to upgrade directly to version 4.7. The only way out was to first upgrade from to version 4.6 then to version 4.7. When KPLC enquired if they could upgrade to mySAP.com, it was informed that mySAP.com was a new product and hence regarded as a new installation.

We have SAP R/3 Licenses, using SAP version 2.11G, and when we planned to migrate to the newest version, SAP told us that we have R/3 license, and we cant get the latest version ECC5.0 or ECC6.0 because it is a different product (mySAP ERP), the only path is to migrate to 4.6 then to 4.7 and stay there or pay extra fee to change

our R/3 licenses to mySAP ERP licenses and could get the ECC5.0 or ECC6.0. We are current with the pay of the SAP license maintenance, and have invested on SAP a lot, how they us that our product only could upgrade to version 4.7? What happened with our maintenance and all the new versions?

Upgrade decisions

This research identified four main influences on the decision to upgrade ERP systems. These are business and IT needs, risk mitigation, external dependence on vendor, and internal resource availability. These factors influence upgrade cycle discussed above. Business needs is a major influence on the upgrade of ERP systems.

For example, in order to justify ERP system at BCL, the IS manager explained that current SAP R/3 version had become incapable of delivering some of the functionality that the business needed:

It was working okay for us, and then we started to acquire more businesses and we were growing. The flexibility that we want to have on our software was not there in the older release. The newer releases were so much better than the old one.

One of the functional team leaders at BCL further recalled that functionality in SAP R/3 version 4.6C was one of the major reasons that it was adopted:

The bottom line is we need to upgrade because we needed a lot of functionality. We need a lot more functionality, a lot more flexibility with the system.

To meet these business needs, BCL preferred to receive software functionality from the system itself than to develop the functionality through additional programming. Besides, modifications to SAP's core program were forbidden except in rare circumstances. A technical lead explained:

We prefer to not have a lot of custom coding. So if it's something that SAP is going to provide then that's a definite factor in making the decision to go ahead with the upgrade.

Thus, the availability of user requested functionalities in later versions of ERP systems as espoused by the above excerpts can be a strong influence over the upgrade decision. In KPLC's case, improvement of business processes which meant introduction of new functionalities in SAP R/3 4.7 was stated as one of the upgrade deliverables. This enforces the notion that availability of new functions in a later version of an ERP system can be an influencing factor in making an upgrade decision. Therefore, upgrading was perceived as a means to meeting users' needs without any new development effort and with SAP's support by KPLC, KenGen, and BCL.

Corporate and IT policies to mitigate software risks also emerged from empirical data as a factor influencing the decision to upgrade ERP systems. Several of the restrictions on software upgrades

were codified in some of the case study organisations policies designed to mitigate the risks of using ERP software. In the case of KenGen, one important policy affected all the software used. Adopting unstable software releases produced unacceptable business risks. To protect KenGen from implementing unstable software, KenGen had a policy prohibiting any upgrade of software that was earlier than release 'c' in each version. As the MD explained:

We never go before 'c' because 'a' is the beta, 'b' is the fixes, and 'c' is the stable release ... Particularly, we don't want a beta version.

Indeed, their preference was to wait for the other companies of compatible size to perform the upgrade first.

We want to make sure [vendors] have it in production and that other customers are using it before we consider using it.

There were two reasons for this practice: to sort out any known problem in advance, and to learn from another companies upgrade lesson.

Another corporate policy required all software to be on vendor support to ensure continuous system operation and timely receipt of vendor support if a problem occurred. Vendor support was important in the case of BCL and KenGen because they relied heavily on SAP's Online Support System (OSS) to solve their technical problems. OSS was a database which contained SAP native code solutions that could be downloaded and applied to fix problems. When IT personnel encountered problems, OSS was the first place they looked for a solution.

Vendor support was also a major influence on the the decision to upgrade ERP systems by the case study organisations. The organisations are forced to upgrade their ERP systems when vendors impose sunset date after which they cease to support certain versions of their ERP softwares. According to the project manager, vendor support was the key reason why the upgrade was not truly a choice of KenGen, but rather an ultimatum from the vendor. According to a functional team lead:

We were basically up on our contract with SAP. So, were told we needed to upgrade.

However, upgrading an ERP is a costly project requiring intensive resources. In the case of KPLC, SAP imposed a sunset date on SAP R/3 version 2.11G which the organisation was using in 2001. This implied that they were to lose SAP's online technical support system. Due to resource constraints, KPLC was not in a position to upgrade their system then. Instead they opted to continue the de-supported version of SAP R/3 until in 2006 when the organisation decided to upgrade from version 2.11G to 4.7. Although, SAP continued to provide technical support after the sunset date, it had to be purchased at an additional charge, and post-sunset customers were given lower priority than customers with more recent versions.

Internal resource availability formed an important factor influencing ERP system upgrade. For example, one of the reasons why KPLC waited for so long to upgrade is lack of resources. These factors are exhaustively covered in section 6.3.1 of the next chapter.

5.3.6.6 National culture

Power distance

Power distance is not used to denote national culture as used by Hofstede. This study restricts its use to organisational culture. In this study, case study organisations manifested different power distance orientation defined by Hofstede despite the fact that they all are located in Kenya. Hofstede asserts that East Africa region where Kenya is located has a high power distance. Hofstede's claim could have been confirmed if all the case study organisations manifested high power distance orientation. However, two of the case study organisations manifested low power distance orientation. This confirmed that national culture is contestable and hence the decision to use power distance in the model to denote the power distance between managers and subordinates within an organisation. High power distance negatively influences ERP implementation decision and consequently the ERP implementation outcome. This is because ERP project management requires project teams to work together. Project teams usually comprise employees from operational, tactical, and strategic level. The finding presented in Section 5.3.3.2, revealed that managers in high power distance organisational culture were uncomfortable working with their juniors leading to resentment by managers. On the other hand, organisations which were oriented towards low power distance achieved better ERP implementation outcome results. Closely related to power distance is the information sharing perception. Lastly, basis-of -truth-and-rationality influences ERP delivery service which in turn moderates ERP implementation outcome.

5.3.6.7 ERP Implementation Outcome

This category refers to success or failure of ERP implementation project. Two properties used for measuring ERP system implementation success were identified namely project outcome and business process outcome. Project outcome refers to whether ERP system was implemented on schedule and on budget whereas business process outcome refers to the business value derived from ERP system as a result of improved business processes. This category and its properties are discussed in detail in Chapter 6 section 6.2.1.

5.3.6.8 ERP Implementation Challenges

Analysis of the challenges faced by case study organisations found 19 main challenges to ERP implementation. These challenges are presented in Table 5.7. These challenges will be further analysed in Appendix B.

Table 5.7: Results of factor analysis

Challenge
Lack of skills
Insufficient training
Incompatibility with work
Data conversion problems
High system cost
Long customisation period
Integration problems
Benefits not recognised
High user resistance
Inadequate preparation by employees
High staff turnover
Organisational changes
Complexity of ERP
System insecure
Staff layoff
Vendors unreliability
Poor ERP quality

5.4 Summary

In this chapter, data analyses and interpretation was carried out. The findings of this chapter will form the foundation of Chapter 6 and Chapter 7. The findings will enable the formulation of propositions which will then be tested in Chapter 6. The categories and properties identified in this chapter will be used in the development of ERP implementation and ERP upgrade decision models in Chapter 6.

Chapter 6

Empirical Models

6.1 Introduction

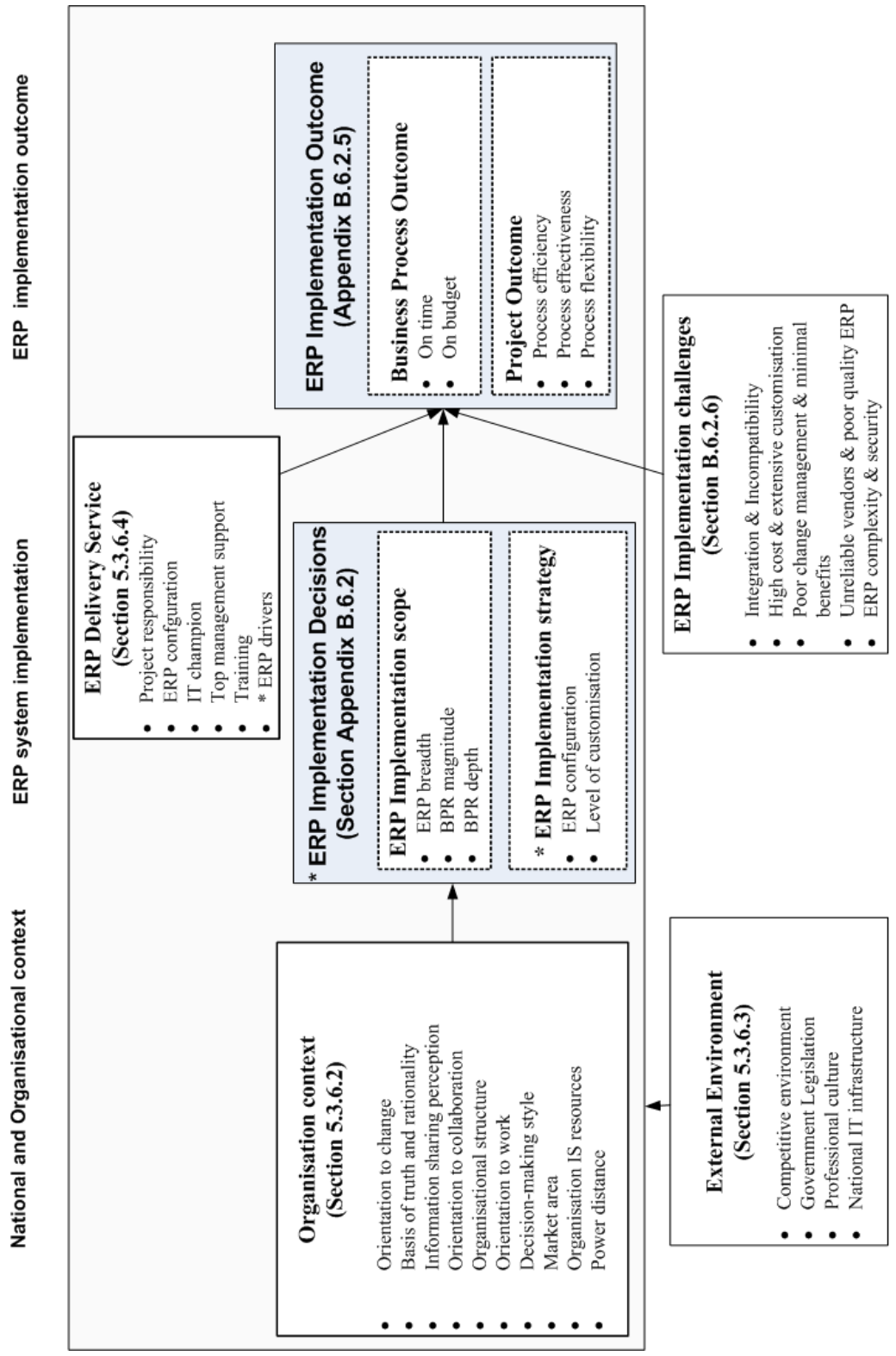
According to Cannon (2001), “a model is an attempt to represent visually or verbally the most important elements in a real world situation as a basis for achieving greater understanding or conducting experiments to test the part or the whole”.

This chapter presents two models developed in this study. In line with the above definition, the two models presented in this chapter represent ERP systems implementation and upgrade phenomena in a real world situation as a basis for achieving greater understanding.

The chapter starts by introducing the models. Next, the constructs forming each model are discussed focusing on how the constructs were derived and how the constructs interrelate and interact.

6.2 Empirical ERP Implementation Model (EEIM)

The Empirical ERP Implementation Model (EEIM) presented in Figure 6.1 has its foundation in the literature reviewed in Chapter 2, the preliminary conceptual model (Figure 5.1) proposed in section 5.3.1 of Chapter 5, and the empirical data analysed in Chapters 5, and Appendices A and B.



* Construct not directly derived from Table 5.5

Figure 6.1: Empirical ERP Implementation Model(EEIM)

The categories identified in chapters 5 and Appendix B formed the model constructs. Therefore, the term construct is used in the EEIM model to refer to category. The identified constructs were used to extend the preliminary conceptual model presented in Figure 5.1.

The next section describes the model constructs followed by discussion of the interrelationship among the constructs.

6.2.1 ERP Implementation Outcome

This construct refers to the IT services that are enabled, created, or acquired as a direct result of ERP implementation. The results can range from total failure to 100% success. In the empirical model, two dimensions were identified namely: project outcome and business process outcome.

Measuring success in terms of project outcome is controversial. This is because even if ERP system implementation exceeds contracted delivery time and budget, organisations may still think their ERP implementation is a success.

Therefore, an appropriate ERP success measure gauges whether an ERP project is completed within the time and budget schedule, and with the intended functionality; and the extent to which the intended business performance improvements were realised. This justifies the inclusion of project outcome and business process outcome in the model. The business process outcome is included in the model to make success measure of ERP implementation complete.

6.2.1.1 Project Outcome

This dimension is used as a measure of success of ERP implementation based whether or not the ERP project is on time and on budget.

6.2.1.2 Business Process Outcome

This dimension refers to the actual benefits derived from ERP implementation and usage. The three dimensions incorporated in the model were derived from empirical data in section B.6.2.5 of Appendix B. These dimensions are: process efficiency, process effectiveness, and process flexibility.

The process efficiency dimension refers to the extent to which the use of ERP implementation reduces operational costs and decreases input/output conversion ratio. Research finding identified some cost related benefits from data analyses which include IT costs, administrative costs, personnel costs, and sales costs (see section B.6.2.5). The ERP implementation decision dimensions – ERP implementation scope and ERP implementation strategy – exert significant positive and negative influences on process efficiency benefits while the ERP delivery moderates these benefits.

The process effectiveness dimension refers to the extent to which an ERP system implementation provides better functionality, enhances the quality of the users' work in terms of better access to corporate data, higher level of enterprisewide data integration, better sales forecasts, and improved quality of operations. The process improvement benefits identified from the data analyses are improved purchase management, improved warehouse management, improved customer relations, improved supplier relations, availability of information, and improved decision making. Process effectiveness benefits is greatly influenced by both dimensions of ERP implementation decision construct – ERP implementation and ERP implementation strategy. For instance, ERP breadth which is determined by the number and nature of modules implemented; the number of implementation sites affect the process effectiveness related benefits. The higher the number of modules the higher number of functionalities covered hence the more process effectiveness related benefits. In addition, the higher the number of sites the higher the level of data integration hence the availability of real time data which can improve decision making through providence of timely information. The nature of modules implemented also determine whether improved decision-making benefit is achievable. However, decision-making especially at a strategic level, require additional specialised modules for analytical processing such as Business Intelligence and Data Warehousing solutions.

The dimension process flexibility refers to the extent to which the ERP implementation provides organisations with more flexibility in response to changing business environments by providing new ways to customise business processes and become more agile. The table-driven customisation allows for rapid changes in business requirements with a common set of source code or programs. The common programs are coded to focus on settings in specific to make the programs react in various ways to fit different business needs. This is what makes ERP systems so flexible – there are well over 10,000 tables in the SAP R/3 database structure. Because table settings instead of old-fashioned hard-coded program logic are what drive program functionality, new and changed business requirements can be rapidly implemented and tested in the system. Process flexibility can be maximised if organisations opt for extensive BPR as opposed to customisation. For instance, ERP system provide tables for tax brackets used for taxation transactions. In case tax rate changes, it simply requires organisations to create an additional tax bracket and assign it to the organisation business object. However, if at the time of implementation an organisation had customised their ERP system and hard coded the tax rate, then process flexibility is eroded.

6.2.2 ERP Implementation Decisions

The ERP implementation decision construct refers to ERP implementation scope and ERP implementation strategy decision taken by an organisation implementing ERP system. Some of these decisions were derived from the literature and presented in Figure 2.1 in Chapter 2. This construct is not included in Table 5.5. The construct was derived by combining ERP implementation

scope together with the factors which influence it. The construct has two dimensions namely: ERP implementation scope and ERP implementation strategy. These properties are discussed next.

6.2.2.1 ERP Implementation Scope

This property refers to the range, reach, and geographic scope of ERP implementation in an organisation. Understanding ERP implementation scope and a better definition and assessment of its likely measures can help towards better understanding and estimating ERP implementation costs and benefits.

The ERP implementation scope construct is an important component of the model not only because it can help deduce the benefits that can be obtained from ERP but also because it defines the changes to managerial autonomy, task coordination and process integration that needs to be carried out in order to realise ERP benefits. Statistical analyses in section B.6.2.7 derived three ERP implementation scope measures incorporated in the model.

ERP implementation scope has direct impact on the ERP implementation outcome. The higher the number of modules implemented and the number implementation sites (ERP breadth), the higher the business process outcome and the higher the duration and cost of implementation. The number of modules implemented determine both the cost and the functionalities covered by the modules implemented thereby influencing project and business process outcome. ERP depth on the other hand, influences the business process outcome. ERP depth refers how vertically ERP is institutionalised within an organisation. Greater benefits is achieved if ERP is institutionalised throughout an organisation's hierarchies. ERP which is institutionalised at operational level can be interpreted as being used for transactional processes. However, if ERP is institutionalised right to the top of an organisation then it means that ERP system is being used at strategic level to aid in informed decision making. The nature of modules would greatly influence the vertical ERP diffusion within an organisation. Top hierarchies in organisations would require analytical processing bolt-ons such as business intelligence and data warehousing.

6.2.2.2 ERP Implementation Strategy

This property refers to the decisions relating to the level of customisation to be undertaken during ERP implementation, and the decision of whether to source all the ERP system modules from a single vendor (enterprise suite) or from multiple vendors (best-of-breed). Suffice is to state that minimal customisation positively influence ERP implementation outcome. The decision on which strategy is adopted by an organisation is directly influenced by the organisational context dimensions discussed in section 5.3.6.2 of Chapter 5, and environmental context dimension (e.g. government legislation) discussed in section 5.3.6.3 of the same chapter.

6.2.3 Organisational context

This construct refers to the structural establishment of the organisations as a whole, based on its management and functional divisions. The dimensions incorporated in the ERP implementation model were derived from case study analyses (Section 5.3.6.2). Each of these dimensions have configuration values which either positively or negatively influence ERP implementation and subsequently ERP implementation outcome. For illustration purpose, we discuss the influence of organisation and IT strategy, orientation to change, orientation to collaboration, and IS resource dimensions influence ERP implementation.

Orientation to change profoundly influences ERP implementation decision and ultimately ERP implementation outcome. The effect can be negative or positive depending on the organisation's orientation. It is an indicator of an organisation's willingness to change its way of doing business by carrying out BPR. Orientation towards change positively influences ERP implementation in that it favours higher BPR magnitude. Higher BPR positively effects ERP project outcome and business process improvement outcome. Organisations which are change-oriented are more willing to carry out intensive BPR resulting in higher BPR magnitude which ultimately leads to low ERP system implementation cost and higher business improvement benefits. On the other hand, organisation which are rigid tend to resist conducting BPR and instead prefer customising ERP.

The external environment (i.e. the competitive environment dimension) influences orientation to change configuration in an organisation. Organisations which operate in competitive environment display tendency towards change. This can be explained by dynamic nature of business environment which requires organisations operating in such environment to be at the edge to remain competitive. BCL and Bidco case study organisations which we classified as change-oriented organisations were both operating in competitive environments while the rest of the case study organisations, which were regarded as rigid, were operating in monopolised market at the time of ERP system implementation.

Orientation to collaboration facilitates information sharing during implementation among team members and across functional teams thereby reducing implementation project outcome – time and cost. Therefore, orientation to collaboration has a positive impact on ERP implementation as observed in two case study organisations – Bidco and BCL. ERP trajectory encourages teamwork due to its process-oriented nature. Therefore, it is arguable that orientation towards collaboration facilitates functional integration within an organisation which leads to improved business process efficiency, effectiveness, and flexibility. Given that orientation towards collaboration encourages teamwork, collaboration oriented organisations tend cope with ERP project management activities which require teamwork which often cuts across the functional areas of an organisation. On the other hand, organisations which are oriented towards isolation may work hard to inculcate collaboration culture which may lead to additional costs being incurred to cater for change management. For instance, the public organisations reported in this study had to undertake additional measures

such as adopting ‘podoville’ structures in order to breakdown isolation culture that was heavily ingrained in them. Therefore, depending on organisation’s configuration (collaboration vs isolation), orientation to collaboration can have positive or negative effect on ERP delivery service and ERP outcome (project outcome and business process outcome).

Organisation IS resource, if available, positively influences ERP implementation decision and subsequently the ERP implementation outcome. Availability of knowledge resources (project management and business process) facilitates ERP implementation thereby reducing the implementation time and cost due to low learning curve. In addition, availability of financial resources positively influences ERP implementation given the intensive nature of resources required during ERP implementation.

6.2.4 ERP Delivery Service

This construct describes the means by which ERP system implementation is supported, managed, and nurtured. The construct has a moderation effect of the ERP implementation outcome. The outcome of ERP implementation in an organisation is not only a function of the organisation’s contextual factors but also depends on how the ERP implementation project is supported, and nurtured. Therefore, this construct is more focused on how the ERP project management is carried out. Based on the case study analyses, four representative dimensions of ERP delivery were identified. It is noticeable that these dimensions represent the commonly known critical success factors. Therefore, this construct represent critical success factors, though not exhaustive, which needs to be observed during ERP implementation in order to achieve successful project and business process outcome. The importance of top management involvement is widely cited in the literature and was also evident in the case study analyses as presented in section 5.3.6.4. Top management involvement is required in order to not only mobilise resources but also to diffuse resistance. Their involvement assist in aligning IT and business strategy which positively influences ERP implementation decision and ERP implementation outcome. In a similar manner, the presence of a IT champion within functional areas greatly affects ERP implementation outcome. The presence of a IT champion will promote the use of ERP which can help diffuse resistance toward ERP project. On the other hand, its absence can have a negative influence on the ERP implementation outcome. The consultant resources dimension was derived from project responsibility discussed in section 5.3.6.4. The use of consultants had a positive influence among the case study organisations in that they makeup for the lack of project management and business process management knowledge in organisation. Their involvement thus have positive moderation influence on ERP implementation outcome. Consultant resources dimension is directly affected by IS resources, mainly the availability of financial resources because of the high cost involved in hiring ERP consultants.

Another property which was added to ERP delivery service is the the ERP drivers. This property was not originally identified and included in Table 5.5. This property refers to the reasons for, or

the justification for ERP implementation in an organisation. The reasons identified from empirical data were grouped into business drivers and technical drivers. Implementation of ERP system in any organisation, as observed in the case studies, can be justified on the ground of business needs, technological needs, or both. ERP implementations which are business-needs driven involve higher BPR magnitude in a bid to improve the old business practices. On the other hand, ERP implementations which are driven by technical needs tend to carry out major customisation with aim of changing the ERP system to accommodate the old business processes. Therefore, ERP drivers have profound effect on ERP implementation scope (BPR magnitude) which ultimately impacts on the project outcome and business process outcome. Business-driven implementations have higher BPR magnitude. That leads to shorter implementation duration and lowers cost and also yields higher processes efficiency, effectiveness, and flexibility benefits. On the other hand, technical driven ERP implementations have lower BPR magnitude and thus have higher customisation. As a result, technical driven ERP implementations are more costly and yield minimal business process improvement benefits.

Technical justification of ERP project is inclined to technological determinism paradigm and is often a scenario when the ERP project is too technically focused and IT group is developed around technical skills. ERP system is seen as a packaged solution to organisation's all technical and business problems. This implementation approach often results in high level of resistance and rates of failure. The IT group handles the implementation process, often paying attention mostly to delivering the project on time and on budget instead of gaining business benefits. Based on the research findings, it is important to justify ERP implementation based in business needs and then use ERP as an enabler to achieving the defined business needs. This ensures that the business and IT strategy are aligned.

ERP drivers were deduced as being influenced by two constructs namely organisational context and external environment. For instance, organisations operating regionally and internationally, in this study, were motivated towards standardising their operations whereas those organisations which were operating within the country were not necessarily motivated in standardising their operations but rather they were interested in replacing their legacy systems. The external environment dimension, which has a profound positive influence on ERP drivers, was presence of competition (competitive environment). Organisations operating in competitive markets often justify their ERP systems implementation along quantifiable business cases. These business cases represent business opportunities expected to be fulfilled by the ERP systems in order to provide business with competitive edge.

6.2.5 External Environment

This construct refers to the environmental setting and associated influences that directly affect perceptions, decisions, operations, and outcomes. The environmental construct influences organisation

context, ERP delivery service, and ERP implementation decision which ultimately impacts ERP implementation outcome. For instance, competitive environment dimension influence orientation to change dimension in that organisation which are operating in competitive markets are influenced to be change-oriented. In addition, it also influences ERP driver dimension in the ERP delivery construct.

The national IT infrastructure dimension negatively influences an ERP implementation decision – more precisely the implementation scope. It limits the scope, thereby significantly affecting the business process outcome. It also adds to additional cost because companies are forced to set up their own private Wide Area Networks in order to link multiple sites as was cited in two case study organisations.

Government legislation also emerged as dimension with negative influence on ERP implementation. Its effect is more severe in public organisations which are governed by State Corporation Act which stipulates procurement procedures. The procurement legislation imposes bureaucracy which negatively influences ERP implementation decision and subsequently the implementation outcome. Public organisations were forced to carry out heavy customisation in order to conform with the State Corporation Act which governs them. Private organisations were less affected by the government legislation. Lack of government policy that facilitates use of IT in general negatively influences business process outcome. For instance, lack of e-commerce policy and data protection policy discourages organisations from implementing extending their ERP systems beyond the four walls. The result is narrow implementation scope and limited business process outcome.

6.2.6 ERP Implementation Challenges

This construct was included in the model to provide organisations with the likely challenges they need to watch out for in order to put in place appropriate mitigation measures. ERP implementation models in the literature tend to focus on critical success factors while ignoring implementation challenges. There is need for organisations to be aware of ERP implementation pitfalls so avoid them. The challenges include those factors which had direct negative effect on ERP project management from initiation stage to the go-live stage. The dimensions included in the model were statistically derived in section B.6.2.6 of Appendix B.

6.3 ERP Upgrade Decision Model (UDM)

Based on the analysis of the cases and comparisons between them (see section 5.3.6.5 of Chapter 5), an empirical Upgrade Decision Model (UDM) was developed as shown in Figure 6.2. The decision to upgrade is shown to be influenced by factors classified into two main categories: motivating and contingency forces.

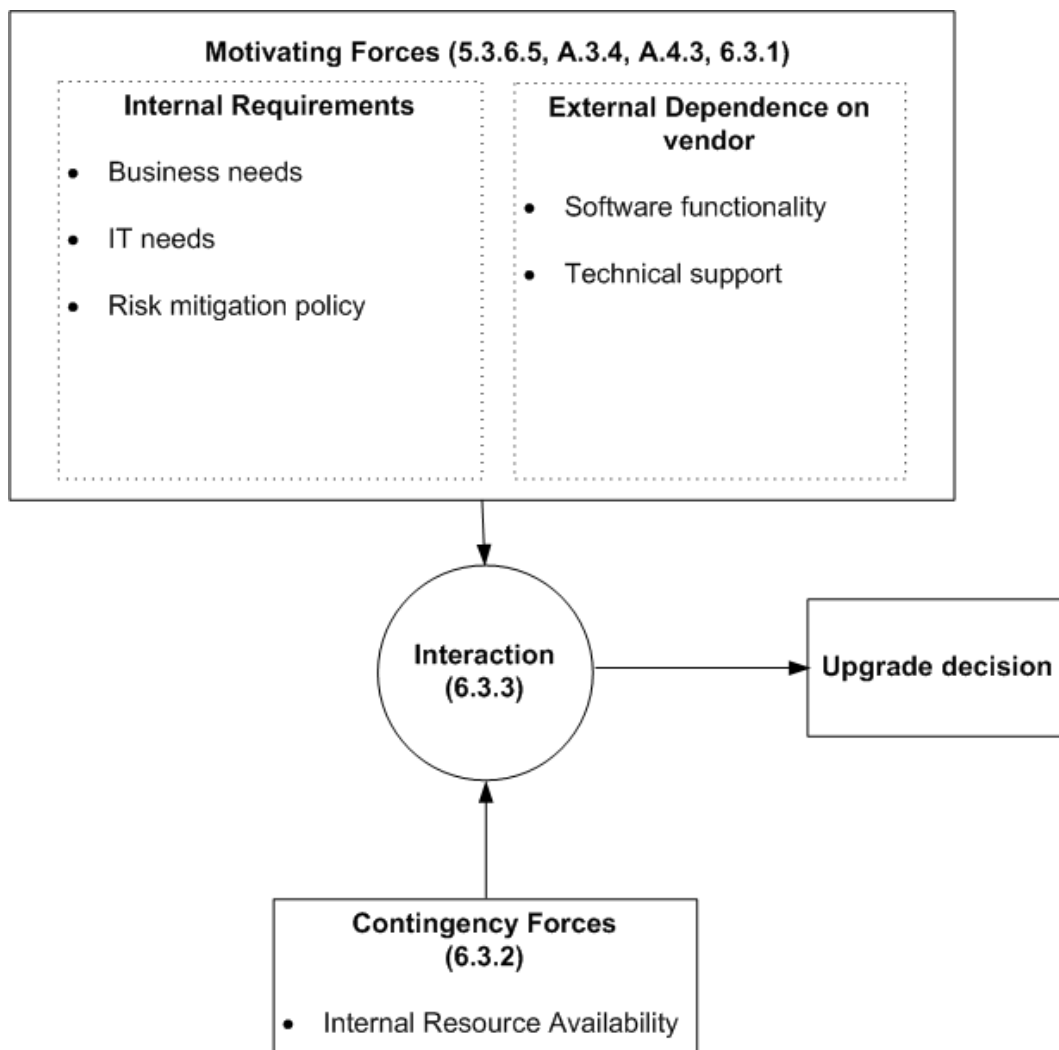


Figure 6.2: Model of the upgrade decision process

The upgrade decision reflects the interaction between those two factors. Our explanation of the model begins with motivating forces, which can originate from both internal requirements and from the organisation’s dependence on the software vendor. This motivating forces would influence the frequency of ERP system upgrade also described earlier on as upgrade cycles.

6.3.1 Upgrade Decisions: Motivating forces

Motivating forces are considered to be any event, or requirement that triggers the interest to adopt a newer version of ERP system. From the study, two types of motivating forces were found to influence both upgrade decisions: internal requirements and external dependence. Three specific internal requirements were identified as influences on the decision to upgrade business needs, IT needs, and risk mitigation.

Business and IT needs

One of the most important factors identified in this study to be influencing ERP upgrade is business needs. It is understandable that demands from business users can motivate upgrade decisions because information technology application serve business users. In this study, business needs prompted BCL to look into a new version of SAP, and the need to integrate business systems prompted KenGen to upgrade their SAP R/3 from version 3.1H to version 4.5B. Business also includes the organisations competitive strategy.

Given the function of ERP system to support business objectives, it comes as no surprise that business needs are a primary influence on upgrade decisions. However, our findings help to clarify that not all business needs are equally influential. In the case of KenGen, the need for standardisation can be considered a higher priority business need because it was related to the firms strategic direction connecting all the power generation plants which were widely scattered throughout the country. Compared to KenGen, KPLC users' needs for improved functionality were seen as needs that could be deferred in the face of more urgent business needs that KPLC had to satisfy until after the software sunset date. Thus we might think of differences in degree and kind when referring to business needs. All areas of ERP system upgrade decisions appear to be based on judgements about the importance of those needs. In this respect, our results are consistent with the software maintenance literature's conclusion that users' business needs, as indicated by their demands for enhancements and extensions, is one of the most important reasons to perform maintenance (Hedelin & Allwood, 2002).

Risk mitigation

In addition to business and IT needs, our model identifies risk mitigation as an important motivation force. In both cases, upgrade decisions were subject to policies designed to mitigate the risks of using ERP systems. KenGen had a strict policy that required all its software to stay on vendor support all times. Although the policy's influence remained dormant when software was not close to the end of the vendor's sunset date, it became a powerful influence when software approached the sunset date without being upgraded. Another company policy was 'no beta version' which both KPLC and BCL observed. The policy prevented upgrade to untested or unstable versions of ERP software. These policies mitigated the risks inherent in the packaged software.

Risk mitigation policies affected SAP, which approached its sunset date while other SAP projects were being pursued. Because further delays would have placed SAP into the unacceptable status of non-support, vendor dependence became a salient motivating force for the SAP upgrade. Although covered by the same policies, BCL upgrade was conducted well before the sunset date for the previous version and was not affected by the policy. However, the corporate policy would have applied to BCL also if it were getting close to the sunset date. Thus, risk mitigation become a

stronger motivating force over upgrade decisions as the risks associated with ERP systems increase.

External dependence on software vendor

When organisations adopt an ERP system, they become dependent on the software vendor to provide them with software functionality and technical support. In essence, they become subject to 'locked in' relationships in which the external producers of software determine what their customers must do. In the case of large producers such as SAP, Baan, Oracle Financials, and JD Edwards, this dependence becomes a primary influence over upgrade decisions for packaged software. Such vendors may use pricing and support strategies to exert pressure on their customers to upgrade earlier than they wish Sawyer (2000), while the vendors reduce their own responsibility for supporting multiple versions of ERP software (Beatty & Williams, 2006a). In brief, consumers of ERP system who depend on vendors for technical support and functionality do not have much choice but to comply. Thus, organisations in the environment surrounding a firm using packaged software exert influence over its software practices (Lederer & Mendelow, 1993).

The creation of internal risk mitigation policies by customers such as KenGen reflects the strong dependence on vendors, who have the power to remove support for earlier versions and thus force customers into upgrades even when business needs are not judged to be a priority. Although new versions offer greater functionality, which might meet business needs, the requirement to upgrade or lose vendor support becomes a pre-emptive criterion for organisations unwilling to accept the risks of unsupported ERP system. Thus, vendors can prematurely end the life of a current ERP system version by setting a sunset date even though customers may still deem current functionality to be adequate.

In addition, to their dependence on vendors to provide support for the ERP system, organisations also rely on vendors for software functionality. In both of our cases, the only way for KenGen and KPLC to receive software features that they wanted was to adopt vendor's upgrade. Despite large differences in the functionality of the respective ERP systems, we did not observe much in influences due to the ERP system's material characteristics. In both cases, the software was critical to the organisation and was supplied by a powerful external vendor. Thus, because the consumption of ERP system is separated from its production by organisation and national boundaries, software characteristics may become practically irrelevant to the decision to upgrade. Only in cases where the ERP system is not critical could an implementing organisation decide to abandon an ERP system rather than upgrade it. Alternatively, an organisation could find another source, such as different vendor or an open source application, for satisfying its software needs. However, neither of these situations was evident in our study. Thus, the exact nature of software functionality appear to play no special role in the decision to upgrade. Although different types of software functionality were needed, any functionality that is critical to the organisation strengthens the dependence on

vendors that supply those features. This dependence clearly influences the decision to upgrade unless the organisation decides to develop new feature in-house.

These findings are consistent with the theory of resource dependence as suggested by Phan (2002). According to the theory, an organisation's dependence on any important resource allows external organisations providing that resource to gain control over the decision processes. According to resource dependence theory, "It is the fact of the organisation's dependence on the environment that makes the external constraint and control of organisational behaviour both possible and almost inevitable". The extent to which the organisation complies with external demands depends on the importance of resources, an external vendor's discretion over resource allocation and use, and the availability of alternative resources. In the case of the ERP systems studied, both systems were extremely important to case studies (KenGen, BCL, KPLC). Thus, the prospect of losing support and technical assistance was inconceivable. As a result, dependence on vendor became one of the most important motivating forces in an upgrade decision, reflecting the customer's dependence on external resources.

Vendor dependence is a long-term proposition. Once an ERP system is adopted, future upgrades become almost inevitable unless the organisation decides either to abandon its current version or to continue using the system without pursuing an upgrade. Prior research suggests that adopters of ERP systems view migrations to new versions as an unavoidable part of ERP systems life-cycle Kraemers & Dissel (2000). The choice is no longer between upgrading and not upgrading, but rather deciding when the upgrade should occur. For this and other reasons, vendor relationships have assumed greater importance in research on ERP systems (Hirt & Swanson, 2001).

6.3.2 Contingency: Internal resource availability

The availability of internal resources is an important contingency affecting upgrade decisions. As Mohr (1982) noted, "Motivations may determine behaviours, for example, by only if the relevant resources are adequate". Clearly, every organisation faces resource constraints, so resources tend to be allocated where they are needed most. Although the availability of the resources alone is unlikely to trigger a decision to upgrade, lack of resources may mean that upgrade initiatives are postponed. The resource contingency played a definite role in the postponement of SAP upgrade until after the sunset date at KPLC. Also, despite the attractiveness of SAP 4.5, BCL was not able to justify the expenditure of resources until other business needs increased the motivation. Thus, resource availability is contingent on the strength of the motivating forces. Although lack of resources can defer upgrade decisions where there is no immediate threat to business operations, resources can often be allocated when business needs to upgrade become more urgent.

6.3.3 Interaction among motivating forces and resource availability

From data analyses presented in section 5.3.4 of Chapter 5, it is apparent that upgrade decisions by different organisations may be different. Several factors were identified as having influence on the decision to upgrade ERP system. This pattern bears resemblance to other dynamic organisational decision processes. According to Mintzberg *et al.* (1976), stimuli for organisational decisions have different amplitudes, and a decision is evoked when the cumulative amplitude of stimuli reaches an action threshold. Decisions, therefore, are not determined by any single motivation and may vary from case to case. Even within a decision type, such as software upgrade decisions, forces may be unequally influential, making the general prediction of decisions difficult. The benefit of case studies of decision processes is a greater explanation of the interaction among motivating forces and resource contingencies.

In the two cases of upgrades described in this study, amplitudes and action thresholds were not explicitly assessed as part of the decision process. The threshold level was a subjective reference point made by managers, and no formal cost/benefit analyses were conducted at both organisations. Nonetheless, it can be inferred from managers' comments that the upgrade decisions for both projects were affected by multiple influences, as shown in the model. According to Bannister & Remeyi (2000), the 'gut feeling' approach is in fact quite a common phenomenon in organisation decision making. Similarly, Mintzberg *et al.* (1976) found that the favoured mode chosen to make 'a choice in his own with procedures that he does not, perhaps cannot, explain'. In the two cases, the threshold can be inferred as a point at which managers perceived that the need to upgrade had become a necessity and could justify the expenditure of scarce resources.

Many organisational decisions, including ERP system upgrades, involve commitment of resources that are in scarce supply. The condition of resource scarcity implied the need to prioritise projects in order of importance. In the case of delayed upgrade at KPLC, the IT manager's wish to upgrade was delayed until complementary business needs arose (the need to integrate regional plants). In the case of KenGen, the priority of the upgrade project increased as the vendor's sunset date neared. Thus, resources are provided contingent upon other motivating factors and external dependencies.

In the study, motivating influences and internal resources interacted to influence decisions depending on their level of intensity and the availability of internal resources. In the normal situation where resources are scarce, the lack of resources dominates the interaction, particularly if the need to upgrade reaches the threshold so that it can no longer be deferred, it dominates the decision to make resources available. When the decision was made to upgrade SAP, the software was in danger of losing support and had to be upgraded immediately. In the KenGen case, KenGen was only able to justify the division-wide upgrade to SAP when the need arose integrate the regionally distributed power generation plant using SCADA which was not compatible with SAP version

2.1H. The combination of stimuli provided the needed justification to conduct both upgrades.

While the research findings pertain to decision making under resource scarcity, it is likely that under conditions of sufficient resources, any legitimate motivation would evoke upgrade decision. This claim is supported by anecdotal evidence about previous upgrade decisions not included in our study. According to the Manager, when KenGen department had fewer competing projects, upgrades were performed according to the director's preference to upgrade to a new version of SAP every 18 months.

6.4 Validation of the developed models

Gasson (2004c) asserts that models developed from interpretive research are not and cannot be totally objective. Therefore, it is important to question whether a model generated in this way is more or less conformable (and therefore useful) than those generated by deductive, hypothesis-based research methods. While the weakness of qualitative, inductive approaches to research lies in the data-analysis stage of the research life-cycle, quantitative, hypothesis-based approaches are weakest in the initiation and data selection stages. The EEIM and UDM were derived mainly from empirical data analyses of qualitative research phase of this study. Their validity depends on the rigor of data analyses of the qualitative data. Where as validity in deductive hypothesis-based research is ensured by statistically testing correlations between data variables and by ensuring a statistically significant sample population, validity in interpretive research is more difficult to establish. Such notions as mathematical proof have no equivalent in qualitative interpretive research because (a) collected data represent social constructs rather than measurable physical phenomena, and (b) data analysis is recognised as subjective and inductive rather than deductively objective.

Interpretive research rejects the “universal laws” (positivist) notion of reality in favour of discerning socially constructed norms and relationships that are located in a particular culture or context. The claims of transferability and fit between contexts in this study was achieved by identifying similarities in factors that are the empirical models and that consistent between different contexts for which the model fits. This claim is supported by the Gasson (2004a) argument that claims for transferability may be made on the basis that constant comparison between data sets can yield similar findings or that differences can enable researchers to extend their models.

In summary, the qualitative and situated nature of this research facilitated the internal validity of the findings, because, as Verschuren (2003) has commented, “internally valid holistic knowledge means knowledge that takes into account temporal, spatial and functional interconnectedness of phenomena” (p. 134). The fact that multiple sites were allowed into this research thereby allowing comparison of data within and across all the sites about the same phenomenon add to the internal validity of the research findings upon which the two research models were developed. Orlikowski (1991) argues that multiple field sites allow ‘analytical generalisation’, where the researcher’s aim is

to generalise a particular set of results to some broader theoretical propositions. The term ‘analytic generalisation’ is used to distinguish it from generalisations from a sample to a population. Here the generalisation is of theoretical concepts and patterns.

One of the mechanisms used to enhance internal validity was triangulation. Stake (1994) says that triangulation serves ‘to clarify meaning by identifying the different ways the phenomenon is being seen’ (p. 241). The use of different data sources and access to different members in each of the sites offered possibility to find consistencies but also inconsistencies within and across the organisations. Thus, triangulation served to identify shared or incongruent elements of practices across organisations and users. It also helped to understand the different and creative ways in which ERP systems were constructed. This further lend credibility to the two empirical models developed in this research.

Triangulation also helps to achieve external validity. However, it does not ensure it. Multiple case study approach provided an opportunity for analytic induction. This was undertaken not only by looking inside the sites but also by establishing connections with existing theoretical debates and looking for resonance with other empirical work addressing similar questions (Yates, 2003). This contributed to the external validity of the two research models developed in this research and the entire research findings.

6.4.1 Comparison With Similar and Conflicting Models

Comparing models with other existing similar and contrasting models is another way of ensuring validity of newly developed models. The EEIM was compared to Somers *et al.* (2000), Myers *et al.* (1997), and Saunders and Jones (1992) models discussed in section 2.5.2 of Chapter 2. At a general level, the conceptualisation by Somers *et al.* (2000), to some degree, provide support to the viewpoints espoused by Saunders and Jones (1992), Myers *et al.* (1997) and the ERP implementation model developed in this study indicating that an understanding of implementation and use of IS (in our case ERP systems) or functions can be enhanced whenever contingency factors or issues are adequately considered.

The model by Somers *et al.* (2000) is rooted in the contingency approach, which is similar to the ERP implementation model in this study. Furthermore, the extent to which the ERP implementation model is similar to their model is that the two models in the context of ERP systems are characterised by views which indicate that the implementation of such systems can be influenced by contingencies.

Currently, there is no other model on ERP upgrade decision. Therefore, the UDM could not be compared with similar or conflicting models.

6.4.2 Critical Group Discussion

We further conducted critical group discussion in order to validate the two models: EEIM and UDM. The critical group discussion aimed at gauging the ERP experts – ERP consultants – opinions on whether the model could be used by organisations that are implementing and/or upgrading their ERP systems.

A critical group discussion guide was developed (Appendix F). The guide was pre-piloted with two ERP consultants drawn from Deloitte and Touche.

Five ERP functional consultants participated in the discussion which was held at the Deloitte and Touche offices in London. Two of the participants were principal consultants while the remaining three were senior consultants. One participant was a specialist in the Oracle Financials while the remaining four were SAP R/3 ERP consultants. The four SAP R/3 ERP consultants were drawn from different SAP R/3 functional solutions – Finance and Controlling, Sales and Distribution, Business Warehouse, and Materials Management.

For EEIM, four participants opined that the model was highly workable while one rated the model as workable. The participants reasoned based on their ERP implementation experience that organisational and environmental factors captured in the model significantly influence ERP implementation and the ultimate outcome. One principal consultant asserted that organisational and environmental constructs depicted in the EEIM can hinder or facilitate ERP implementation. This opinion supports these research findings and the proposition put forward by the EEIM. All the participants strongly agreed that the model constructs were meaningful. However, one senior consultant observed that the ERP implementation decisions spans across the entire ERP implementation life-cycle and may include some additional decisions to those presented in the model. He suggested explicitly stating that there are other decisions and that the ‘ERP Implementation Decisions’ construct signified only two of those decisions.

All the participants suggested that the operationalisation of the two models can be enhanced by the development and use of a readiness assessment tool. They observed that determining an organisation’s ERP readiness for an ERP implementation is often one of the most difficult parts of moving forward with such a large undertaking. It is easy to get caught up in all the potential benefits of ERP and forget that there are some fundamental business issues to consider before proceeding. For example, the participants argued that to determine an organisation’s ERP business readiness, it is useful to first determine the organisation’s configuration. The participants observed that the EEIM when operationalised, can effectively address the issue. On how to operationalise the model, the participants suggested designing a questionnaire addressing the model constructs and dimensions. The organisations can then complete the questionnaire in order to determine whether their configurations favour or inhibit ERP implementation and use. Thus the organisational structure and culture can be reviewed and analysed for suitability to an ERP implementation. The functions of organisational units and their interrelationships can be analysed to insure that clear

lines of data and process ownership are defined and understood. Also, with the operationalisation of the EEIM, organisations can evaluate their cultural attitude toward information sharing and the degree to which common, customer centric, business views are held.

For UDM, all the participants agreed that the model was highly workable. The participants argued that although the model may not represent all the factors which influence decision by organisation to upgrade ERP systems, it nevertheless captured the major factors which influence ERP upgrade decisions. All the participants strongly agreed that the model constructs of the UDM made sense them. One of the principal consultants described the model as a perfect representation of how organisations make decisions to upgrade ERP systems. They observed that vendors would continue to be a key factor in ERP upgrade decisions. To support the model's proposition that availability of resources mediates ERP upgrade decisions, one principal consultant observed that the reason why many organisations have not upgraded their system to ECC6 version of MySAP, is lack of resources. He observed that the number of organisations carrying out ERP upgrades have reduced remarkably since the global recession started taking effect.

It is arguable that the EEIM and UDM are valid in the light of the experts opinion presented above.

6.5 Summary

This chapter presented the two empirical models: EEIM and UDM. These models were derived from our empirical data. The models depict the contextual factors which impact on the implementation and/or upgrade of ERP in organisation. From our data analysis, it is clear that the relative strength of the influences on upgrade decisions is dependent on the internal requirements of the organisation and the external influence of vendors. Thus, the models provide an empirically grounded basis for understanding contextual factors and their influence on ERP implementation decision. Additionally, they show ERP implementation outcomes and understanding of how and why ERP systems upgrade decisions are made.

Chapter 7

Conclusion

7.1 Introduction

This chapter provides a summary of the key issues that have been addressed. It forms a narrative of the whole thesis, incorporating ideas which have been constructed over the course of this research. These include contributions to knowledge, practice, literature and methodology. At the end of this chapter are the limitations of the research and proposals for future research.

7.2 Summary of the Research Findings

7.2.1 ERP Implementation Practices in Kenya

The first research question was aimed at identifying ERP implementation practices in Kenya. Based on the case study organisations, the research elicited the current ERP implementation practices in Kenya. These practices are outlined below.

Kenya, like other countries is ushering in the second-wave of ERP system. This is in line with the measures being taken by organisations to optimise ERP performance in their organisations. Some of the measures taken by the case study organisations in this regard, have been discussed in the previous chapter which include addition of new modules, upgrading to the latest versions, and entirely replacing the ERP system or some of the modules. The study deduced that while all the case study organisations have been actively using their systems for five years or more, they are learning that there is really no “hard-stop” implementation end point: ERP systems continually evolve to meet demands for additional functionality, capability, and expanded deployments throughout the organisation. Furthermore business requirements are in a state of continuous change to respond to the ever dynamic environment.

Given that there is no “hard-stop” implementation end-point, Kenyan organisations are beginning

to realise that learning from past implementation experiences – from both internal and external sources – is key to the success of adding ERP capability or functionality.

The average length of time for a “typical” implementation in Kenya is about 24 months and can employ as many as 30 consultants. The project outcome – cost and duration – is influenced to a great extent by the ERP implementation scope. The greater the implementation scope, the longer the total implementation duration. Also, as the scope of implementation grows from a single business unit to multiple units spread out globally, the duration of implementation increases. Among the case studies, Bidco had the shortest implementation time of 3 months while ACFC had the longest implementation time of 4 years.

The success of having the shortest implementation time with required functionality and within budget at Bidco is attributed to a number of factors stated in Appendix A, which include:

- Adequate user awareness and involvement at all stages of the project;
- Direct control of the CEO and a fully empowered project team;
- A well motivated staff made to fully share the management vision. This enabled the sustenance of vital team spirit both during and after the implementation. To this extent the HoD are referred to as “Team Leaders”;
- Dynamic management style that has inculcated a ‘Family culture’ guiding the “The Bidco Family”;
- Management that is ready to spend on projects that would be considered as risks as long as it can enable the realisation of goals.

All the case organisations adopted the enterprise suite approach during the initial implementation. However, most of the organisations which have implemented additional modules have chosen modules from different vendors. Findings revealed that enterprise suite ERP implementations have stopped making headlines. One PricewaterhouseCoopers consultant contended that “throughout the last 12 months, ERP has not been a popular subject. It dropped off people’s radar screen”. Best-of-breed implementations are becoming more common now, especially in large organisations, which are “looking at implementing CRM, data warehousing and business intelligence systems that sit on top of their ERPs”.

The above discourse holds in the light of our case study organisations. For example Bamburi which is running SAP R/3 4.5B is considering implementing Oracle Business Intelligence and PeopleSoft Human Resource Management in 2007. Another showcase that there is a move towards best-of-breed strategy is by Bidco which although it runs Baan, it has implemented Siebel CRM and SCM. Another consultant further stated that “Big ERPs are done. There are more of add-ons and bolt-on implementations now”. This was especially true for ERP systems that needed to satisfy

Kenyan specific industries such as Power Generation and Electricity distribution at KENGEN and KPLC. However, in the medium-size case organisations – e.g. Bidco – traditional “ERP systems meet most of their business requirements”. The type of modules in a typical implementation differs depending on the implementation phase and stage. In general, enterprise suite strategy was found to be common in the initial ERP adoption and implementation.

ERP configuration has a profound effect on: maintenance cost, complexity of integration with new or existing application, implementation cost, and flexibility to meet business requirements.

Whereas some organisations studied provided quantifiable business cases before initiating system implementation others provided unquantifiable and elusive business cases for implementing their ERP systems. Some of the reported quantifiable benefits related to business improvements are: customer response time and improved turnover by maintaining existing customers and by gaining customers from competition.

There was no evidence in Kenya that ERP reduces headcount since none of the companies which implemented ERP laid off its workers though there were fears that ERP could lead to loss of jobs during the project initiation stage. This confirms Mabert *et al.* (2001b) and Laughlin (1999) who argue that ERP does not reduce headcount. Although it is reported widely in the literature that one of the major benefits of ERP deals with eliminating the redundancies associated with legacy systems, this was not the case with our case study organisations.

A major difference between Kenyan implementations to others elsewhere in the world is that Kenyan implementations are generally smaller in size in terms of number of modules implemented. However, ERP implementations in Kenyan share similar complexities to international implementations. Furthermore, there is less money in Kenyan businesses because of their small margins.

7.2.2 Organisational Context

Our findings suggest that ERP implementation is influenced by, but not necessarily bound by existing organisational context and culture. The organisational configuration affects all stages of ERP implementation, including the planning, selection, training, initial and longer term diffusion. Our research findings further suggest that organisational context makes a difference inline with the contextual dimensions which were identified in this study, namely, orientation to change, orientation to collaboration, decision making style, orientation to work. Some cultural configuration favoured ERP adoption and implementation while others created barriers as discussed in Section 5.3.6.2 of Chapter 5. Through examining the organisations contextual dimensions it is also apparent that there are complex interrelationship between dimensions.

In order to illustrate the significance of cultural orientation, four dimensions of organisational culture unique to the two organisations which exhibited successful ERP implementation outcomes and as a result reaped more benefits were proposed. These cultural dimensions are orientation to

change, orientation to collaboration, decision making style, and the basis of truth and rationality. These dimensions are briefly discussed below.

The findings of this study confirmed the Bingi *et al.* (1999) assertion that it is inevitable that business processes need to be modified to fit the new system during ERP implementation. The findings also concur with the Holland *et al.* (1999) argument that aligning the business process to the ERP system is critical. Organisations should be willing to change the business process to fit the software with minimal customisation (Holland *et al.*, 1999). This study by indicating that orientation to change as a cultural configuration favours ERP implementation, confirms that willingness by the organisation to adopt new work practices is an essential requirement in ERP adoption and implementation. The case study organisations which were oriented towards change were more willing to change their business practices to conform with the processes embedded in ERP system. However, being change oriented does not mean adhering to Vanilla implementation as advocated by the ERP vendors.

The findings of this research show that any typical ERP implementation will involve redesigning of existing business processes and customisation of the software. However, it is suggested that customisation, while only a small percentage of the entire system, can be quite significant in creating differences between otherwise similar systems. Organisations should only use small-scale customisation to fine-tune their ERP systems to match their own specific strategic and decision-making needs which can be difficult to imitate. Typical examples of when a system needs to be customised are illustrated in the Bidco case study (Appendix A). Most case study organisation which carried out major modifications underestimated the effort required for modifications because of integrative design of ERP systems increases the complexity involved in source code modifications. Modifications not only lead to increased costs and implementation times, they also make future upgrades of the system difficult to implement as seen in KPLC's case.

While this research determined major customisation to be a highly significant variable with adverse impact, it also asserts that vanilla implementation advocated by ERP vendors is utopia, especially in the Kenyan context. Business Process Re-engineering (BPR) and customisation considered simultaneously had a positive impact on ERP implementation in the case study organisations in Kenya. Such compromise happens while there is the conflict between the new Western business conceptions and Kenya business society. The Kenya business society welcomes new, advanced conceptions or solutions; however they also have to be suitable for the Kenyan.

There is a need to stress that adopting ERP's best practices is not merely the learning of new terms and terminology, in the sense of translation. In addition, new concepts that underlie the best practice routines need to be learned and old (related) concepts need to be changed or forgotten. Although this may seem to be a straightforward process, the adoption of best practices in particular and ERP systems in general, is likely to require fundamental changes, modifying deep understandings of many relevant concepts. Over and above this it becomes necessary to learn and

understand how to interpret new and existing routines and enact them in day-to-day situations.

Our findings indicate that orientation to collaboration has a positive impact on ERP adoption and implementation as observed in two case study organisations – Bidco and BCL. Orientation to collaboration should also be interpreted as a mentality of working as part of a group or working as team – teamwork – in which there is a shared goal, and different members of the team take on different roles in order to achieve the goal, which the ERP team member should carry through the whole project. In this sense, teamwork mentality is one way to reflect an organisation's culture. Private organisations in the case study organisations were more inclined to collaboration. Organisations which were aligned to working with a teamwork (collaborative) mentality were more successful in achieving ERP outcomes therefore suggesting that teamwork mentality should be encouraged in Kenyan traditional public organisations, in order to achieve successful outcome.

However, in some organisations especially the public organisations, this mentality is seldom reflected. Employees are used to accept the work as the assignment from the managers and in most cases work in isolation. They are not keen in knowing the reason of doing so. They are not keen either to work together with other team members. They take it for granted that obedience to the management to finish their own job is the rule. This cultural configuration is a major barrier to knowledge sharing among implementation team members and between different functional units, during ERP adoption and implementation. This requires more effort being put in place to nurture teamwork culture and it also results in lack of inter-functional integration. One positive tendency is that as Kenya continues to develop, more and more Western management concepts and solutions are introduced to Kenya. The traditional business working environment is slowly changing, or merging with the Western business context. The teamwork mentality might consequently become one of the Kenyan organisational cultures in the future and be readily accepted in public organisations.

Our findings support earlier literatures which stresses that teamwork is important through all the ERP life-cycle (Markus & Tanis, 2000), at least in the Western business context. Interestingly the same argument also applies to the ERP implementation in the Kenyan case study organisations. Orientation to collaboration has a positive impact in ERP implementation in Kenya, as well as in the Western countries.

Another organisational cultural configuration is the decision making which is a key determinant on how implementation decisions are made during implementation. The manner in which decisions are made within an organisation affects the manner in which steering committees make decisions during ERP adoption and implementation. The ERP implementation decisions are strategic in nature (see section 2.5.1) and determine strategies to be adopted by the organisation during the deployment of ERP system. These include such decisions as to whether to implement using the Big-Bang approach or the phased-in approach, and the amount of software customisation and re-engineering required.

Our findings on the influence of decision making on ERP adoption and implementation suggest that

a more ‘modern type’ of management system characterised by majority based or consensus-based decision making in the organisation and ERP implementation steering committee, and delegation of decision-making authority to the project team is associated with more satisfactory results. In contrast, a more ‘traditional’ management system characterised by seniority based decision making is associated with more negative implementation results. However, the same results show the seniority based decision making style is required in the early stages of ERP implementation i.e. the initiation stage.

This finding revealed that steering committee decision making style has a distinct impact upon the risk of budget overruns while application of a consensus principle reduces it. One possible interpretation of this finding is that a seniority decision making principle may encourage top managers to unilaterally change crucial project parameters, possibly without being aware of the impact of these decisions on the budget. In contrast, a consensus principle effectively gives a veto-right to each steering committee member thus allowing him or her to block decisions which would risk increasing the project budget. In cases where the steering committee was endowed with sole duty of making crucial implementation decisions itself lead to the risk of schedule overruns. A possible interpretation is that the project team will be discouraged from making crucial implementation decision under such conditions, implying significant delays as it has to wait for steering committee meetings for these crucial issues to be decided.

However, the study also encountered incidences which are contrary to popular belief that bureaucracies have a negative impact on management. A case at hand is at ACFC where this study found that “seniority-based” management style has actually pushed forward the procedure of the ERP project. At the beginning, the project was difficult to start because the project manager was at the relatively junior position although he had a good education background both in accounting and technology. The business managers did not take him seriously. The situation only changed when the Financial Controller took over the project controller role. The possible interpretation is that Financial Controller in high in chain of command, actually second in command, and thus due to his position, he wielded more power. Employees in the public organisations are used to be driven by the “seniority-priority” rule. At the end, the business managers accepted and took the implementation seriously.

However, as Kenya is developing apace, the Kenyan business society is evolving as well. Kenyan organisations, especially public organisations cannot avoid the changes either. As a result, the “traditional” “seniority-priority” management style will slowly disappear as the older generations of managers retire, it is replaced by the “modern type” of management, which is characterised by “majority-based” or by “consensus-based” management style, brought by the younger generation of managers.

From the above discussion, it is evident that the role and the decision making style of the steering committee would foreshadow the decision making style in an organisation; and it would be reflected

in the organisational culture. From the pattern revealed in the case study organisations, role and the decision making style of steering committees are important indicators, and possibly cause of the risk of budget and schedule overruns and thus warrant special attention.

Our findings suggest that organisation configuration relating to coordination and control influence ERP implementation greatly. ERP tends to favour centralisation. The general structure defines how control and co-ordination is carried out in an enterprise. The case study organisations have functional oriented structures. They are built over solid, rigid and isolated organisational boundaries. More emphasis is put on in-group relationships built over a long time. The in-group relationships are stable and difficult for outsiders' access. This inhibits cooperation across different functional areas entailed by ERP thereby having an adverse effect on ERP adoption and implementation. Therefore, if an ERP system that was developed in a culture that is highly centralised is to be implemented in an organisation that is part of highly decentralised culture, implementation and ultimate outcome could be less than ideal. The implementers should be sensitive to the culture in which the system is being implemented to make sure that aspects about the system are modified to fit the culture in which the system is to be implemented. For example, research finding indicates that decentralisation leads to functional specialisation which makes departments and divisions to be autonomous. This creates a culture of internal competition making functional units to be pitted against each other as discussed in Section 5.3.6.2 of Chapter 5.

Culture oriented towards isolation and functional specialisation by the department or divisions emerged as barriers to achieving inter-functional integration. Most of the case study organisation were functional based which is against the ERP systems trajectory of process-model. Members are usually confined to their departments which impair the ability to achieve overall understanding and coordination, and reduce the efficiency and effectiveness of communicating information across functions. Second, certain power and political consideration was a major obstacle to inter-functional integration. This is because ERP requires changes in job descriptions and required skills which give some employees. For example, some managers might feel that participation in integration activities could result in reduced resources for their units. Most of the managers were keen on maintaining their autonomy as head of departments or divisions and were weary of losing their autonomy to IT and other departments which appeared to be encroaching into their functional niche. Put in other words, sharing information, which is a prerequisite to integration, might also be seen as a potential threat to functional territoriality. Those who control information, were not only reluctant to share it, but they also used it to subvert integration efforts. Implementation of ERP meant that some duties and functions which were previously carried out by a department needed to be carried out by other department.

Reimers (2002), while studying Chinese organisations, found that managers do not trust the system in terms of data quality and also in terms of appropriateness of suggested decisions. He found that managers prefer to make the decisions according to their intuition and experience. The findings of this study are similar to Reimer's in the case of Kenyan public organisations. This was revealed

in the cultural dimension concerned with basis of truth and rationality in decision making. This finding underscores the importance of sharing personal experiences in addition to hard data. This supports the knowledge-based view of the organisation which asserts that employee knowledge, experiences, and know-how, are critical resources of the organisation. While these two dimensions – personal experience and hard data – are necessary, the case study organisations demonstrated that each dimension must be supportive of the others, forming a cultural configuration that is conducive to ERP adoption and implementation as discussed in section 5.3.6.2 of Chapter 5. However, reliance on personal experience as a basis of decision making adversely effects in the appropriation stage (usage stage) of ERP system. There were cases where managers modify quantities recommended by the system and request alternative sources of information in order to verify the accuracy of data provided by the system.

This study's findings however disputed the long notion of national culture proposed by Hofstede. In this research, it was expected that the Kenya organisation's decision making would be less egalitarian (high on power distance), more risk averting (high on uncertainty avoidance), less shared among different levels in the organisation (high individualism), and more in line with employee's and family lifestyle concerns (low masculinity). The research findings from the case study organisations disputed these expectation as different organisations exhibited different Hofstede cultural dimensions. For example, while ACFC, KenGen, and KPLC rated high on power distance ("seniority based"), Bidco and BCL rated low on power distance ("consensus based"). The same was observed with the uncertainty avoidance. ACFC, KenGen, and KPLC were regarded as having high uncertainty avoidance while BCL and Bidco were perceived to have low uncertainty. However, all the case study met the expectation of being low in masculinity. Expectation would have been that all the organisations should have portrayed the same dimensions of national culture prescribed in Hofstede. Hofstede asserted that East Africa where Kenya is located has a high power distance and uncertainty avoidance in terms of national culture orientation.

This research findings support the Hower *et al.* (2002) argument that the very concept of 'national culture' is problematic. The finding validates their argument there is no necessary alignment between culture and the nation-state. The research therefore propose a more dynamic view of relationship between culture and IS in a global context – one that sees culture contested, temporal, and emergent. This preposition is inline with Myers & Tan (2002) and Walsham (2002) who agree that culture is dynamic and emergent, and that ICTs are appropriated by people in local contexts to suit themselves.

Other than the cultural configuration, organisation vision has a significant influence according to the research results. This finding supports ERP literature in which organisation vision has been commonly accepted as one of the critical success factor to ERP implementation (Akkermans & van Helden, 2002; Buckhout *et al.*, 1999). Buckhout *et al.* (1999) asserted that a clear business vision to steer the direction of the project is needed throughout the ERP life cycle. Organisation vision translates into a business plan that outlines proposed strategic and tangible benefits, resources, costs, risks

and time line is critical (Wee, n.d.). This will help keep focus on business benefits (Nah *et al.*, 2001). The success factor of clear vision will translate later into needs requirement, into measures checks and balances control, and a means of calculating a return on investment (Gunson & de Blasis, 2001).

The research finding also emphasised the importance of IS resources, especially knowledge and infrastructure resources. The research finding suggest that knowledge resources are significantly directly related to organisational support and project management practices. This confirms the importance of the knowledge of the team, the sponsor, and the project manager (Barki *et al.*, 2001; Wallace *et al.*, 2004) and suggest that these knowledge resources act as an enabler for project management practices and organisational support. This result suggests that project managers should place emphasis in developing a strong team at the beginning of a project and ensure that sponsors and clients have a solid understanding of project management. ERP implementation success is dependent not only on internal project leaders who have “earned their stripes” leading strategic projects but also on the availability of consultants who can fill gaps ERP knowledge and ERP experience by function. Kenyan experience supports the finding that consultants often take the project responsibility role at two to ten times the cost of the ERP software for the initial implementation, and as much as 80% of the total can go to consulting services. The need for consultant support increases exponentially with the increase in ERP implementation scope because of the difficulties associated with configuring a large number of modules and coordination of operations.

In conclusion, the findings from this research suggest that cumulative effect of the various cultural configurations can result in different implementation outcomes. Thus, while the cumulative effect of the cultural configuration such as orientation to collaboration and change had a positive effect on ERP implementation in that the project met all expectations, this was not the case in organisation’s which were oriented towards isolation and were not oriented towards change, in that the project had less than a successful outcome.

7.2.3 Project Management and Support

The outcome of ERP implementation in an organisation is not only a function of contextual factors (national and organisational) but it is also mediated and controlled by the manner in which the project implementation is nurtured, supported and managed throughout its implementation. Fichman’s literature review on identifying the characteristics of effective delivery of systems pointed to organisational factors (e.g. top management support, technology champion, training, links to consulting services) and process model factors (i.e., the fit of the process model with the technology and organisation) that used to guide IT implementation. In the same vein, the factors that were selected are organisational factors which facilitated assimilation of ERP system in the case study organisations and are also among the critical success factors for ERP implementation. The factors identified as ERP deliverable dimension in the EEIM emerged as critical.

For example, the findings of this study are inline with studies which have widely emphasised the critical role of top management support in successful ERP implementation. Although formal, hierarchical authority may not be translated into actual power, top management, nevertheless has the greatest capacity and social status in influencing the behaviour of other members and in resource allocation in organisations. With strong support from top management, necessary resources can be mobilised and the project put on top priority by altering the political agenda. Top priority encourages the entire organisation to focus on the ERP implementation and motivate users to learn the new system and truly appreciate the project.

Top management support has always proved to be one of the key factors, which give a positive impact on ERP implementation. The same phenomenon can also be found in this research. This research found that support and the attendance from the top management had a positive impact in ERP implementation in all the case study organisations. No matter if is in the public, or the private organisation, top management support seems to be one of the essential issues to ensure the ERP projects to be successful, in terms of designing and controlling the whole implementing process. In addition, the attendance of the top management during the ERP implementation could also strength the employees' confidence in the whole project.

ERP deliverable dimensions, individually and collectively, are not as significant in predicting on-time and on/under-budget implementations as anticipated. Other the implementation challenges discussed in section B.6.2.6, external environmental factors and organisational factors discussed in Sections 5.3.6.2 and 5.3.6.3 respectively also influence the project outcome – on-time and on/under-budget. In addition to affecting the project outcome, project management is also a determinant of business process outcome.

This research findings invigorate the importance of training as a means of change management during ERP transition. For example, all the case study organisations conducted training during their ERP implementation. However, the training activities took place in different ways and at different time frames. Sufficient training has positive impact on ERP implementation in Kenya. Organisations need to realise the importance of the training in order to increase the chances of successfully implementing ERP systems. Training should go beyond teaching the users how to operate with the new system.

This study provides valuable insights towards understanding ERP implementations and important factors influencing success. In particular, it analytically verified the importance of IS resources, project responsibility, level of customisation, ERP configuration, IT champion, and top management involvement and support on implementation time and budgets. While the findings have some common elements with other IT implementation studies, there are many that are unique to ERP implementations because of the integrative characteristics of ERP systems.

7.2.4 External environmental factors

Other than organisational culture, this research identified professional / industry culture as another factor which influenced ERP implementation. In particular, professional culture influenced the BPR breadth and depth dimensions of implementations. Even though professional culture is voluntary, interviewees asserted that it had a bearing on the organisation's reputation. Organisations need to conform to the standards laid down by the professional bodies in order to be accredited. Professional culture also had an influence on ERP appropriation by hindering ERP usage. A good illustration is the case where SAP R/3 provides a facility for reconciling wrong postings in the general ledger. However, accounting standards require that such corrections be done by posting a journal voucher of the same amount resulting to a net effect of zero. Most of the end users observed during field work do not use the reconciliation tool provided by SAP R/3. Instead they correct errors in posting by journal vouchers.

Competitive pressure emerged from data analysis as one of the most important factors influencing ERP adoption decision and ERP implementation scope. This is illustrated by the research's data in which case organisations which experienced relatively stable business conditions were implemented ERP on a smaller scale and had not taken measures to optimise their ERP system performance. A good example is KPLC whose lack of competitors can be explained by the fact that electricity transmission and distribution is capital intensive requiring laying down of national transmission grids. On the other hand organisations which are in highly competitive sectors or industries were more agile in ERP adoption and implementation. In addition, these organisations are continually involved in ERP improvement to maximise the benefits derived from ERP and to enable them gain competitive edge over their competitors. A showcase of the above claim is KenGen which has been continually involved in post-implementation enhancement. The company conducted two technical upgrades in a span of two years (i.e. 2002 and 2004) and it is also planning to implement SAP ECC6 which is the latest product from SAP Germany. Furthermore, due to competition from multinational corporations, Bidco aggressively pursued ERP making it the first organisation in Kenya to implement web based ERP and business intelligence.

Retail and manufacturing businesses are generally considered to operate in dynamic environments and are seen to be at the forefront of technological innovation. As commonly argued in the strategic management literature (for example Rumelt (1991)), sectors in which there is a small degree of competitive rivalry are less likely to be innovative. Service and manufacturing businesses are generally considered to operate in dynamic environment and are seen to be at the forefront of technological innovation. This argument is applicable to Kenyan case study organisations in this study.

Our research findings indicate that government regulations is one of the most important factors that influence ERP implementation in public corporations. However, government legislation had less significant influence in ERP implementation in private organisations, except for taxation policy

which organisations needed to comply with. In public organisations, the ERP functionalities most affected are finance, procurement, and payroll.

Given that factors relating to legislation are mandatory requiring organisations to comply, the ERP caused a lot of tensions in the process of encoding existing institutions into the new rules. According to Orlikowski (1992), it is likely to be much easier to introduce changes which do not challenge existing ways of thinking and norms of behaviours. However, change that conflicts with existing routines and institutions is likely to be much more difficult to implement. In ACFC, the new rules built into the ERP system were incompatible with the established ways of thinking and norms of behaviours embedded in the existing routines.

Poor and unreliable local telecommunication network in Kenya negatively impact ERP implementation in Kenya. It adds cost to ERP implementation and maintenance as organisations are forced to install their own private networks. The existing private networks installed by individual organisations are still slow and unreliable compromising system availability. National ICT infrastructure also influences ERP implementation scope as illustrated by a case where ACFC completely abandoned implementing the web-portal feature in their ERP due to lack of internet connectivity in Muhoroni. The cost of setting up a private WAN using V-Sat was exorbitant for the company to afford. Poor internet connectivity is also hindrance to complete value chain management and customer relationship management.

7.2.5 ERP Implementation challenges

The unique challenges identified in this study are largely consistent with Huang & Palvia (2001) findings that ERP projects face additional challenges in developing countries related to economic, cultural and basic infrastructure issues. This research has derived six composite challenges in ERP systems implementation in Kenya (see table in Chapter 5):

1. Integration and staff turnover issues;
2. High cost further escalated by extensive customisation;
3. Poor change management and failure to realise ERP benefits;
4. Unreliability of vendors and poor quality of some ERP systems;
5. Lack of skills by both users and consultants;
6. Complexity of ERP system further compromising its security.

These challenges are discussed in section B.6.2.6 of Appendix B. This section expounds on some of these challenges.

Issues relating to integration have been discussed in section B.6.2.6 of Appendix B. Instances where incompatibility between the ERP embedded business practices and organisation work practices have been highlighted in section 5.3.6.5 of Chapter 5 and in the case study descriptions in Appendix A. These findings illustrate that incompatibility is an issue which is likely to be encountered by organisations in Kenya when carrying out ERP implementation and subsequently during its assimilation and usage. The new rules built into ERP software were incompatible with the established ways of thinking and the norms of behaviour embedded in the existing work routines in the case study organisations. This finding is similar to Janson & Subramanian (1996) who observed that one of the problems associated with implementing packaged software is the incompatibility of features with the organization's information needs and business processes.

The ambivalence towards technology is to a certain degree related to the technology's 'openness'. This 'openness' means that ERP system is open to many different interpretations and use patterns (i.e. what Orlikowski (1991) terms interpretive flexibility). The different functionalities are interpreted according to how the tool is linked to the organisational work routines.

Global ERP vendors have enjoyed world-wide brand-name reputation. However, due to cultural differences and resource and policy constraints, their ability to simultaneously satisfy the local business requirements of many countries is limited. In fact, as the big, global ERP vendors, such as SAP AG and Baan, emphasise universal solutions to enterprise integration by imposing features, their systems may be too rigid for many organisations operating in a different social and business context. For example, the majority of organisations in Kenya are small to medium-sized companies organisations, which are well known for their diverse ways of conducting business; their sophisticated, adaptive logistic networks; and their flexibility in responding to buyer demands.

High costs exaggerated by extensive customisation is a major challenge for Kenyan organisations. In fact, cost continues to be a major concern for many organisations. In the case of SAP R/3, their costing model does not favour Africa. For example, the cost charged per day per consultant is USD 1,200 plus and an additional hotel and overnight stay allowance of USD 400 charged per night. This is three times above the amount charged in the Asian continent e.g. in India the cost is USD 600 per day. Implementation costs were found to be, on average 25% percent over budget. Organisations under-estimated support costs for the year following initial implementation by an average of 20%.

Heterogeneity among countries in Africa adds to the cost of implementing in Kenya and Africa as a whole. ERP vendors especially those in Europe and USA, consider Africa as one homogeneous region and therefore assumes that what applies in one is applicable to others. This could explain the reason why there is no SAP R/3 human resource module version for the rest of African countries except for South Africa. Indeed, nothing could be further from the truth. The diverse cultural origins in each country and in each tribe and lack of regional policies conspire against regional standardisation. Typically, what is true in one African country does not apply to any of its neigh-

bours. This often makes it mandatory for organisations acquiring ERP to engage in customisation. Lack of regional standardisation and low budget for IT within Kenya and other African nations makes it difficult for ERP companies to find markets with enough potential to justify investing in costly customisations of the products. This problematic especially for organisation which are implementing ERP within the region (i.e. in more than one country) like in the case of two case study organisations, Bidco and Bamburi, which operate within the East Africa region.

Poor change management and failure to realise envisaged benefits also presented challenges to organisations implementation in Kenya. ERP is more than just a software but a way of doing business. It brings about radical changes in the way business is carried out in an organisation. Implementing an ERP will bring changes to the way people work within the organisation, processes will change and there may be job cuts and rationalisation of responsibilities within departments. Currently, there are no change management experts in Kenya. In all the case study organisation, there was no evidence of initiative to manage change. This creates a window of opportunity for change management experts in Kenya. Failure to manage change create resistance which ultimately leads to sabotage of ERP project during implementation, or low utilisation once it becomes operational.

Lack of skills knowledge relating to ERP and supporting technologies within Kenya of how to configure, customise, and use the ERP software further reduces the benefits obtainable from adoption of ERP systems by Kenyan organisations. The few who are available are in high demand which has seen organisations pay them hefty salaries in order to retain them. Even with the hefty salaries, there is no guarantee of their retention. As a result organisations complained of frequently losing key personnel experienced with ERP or supporting technologies. Frequently reported problems were: (1) losing key IT specialists and user representatives working on the project while the project was going on, often despite handsome retention bonuses, (2) losing experienced people after the project was complete. Many IT specialists thrive on project work and view assignment as a 'competence centre' and springboard to lucrative opportunities. During ERP implementation organisations train to key users with aim of transferring skills to the in-house staff. Whereas skill transfer is advantageous in that it helps to: reduce the need for (as much) bought-in resource in the future similar circumstance, clarify and simplify future discussions with external consultants (due, in part at least, to an understanding of the terms and principles involved in ERP implementation), improve staff morale by broadening users' skills and understanding, respondents reported that it is also a problem it is pursued because staff members are interested solely for their own sake (that is, they are succumbing to technical curiosity or believe it will increase their own marketability). Respondents reported that for many staff, the possibility of deeper understanding and broadening of their own skills is attractive enough to take precedence over delivering their everyday job, which may be less fascinating by comparison. This had lead to high staff turnover in most of the case study organisations.

This research finds complexity to be a challenge for ERP system implementation in Kenya. Organisations that perceive their adopted ERP to complex business solution diffuse it slowly and in

limited capacity, thus not realising its full benefits. Because of the complexity of ERP systems, few organisations by themselves have sufficient in-house skills and knowledge base to implement one. The technology and business knowledge relevant to ERP implementation was inadequate in Kenyan among the case studies and therefore called for effective articulation, gathering, and sharing during implementation. The technological know-how and its implementation are tacit and not easily articulated or transferred. It is for this reason that the service of consultants is necessary.

7.3 Research Contribution

7.3.1 Contribution to Knowledge

The cultural configurations and the proposed models (EEIM and UDM) arising from data collected during our multi-site case study extend theory about the influence of context in ERP implementation and upgrade. They provide a theoretically grounded basis upon which future research can be built. Our findings suggest that ERP implementation is influenced by, but not necessarily bound by, existing contextual factors – national and organisational. ERP is often result in the fundamental structural changes in an organisation. ERP can also require or bring about changes in the underlying organisational culture to support the integrated, cross-functional nature of an ERP environment.

EEIM helps to identify why there will be particularly high variance in potential outcomes and further validates which organisational contexts and ERP implementation configurations create options during ERP implementation and usage. Organisational context, environmental context, ERP delivery, and ERP implementation decisions lead to increasing variance in potential ERP implementation outcomes, and they are also predictive of early ERP adoption. Therefore evaluation of these constructs and their dimensions can help managers to direct their attention towards more promising factors and configurations.

The EEIM explains why some organisations implementing ERP systems will have higher return from ERP implementation than others. Ultimately, the results can help managers to direct their decision to terminate or redirect troubled ERP implementation projects. The ERP delivery construct and its underlying dimensions provide a holistic combination of factors that can explain and provide sufficient conditions to have positive effect on ERP implementation outcomes.

Research research is one of few empirical studies focused on ERP system upgrades. It offers an in-depth, qualitative view of decisions to upgrade ERP systems. In relationship to the existing literature on ERP systems, our focus is on activities near the end of an ERP system's life-cycle. Given the growing importance of ERP systems, and apparent inevitability of upgrades, it is increasingly necessary to understand the decision processes for ERP system upgrades.

The research also fills the gap relating to reasons for carrying out ERP upgrades. Our contribution

to this effort is the UDM portraying the interactions among motivating influences (business needs and vendor dependence) and contingent resources. The model draws its inspiration from earlier literature on software maintenance and other related literature. However, a software upgrade is a unique type of IS project, with characteristics that distinguish it from maintenance, traditional system development and initial adoption of a commercial system. In ERP system upgrade, the vendor has substantial control over the development of the system, and the client organisation becomes vulnerable to vendor's actions. As our study has shown, sunset dates can have a dominating influence on an upgrade decision. The study thus draws attention to vendor influence over major IS projects.

Although our findings in some ways support the conclusions of earlier research on IT adoption and software maintenance, our UDM makes an original contribution by focusing on the interactions among motivating forces and contingent resources. Indeed, resource availability has been largely overlooked in IS research, while it plays an obvious important role in IT practice. Resources are directly implicated in sourcing decisions for information services, which recently seem to be affected by resource scarcity, to the extent that most IT decisions, including software upgrades and maintenance, require resources. We believe that resources should be justified and allocated more directly. Following Mohr's (1982) observation that reasons to act require resources to convert them to behaviour, we have positioned internal resource availability as a contingent influence on upgrade decisions.

UDM also goes beyond the more obvious rational motivating forces for upgrades, namely business needs for functionality. Although business needs are always important, our model suggests that business needs were not the only or always the most important factor motivating an upgrade decision. Rather, policies to mitigate the risks of dependence on ERP system placed vendors in powerful positions to influence upgrade decisions. Thus even where business needs for new functionality were not overwhelming, upgrades occurred to avoid the loss of vendor support for software in its twilight years. This kind of influence is comparable to the structural exercise of power by IT professionals over users, identified by Markus & Bjorn-Andersen (1987) in the context of in-house development. Structural power by IT professionals involves 'organisational structures and routine operating procedures that give them formal authority over users or foster user dependence on them for important resources'. Organisations that adopt ERP systems increasingly find themselves in similar situations with regard to vendors (Howcroft & Light, 2006). The importance of dependence on external resources suggests a more political than rational motivation for an upgrade decision (Pfeffer & Salancik, 1978). By considering the vendor influence directly, our model avoids the tendency to emphasise rational criteria in IT decision making.

Finally, the upgrade model makes a novel contribution by allowing us to see how different forces interact to bring an aggregate of influences to a threshold level where a software upgrade becomes necessary. In other words, influences on upgrade decisions are interdependent. Dependence on vendors generates the need for risk mitigation policies. When motivating forces pass threshold levels,

resources become important contingencies that must be made available. The case study methodology and qualitative data analysis used in this study are the means by which these interactions can be described and explained.

Our research findings contest the notion of national culture. Therefore, these findings are particularly of interest because they coincide with Myers & Tan (2002) view. Myers & Tan (2002) suggest that the very concept of national culture is problematic. They argue that there is no necessary alignment between culture and the nation-state, and propose a more dynamic view of the relationship between culture and information system in a global context – one that sees culture as contested, temporal and emergent.

By proposing set of decisions which organisations need to make during ERP implementation (Figure 2.1), this research provides a rare view of ERP systems in the literature. These decisions can be mapped into of ERP life-cycle phase and their sequence determined.

This research also makes a contribution to research methodology by adopting Lee (1991) to inform the research design. In doing so, the research combined quantitative and qualitative research methods, and allow analysis to be done in three phases.

This research has derived six composite challenges in ERP systems implementation in Kenya. Given that these challenges were identified locally, Kenyan organisations can be aware of them and put in place mitigating measures which can increase the chances of successful local ERP implementations. In addition, this research derived three composite measures of the ERP implementation scope. Therefore, this research proposed a new conceptualisation and measurement of ERP implementation scope by suggesting three characteristics of ERP implementations, i.e., breadth, depth, and magnitude as a means to meaningfully describing the scope of ERP implementations. This view enables a fine grained categorisation of ERP projects and provides an informative tool that can be used to better estimate their duration, cost, and business outcomes. The research provides some answers to the question of how to accurately and reliably measure and categorise ERP projects. It also opens new research avenues that will hopefully stimulate the interest of scholars and practitioners working on ERP implementations.

7.3.2 Contribution to Practice

This research contributes to practice in many ways. It calls for recognition of the interaction of local factors. This can help identify the limits of implementing particular business processes embedded in ERP systems. The pressure to implement ERP systems will be there due to the pervasive character of Information Technology, but practitioners should be aware of the need to interpret the project implementation according to the specific conditions of the organisations and to set appropriate project goals based on this contextualised understanding.

Organisations can use the examples of cultural barriers to adoption and implementation highlighted in this research such as limitations to information sharing as a basis to identify their own barriers and

link those barriers to specific aspects of culture. In addition, they can assess whether the barriers are externally based, organisationally based or whether they arise from within the team itself. This assessment is useful so that organisations can also determine the level at which an initiative is required. It is important that organisations monitor these initiatives and make adjustments as needed.

This research showed clearly that ERP implementation is influenced by a plethora of factors emanating from diverse contexts. Understanding how these cultural dimensions influence ERP implementation is important to practitioners engaged in ERP implementation. It is important to recognise that the factors included in the two models (EEIM and UDM) influence ERP implementation and upgrade. All these operate within the broader context of organisational culture. This calls for actions which promote collaboration like team building activities, team bonus programmes, relocation of team members into 'podvilles', and encouragement of members to contribute both 'hard data' and 'soft knowledge' to discussions.

We offer a further practical implication from this research: IT managers need to appreciate the interacting forces surrounding upgrade decisions. A naive view would expect that outdated software should be updated when new versions with improved functionality are released by the vendor. A more sophisticated view would require an assessment of the existing version's functionality, the value added from new functionality, the power of the vendor to enforce sunset dates, confidence in the vendor's ability to build functionality into new releases, and internal resource availability. Unfortunately, such complex assessments are not easy to incorporate into simple decision models. Therefore, IT managers and users of ERP systems need to weigh all of the above elements as they change over time. By limiting the number of decision elements to those found in our study, we provide practical guidance while not oversimplifying the process of making ERP systems upgrade decisions.

This study provides some key insights into the implementation and use of ERP systems in the public and the private sectors in Kenya. Case study findings suggested that the company sector played an important role in ERP implementations on several key dimensions. This was confirmed through an extensive survey. While there have been numerous studies conducted in private organisations on various issues, very little has been done to study public organisations and the impact of sector on the implementation and utilisation of large-scale enterprise-wide systems. This research shows that company sector is again a key factor in the implementation approach for ERP systems. This may have implications for public and private organisations as they move to implement other enterprise systems such as Supply Chain Management (SCM) and Customer Relationship Management (CRM) systems.

Finally, this research makes a vital contribution by providing guidelines on ERP implementation and upgrade. These guidelines are derived from the experiences of the case study organisations, the literature reviewed in this research, and the researcher's experience as a SAP R/3 FICO consultant.

ERP Implementation Guidelines

Customisation of ERP software should be required rarely if the organisation is committed to changing business processes to match those inherent to the software package. The effort involved to re-engineer business processes to fulfill this commitment cannot be understated. There are various government statutory and regulatory rules which are not accommodated by ERP software, but this does not have to be a barrier to using the delivered ERP functionality. Sometimes these regulations can be changed to accomplish the same goal using the delivered software. Blueprinting, which includes comprehensive pilots on a live system of proposed business processes using delivered ERP functionality, is key to developing an effective and accurate process. The result of these rigorous pilots should be a list of valid customisations mainly based upon statutory and regulatory rules which cannot be changed in the foreseeable future or cannot be accommodated by changing a current business process.

The first line of defence, if major business requirements cannot be met by delivered ERP software functionality, is acquisition of a bolt-on whether it's a product of the same ERP vendor or a third-party software vendor. Bolt-ons provide similar benefits to ERP software and can provide process innovations necessary for specialised industry needs. The additional cost of support and maintenance of an additional software license would need to be evaluated versus the magnitude of the customisation required to meet the necessary business requirements. Historically, if a requirement is too industry-specific, even bolt-ons may not meet the need. The next priority should be changing a business process or as a last resort, customisation of ERP software.

There are two potential methods for customising ERP software but only one method should ever be used. The method which should be prohibited by project leadership is modification of delivered software code from the vendor. The accepted method is the creation of a new code base, also called an extension, which is derived from a clone of a delivered software routine. The modified code is then referenced by core application components. This approach requires all the references to the delivered code be changed to reference the new code creating a potentially costly modification from a time and budget perspective. If a major business requirement needs to be met, a bolt-on is the preferred approach.

An extension retains the delivered vendor's code in the database but the original code is no longer used. Subsequent ERP upgrades will update the delivered code and the modified code can be integrated into the upgraded application if the underlying technology remains the same. The following must also be considered:

- The upgrade process for a customised ERP implementation is more time consuming than an upgrade of an ERP implementation with no customisations;
- The timeframe and cost of upgrades increases exponentially with the number of customizations due to validation and testing;

- Customisations are not supported by the vendor and must be maintained and updated by the organisation's internal staff.

If the organisation's customisation is one used by multiple clients, there is the possibility that the ERP vendor can be persuaded to include this customisation in their next product release but this could require significant negotiating leverage and is uncertain.

Depending upon the magnitude of the required customisation, a bolt-on can be more cost effective, less susceptible to defects and enable the team to meet project timelines. The measurement of the level of customisation of a particular installation of an ERP system is difficult to judge. There is currently no industry measurement baseline or metric for this type of analysis. Objective measurements would ideally involve a determination of the amount of customised code as a percentage of the vendor's delivered code. In order for this measurement to be meaningful across industries and even within the organisations, there would need to be a common metric for delivered code and a common method for determining the means to parse and quantify the amount of customised code. These measurements would be further complicated by the fact that implementing an ERP product often does not include implementing full functionality. Often, ERP modules are implemented over a period of time in a phased approach leading to the need to further refine the definition of the baseline delivered code versus customised code. Finally, this analysis also presumes that a common baseline would be applicable across ERP packages leading to a comparable assessment of the levels of customisation of an SAP versus an Oracle implementation, for example. This task is not without merit but will require industry and organisational alignment to reach fruition.

Organisations implementing ERP can achieve package-organisation alignments through careful selection of package, proper configuration and customisation, working around the system, and eventually through upgrades or replacements by a better package. It is important that organisations identify the significant misalignments early to make sound decisions on whether to adopt the package and, if so, to assess the extent of customisation and organisational change required such that adequate resources can be provided and proper change management be put in place. Organisations can structure the evaluation of packages by probing the discrepancies between the practices embedded in the system and the implementation context – country, industry, and strategic organisational context. Clear analysis would be enabled if implementing organisations continuously work to improve the transparency of their business rules concerning their key data and processes.

Managers of organisations seeking to implement ERP systems should seek to improve their business processes prior to embarking on an ERP project through adoption of international standard practices such as ISO quality certifications. They should also seek to raise staff skill levels and change work practices to align more closely with the global practices currently embodied in ERP software.

The empirical evidence of this research revealed the need for improving the education system in order to help develop the required IT skills to particularly implement and use ERP software in

Kenyan organisations. It is also imperative that the top management assume responsibility and drive change management throughout the implementation life-cycle.

Knowledge management mechanisms with emphasis on knowledge retention should be put in place by organisations implementing ERP systems. Know-how is tacit and not easily transferred. Organisations should at the time of negotiating service level agreements consider having knowledge transfer as one of the deliverables. Metrics can be formulated to measure if the key users and end users have mastered required knowledge to assist in future implementation and also to support the ERP system.

Implementing organisations should consider a delayed adoption strategy for new ERP systems to allow sufficient time for package vendors to localise the package. As these misalignments relate to country or industry-wide regulations and norms, vendors who wish to increase the adoption of their packages in a country and/or industry will be motivated to incorporate the missing functionalities over time. Pioneering an enterprise-wide package implementation in a new country is likely to be risky as observed at ACFC. Alternatively, such organisations can attempt to rally other organisations facing similar dilemmas in ERP adoption to lobby the vendor for localisation.

For incompatibilities relating the way of doing business (business processes), tight control over such change requests is likely to be an effective response. Unless these misalignments relate to some strategic imperatives like in the case of Bidco, they should not be customised. A key ingredient in this process is to institute sufficient senior management authority in the project team to defray unreasonable demands from powerful staff or line managers. Organisations should put in place early and sustain change management to manage user expectations and to provide adequate training to facilitate adaptation to the package.

There are cases where ERP systems could not cater for functionalities required by individual organisations in order to cope with their external environments. Such a case at hand is at Bidco where the system could not handle 'per print'. Lobbying the vendor is less likely to work as the requirements are organisation specific. There are few mass-market forces that would lead vendors to localise or to incorporate organisation-specific requirements in future upgrades. Organisations often have to bear the cost by engaging expertise of local ERP system consultants or specialised vendors for further customisation and to deal with the subsequent maintenance issues. Hence choosing to be unique will become increasingly a costly option. Organisations should be mindful of the 'differentiation trap'. They should critically evaluate their internal organisational complexity and identify those aspects that really need to be different, competitively or strategically. Continuous streamlining to reduce organisational complexity is one way to reduce the number of incompatibilities.

This research recommends that ERP vendors, in advocating embedded processes as 'best practices', should be mindful of the risks of going against institutional forces in a new country/industry, particularly when it is likely to undermine legislation. Clearly addressing legal and imposed industry or professional requirements, particularly for sizeable markets like Kenya, will contribute to wider

adoption of the package, since these mandatory requirements affect all potential implementers in the country and industry. The large number of incompatibilities arising from work practices that are persistent in any implementation also suggests that ERP vendors should consider developing flexible reporting and input capabilities to their packages or spend significant resources on identifying industry best practices in information presentation and building these into their systems.

Package developers also need to pay more attention during requirements analysis and design to the specification of business rules that govern the embedded best business practices. More needs to be done to address the deficiencies in the current approaches to capturing and modelling business rules. This is particularly critical as the scale of ERP systems continues to expand and more 'best practice' processes (and their business rules, policies, and procedures) are built into the software. Large 'process heavy' systems such as ERP systems demand a careful attention to the modeling of business rules. It is no longer feasible for ERP system vendors to adopt a passive development approach and assume that the business rules embedded in their system are always applicable to all organisations.

In addition, based on the case study of Bidco and interviews with the consultants, this study proposed an IT strategy framework (Appendix G which can be used by organisations planning to implement ERP to align their business and IT strategy. The IT strategy framework is tailored into four-phases: strategic vision, IT assessment, IT architecture, and IT plan. This four-phase approach can result in an IT strategy that is business-driven, comprehensive and pragmatic for organisations which are implementing ERP systems.

ERP Upgrade Guidelines

Given the lack of literature on ERP upgrades, this study provides ERP upgrade project teams' with proven and practical recommendations for successfully completing an ERP system upgrade from planning to implementation based on the empirical findings from three of the case study organisations.

Organisations should treat an ERP upgrade as a new project. Many organisations underestimate the time and resources required to successfully complete ERP upgrade project because the perception of an ERP upgrade project initiative seems more to be like a technical maintenance effort than a true system development project. While the total effort to fully complete an ERP upgrade project varies based on a myriad of technical, organisational, and operational factors, on average (based on estimation at KPLC, KENGEN and Bamburi) an ERP upgrade costs 30% of the initial ERP project cost and can take more than a year to complete as organisations restructure their business processes and update their technology infrastructures. Organisations that fail to treat the upgrade as a new implementation project invite

disaster by introducing otherwise avoidable mistakes into the effort. The most common resulting mistakes are limiting project planning time, rushing to implement system changes, and failing to thoroughly test all facets of the updated ERP environment.

Organisations should strive to keep the ERP implementation team together and should make every effort to have the same team of key employees who planned and implemented the organisation's initial ERP system to also plan and implement the organisations upgrade project. Though potentially unpopular with the members of the project team who spent countless hours getting initial ERP set up and running, team continuity is an essential factor for project success. Assembling a new project team or rotating new members into the team will serve only to slow progress on the upgrade project since new team members must take time to become acquainted with all aspects of the initial ERP project. Additionally, no one in the organisation will be better qualified to evaluate the impact of an ERP system upgrade will have than the individuals who implemented the existing system. The vast knowledge and experience team members gain during the initial ERP project will prove invaluable to reducing the overall cost and time required to complete the ERP upgrade project.

Organisations should treat ERP upgrade project as a business project, not an IT project. While the majority of the time required for completion of the initial ERP implementation project is allocated to the IT department, the time required to successfully upgrade the system shifts to the business units. To illustrate by example, the technical upgrade at KPLC took only one month whereas functional upgrade took seven months. The reason for the shift in hours from IT personnel to business personnel is simple: system ownership. Once all technical and operational issues are resolved by the organisation's IT staff and technical consultants on the initial ERP installation, it becomes the responsibility of the business units to begin maximising the business value from the system. This responsibility carries over to all ERP upgrade projects which are mainly concerned with business improvement. The business side is responsible for determining the business case for the ERP upgrade. Only the business units can readily establish the timetable for planning, installing, and testing the upgrade to minimise disruption to critical business operations. Also, only the business units can correctly identify how much training will be required for the employees impacted by the upgrade. Organisations unable to gain the full support of the business units that are critical to the success of the project should seriously consider delaying any ERP upgrade initiative.

Organisations should watch for hidden infrastructure costs. Many organisations mistakenly think the vast majority of their ERP upgrade project costs will be software and labour related. Organisations may forget that updated software provided by their ERP vendor includes new system functionality intended to improve the competitive value of the product.

In order to fully leverage the new capabilities available in an upgraded system, organisations may be required to make further modifications and additions to their established IT infrastructure. For example, the SAP R/3 version 3.1H initially installed at KPLC was running on 2 tier landscape – production and development environments. However, when they were upgraded to SAP R/3 4.7, the company was forced to adopt a 3 tier landscape – production, quality assurance and development – which is a prerequisite for running SAP R/3 4.7. As a result they bought an additional server to use for quality assurance. In addition, they had to upgrade the hardware and software of the previous servers – production and development – to recommended specifications to enable them support the new version of SAP. The IT department also realised that each computer that was to use SAP R/3 4.7 required 87% more CPU speed, 72% more memory, and 33% more storage space. Depending on an organisation’s current infrastructure, ERP upgrade projects can become an expensive proposition. Organisations should work closely with their product vendor to uncover any hidden infrastructure costs prior to the start of their upgrade project.

Before embarking on ERP upgrade project, organisations should ensure that they un-customise any previous customisations. During the initial implementation of an ERP system, many organisations choose to customise the standard ERP software modules to meet implementation dates and to match their unique business requirements. Although most organisations that implement ERP make some customisations to a vendor’s basic product offering, many make the mistake of over-customising their application modules in attempt to appease the end users. For example, each maintenance release requires an organisation to evaluate the effects of changes in the core application on customisations. Dealing with customisation issues during an upgrade, as we were informed by the principal consultant involved in the upgrade at KPLC, required approximately 80% of a software developer’s and 66% of a business analyst’s time and effort. An organisation must carefully determine the appropriate customisations and corrections with third-party software on the new version. Customisations that needs to be carried over from one version of enterprise software to the next are the biggest technology headache that organisations will face in upgrades. Therefore, organisations must carefully review the new functionality added to each new release of their ERP suite to determine if specific company-developed customisation can be eliminated during the upgrade process.

7.4 Limitations and Future Work

Choices that were made during the course of designing this research brought with them some limitations. While this study covered all aspects of an ERP implementation, it was

not designed to study such issues as the rationale for doing things in certain ways or to determine exact outcome relationships. For example, one key question that our study could not answer definitely is the cost and benefit relationship. Another issue that needs to be studied is whether early ERP adopters or late ERP adopters receive the better returns. While early adopters may receive some competitive advantages, late adopters generally benefit from upgraded systems and a better implementation knowledge base. This raises the issue of the optimal time to start an implementation of a large system. This study is an initial step in answering such questions. ERP systems are here for the long haul and will need to be studied on an on-going basis.

Future research on ERP systems could profit by taking more of a process view of decision making. Further development of the models has the potential to capture the dynamic nature of upgrade decisions. For example, tracking the entire productive life of an ERP system application, from implementation to replacement by an upgraded version could provide greater insights into the dynamics of implementation and yield more subtle temporal interactions among factors. We also intend to carry out a statistical verification of the models using statistical techniques such as regression analysis and Confirmatory Factor Analysis (CFA). Additionally, future research will involve designing a ERP readiness tool which as suggested by the interviewed consultants, will enhance the EEIM.

There are a number of questions still to be addressed. Future studies could look at differences by size of firms, by industry type, by number of locations, by number of customers and so on.

The conflict caused by the globalisation and localisation of management work practices is worth further investigations. However, this conflict is not a unique phenomenon to developing countries.

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Appendices

Appendix A

Within-Case Study Analyses and Interpretation

A.1 Bidco Oil Refineries

A.1.1 ERP Implementation Practice

ERP Drivers and Background

Bidco's market share has grown steadily in Kenya and the rest of east African countries, especially in the laundry bar soaps and edible oils market since 1998. The year 2000 was fast approaching and like most organisations, Bidco's management was faced with the Y2K compliance problem. The company was also facing problems related to inaccurate costing, lack of clarity in stockholding and poor quality procedures which were caused by the outdated systems.

Its rapid growth was a key challenge for the firm leading to an increase in demands for efficiency. In order to realise its strategic vision of expanding its business in Africa and enhancing efficiency to be able provide quality products and affordable price, IT was seen as essential.

An IT strategic plan, initiated by the senior management and launched in 1999, recommended the implementation of an ERP system throughout all areas of the organisation. The ERP system was intended to support rapid business growth, address data sharing issues, obtain a competitive advantage and introduce "best practice" process management techniques.

Bidco's goal is to be a number one on market share in the edible oils, fats and soaps market in Africa. As a result it was imperative to harness the IT and

integrate into our core business strategy. ERP was deemed as most appropriate for the task (Group team leader, ICT).

A request for quotation was sent to various ERP vendors on their products. After evaluation of the quotations and vendors carrying out demo on their products, the final choice was between SAP R/3 and Baan because they offered an enterprise suite which spanned across the entire Bidco's operations. Baan was finally chosen over SAP R/3 because of its scalability and ease of use, and its strength in handling discrete manufacturing. In addition, its superior after-sales support modules made it the favourite choice.

Baan's strategy aimed at transferring ownership of the implementation to the customer also greatly influenced the selection of Baan. This meant that Bidco could build capabilities to implement Baan in its multiple locations planned in future. This strategy has proved to be very effective for Bidco in that it has enabled Bidco staff to solve challenges as they arise with the help of online Baan support, thus effectively empowering Bidco's staff to resolve operating issues by themselves.

Prior to implementation, Bidco took a pre-implementation skills transfer of their core implementation team by taking them for iBaan specialised training at the Baan office in South Africa. This enhanced their in-house capacity to implement and support the system with minimal assistance from the consultants. The training though costly and the managements commitment to the success of the project, enabled the system to be up and running in a record of 2.5 to 3 months.

Sulfox ltd was chosen as the implementation partner. The initial roll out was confined to four modules with a team of four from Baan and eight key users from Bidco. Bidco also chose a team of 20 end-users drawn from different functions like production, planning, sales, accounting and excise for the purpose of implementation. The team worked full-time on the implementation of the ERP solution along with Baan implementation consultants. The group Team leader commented:

We were impressed with how the end-users adjusted so quickly. They were very dedicated, worked hard and put in long hours on the implementation. The project has been a phenomenal success (Team leader, ERP project).

An overall aim of the project was to, where possible, adapt to the ERP. This was referred to as the 80/20 rule, and meant that the company was prepared, most of the time, to re-engineer business processes to map onto the ERP. The first phase which took about 1.5 months involved implementation of the Finance, Distribution, Production Planning, Materials Management, and Sales module. In the second phase, Fixed Assets and Service and Maintenance modules were

implemented. Change Management was complex since Bidco had to manage the shift from paper-based systems to ERP.

It was one of the shortest implementation cycles, we used Baan out-of-the-box as much as possible (Team leader, IT).

ERP driver at Bidco was mainly business driven –need to consolidate its operations across the East Africa region. The business functions within Bidco and IT department worked in hand-in-hand to deliver ERP solution.

ERP Post-Implementation Activities

The Bidco's geographical and financial growth had led to an increasingly distributed environment, resulting in considerable demands for collaboration within the organisation. Bidco purchased additional licenses in 2002 in order to facilitate business growth in Kenya and the expansion into Tanzania. The organisation launched an e-commerce initiative by buying iBaan eBusiness suite with the aim of creating collaboration amongst its dispersed regional offices, customers, and suppliers.

In 2002, Bidco went live with Africa's first iBaan eBusiness implementation in Kenya which included E-sales, E-procurement and E-collaboration. One of the main reasons mentioned by the respondents for additional investment in the iBaan solution set is the company's original successful start-up. In addition, ERP and IT in general are perceived as an enabler in realising Bidco's strategic goal as expressed in the below excerpt:

IT remains central in our operations, as through it we have been able to develop the capability to foresee and manage changes in both local and global economic environments and thus gain an edge over our competitors (Managing Director).

After successful implementation of the iBaan eBusiness suite, Bidco became the first organisation to venture into e-commerce and the first to network all its multi-location facilities through V-Sat and Internet.

This study considers the ERP implementation at Bidco to be very successful. Besides being implemented on time and on budget, the system met the initial set objectives. The system is being used extensively across the organisation reaping enormous benefits to the organisation, some of which are spelt out in the next section. The probable reasons why Bidco did not experience any escalations are:

1. they were able to get the system running within a very short period (less than 3 months)
2. they negotiated for a fixed price implementation costs and payments terms based on strict predefined milestones

However, respondents confirmed that the cost of Software Annual Maintenance charges is proving to be an element of considerable cost escalation (ranging between 18-20% of product costs).

ERP Benefits

The use of ERP at Bidco is highly strategic and has brought massive benefits to the organisation. For example, iBaan's eBusiness solution effectively eliminated geographic and time barriers to streamline business processes and reduce costs while, at the same time, creating new ways of growing the business and delivering value and services to customers:

Thanks to Sulfox and iBaan's eBusiness solution, real-time access to customers and suppliers and the ability to transact 24x7 irrespective of location, now forms part of Bidco's formidable competitive advantage. (Managing Director)

Bidco has realised the benefits of utilising the internet as a business tool, giving the company opportunity to tap into new markets and venture outside Kenya's borders. iBaan enables Bidco to share information and automate processes between the company and its customers.

The system has also enabled the company to make proper sales forecast and monitor warehouse stock of finished goods. The company has also improved its stock monitoring system, while the lead-time for raw materials has also been reduced.

The key here is decision-making. We are able to make advance planning and take strategic control of inventory (Team leader, Sales and Distribution).

ERP has improved Bidco's efficiency by helping it analyse its market and reduce the time and expenses involved in running its operations, reduce stockholding and shrinkage, eliminate cost of loss making products and quality products, and improve accuracy of stock tracking.

It is key for the success of a project to choose the business partner that best meets your needs. Organisations should choose a good business partner with good track record. They should be realistic about immediate benefits and focus on added value such as best practice and quicker implementation

In summary, Bidco has realised significant and quantifiable business benefits achieved from ERP implementation. The organisation milestones were achieved within reasonable time frames. Upon completion of its milestones, new objectives were defined such as the acquisition of iBaan Business Intelligence and entering into partnership with Uchumi supermarket.

ERP Implementation Scope

Bidco implemented all the iBaaN ERP modules. In addition, the ERP system was adopted in all the departments (functional units) of the organisation. The organisation's business practices were greatly changed to bridge the gap between iBaan functionalities and old organisation business processes. All basic modules of ERP implemented along with other speciality functions; employing more advanced technologies such as even management and workflow technologies and using more than 70% of functionality in those modules were implemented. Implementation made use of advanced middleware and integration technologies such as Service Oriented Architecture (SOA). The organisation also adopted advanced analytical reporting tools. These tools included business intelligence solutions –Enterprise Data Warehouse Performance management –to support enterprise wide trend analysis and analytical reporting, i.e. historical trends, forecasting. Performace management solutions and knowledge application provide key metrics and information tailored to the needs of managers and executives to measure the performance of an organisation and facilitate strategic vision and planning.

ERP at Bidco was greatly used to redefine the competitive environment through the creation of strong inter-organisational relationships (joint ventures, long term contracts, licensing agreements). For example, Bidco formed a joint venture with one of Kenya's largest retail chains in order to streamline Uchumi's distribution network through a product distribution partnership with Bidco Oil Refineries Ltd. In this partnership, Bidco restocks specific Uchumi's branches from its Thika plant without necessarily passing through Uchumi's central distribution warehouse in Nairobi. A key benefit of the new system is that Bidco is linked up with all its distributors under a plan that has gained respect from the region's highly sceptical corporate sector.

The partnership with Bidco Group and 10 other major suppliers is expected to free billions of shillings tied up in stocks to restructure other operations and help turn-around the cash-strapped supermarket chain, which closed ten branches earlier this year due to lack of profitability. This new venture has been made possible by the integration of Uchumi's and Bidco's Enterprise Resource Planning (ERP) programmes (Consultant, Symphony)

Training

Training was arranged before and after the system was launched. The focus of the training was on the daily operation of the system, for example, how to input data, and how to import the needed information into the system. The employees interviewed mentioned that trainers held an active and eager attitude towards the training. The interviewed staff said, "It is good that I have opportunity to take part in all kinds of training." As mentioned above, they see it more as an opportunity to increase their own working value, than seeing it as a waste. Another respondent mentioned that "This is also a bonus in working at Bidco." Thus the positive attitude had a positive influence on

training and lead to favourable result of the training. In addition, most of the staff members have a good educational background and high learning abilities to accept and handle new information and skills. Therefore, adequate training and time to learn was provided at Bidco. The human resource team leader also mentioned that the training has been institutionalised and communicated, and users identify and document training needs. Documentary evidence showed that sufficient budgets, resources, facilities were provided for the training and education programs.

Level of Integration

Most of the integration enables real time exchange of information between the systems. At Bidco, batch exchange between the modules is minimal whereas manual intervention is non-existent resulting in a seamless integration. In addition to achieving internal integration, Bidco has also managed to integrate its ERP system with a Kenyan retail supermarket leading to inter-organisational integration. In this venture, Bidco is able to automatically replenish the supermarkets inventory once it reaches the re-order level.

A.1.2 Organisation Context

Information Sharing Perception

The ERP implementation team at Bidco exhibited strong information sharing throughout their implementation. Extensive communication of ERP plans, work process changes, and discussion of the importance of ERP implementation took place among team members and between the team and the rest of the organisation. In order to facilitate information sharing, the project team managers implemented team-based bonuses so the entire team was rewarded upon reaching milestones. This encouraged knowledge sharing on the team because it minimised benefits usually associated with knowledge hoarding. Team members were willing to share knowledge with one another, both on a formal and an informal basis. Both hard data, such as current written policies, reports, and other analyses were shared along with soft data such as previous experiences or personal insights. Team members were also encouraged by the project manager and each other to seek out additional expertise if the requisite knowledge was not in existence within the team. Thus, Bidco exhibited a considerable amount of information sharing throughout the ERP implementation which had a positive impact on ERP implementation.

Orientation to Change

Bidco's objective was to follow the system's standards as far as possible during implementation of Baan ERP system. Implementation started with an analysis of the standards provided by the ERP system. If the existing business processes differed from this standard they were redesigned.

Therefore, Bidco can be categorised as a change-oriented organisation. The driving principles for ERP implementation related to the simplicity of its implementation and use of the system. Although simplicity might be a desired goal, it may not always be achieved without any costs. More simple processes are necessarily more generic in nature and they may not provide a good match with specific business requirements. Bidco tried to balance between concern through the application of a generic 80:20 rule to evaluate the trade-off between increased levels of simplicity in business processes versus the extent of functionality lost. This rule specified that if simplified business processes could be implemented that met about 80% of business requirements, then they would be adopted without any further modification on the system. More simplified processes were considered to increase system usefulness across business units and geographical areas in addition to the fact that they were easier (less costly) to maintain and upgrade. However, where a significant discrepancy existed between the desired and actual levels of business functionality (more than 20% according to the 80:20 rule), the organisation opted to customise the package or implement “add-ons” to satisfy specialised user needs.

Processes were changed as a result of ERP implementation. “Our business processes have become much more well-defined and understood” said an end-user interviewed. “A lot more people are aware of the integration and dependencies among processes” added another end-user. For example, the purchasing process is now uniform throughout all the plants. To help achieve this, the plants worked together to change their nomenclature for parts to create a common master file of parts across plants. This was a major hurdle to cross because of the vast number of parts involved. Bidco’s organisational culture was explicitly focused on knowledge sharing that helped get the organization ready for change. “We had never worked so hard on cultural readiness”, a respondent asserted.

The Bidco willingness to change is also evident in the excerpt below:

... our aim was to gradually adopt standard processes and so we have restructured our management to reflect the Kaizen philosophy, a concept that is behind the transformation of Japanese companies into global brands (Managing Director, Bidco).

Kaizen is process-oriented change, involving operators continuously searching for better ways to do their jobs. Each employee strives for improvement.

Orientation to Collaboration

At Bidco, the implementation team members were accustomed to working in teams on other projects. Therefore, they were comfortable sharing knowledge and working with people from diverse perspectives and different functional areas from the beginning of the ERP implementation. In order to facilitate the collaboration, Bidco implemented a “podville” structure for the ERP implementation team. Working together “was more natural than difficult”.

We already knew how to work in teams, we just had to get to know each other on this team (Team leader, IT).

Orientation to Work

Bidco was oriented towards the functional-units rather than processes. This was in contrast to ERP trajectory which is processes oriented. As a result, the organisation reorganised their entire approach to work operations after their first implementation in order to provide a system in which new business processes could be supported –process-based work practices. They followed their integration partner’s model where they met with key people at each department such as engineers and “folks who knew the departments processes and were going to make decisions on who was going to do what”. The users were fully involved through their representatives in the actual discussion of how the system was going to be, what they were going to see, and what they were going to get. On completion of the project, users appreciated how the processes worked in iBaan, and they “knew what the core processes were”. The users did not only know their part of the process but also how their processes related to other processes.

Basis of Truth and Rationality

Basis of truth and rationality in decision making process emerged as one of the factors that impacts on ERP implementation. In the case of Bidco, knowledge sharing in terms of personal experience and opinions was highly encouraged in the organisation. In addition to personal experience, hard data was considered during the decision making. This is explained by the excerpt below:

If someone said we can’t do it this way, we said, Why can’t you? Is it really unique? We’d get them to list what they do and to look at what others have listed, and identify the commonalities (Team leader, Finance).

Therefore, basis of truth and rationality in decision making comprises of both personal experience and hard data. However, personal experience supercedes hard data in decion making process.

Nature of Time Horizon

Management was well aware that an ERP solution was not a “quick fix”. They were willing to embark on a multi-year effort to install and successfully implement an ERP system. This helped in leveraging the ERP system to realise its full potential within the organisation. Due to the long term perception of ERP project, Bidco has continually been involved in extending its ERP system beyond its four walls. The company is currently involved in a campaign to convince its suppliers and customers into integrating their ERP system to create a value chain. However, the IT team leader commented that the Kenyan market is still skeptical about IT and this may take time.

A.1.3 ERP Implementation Challenges

Information Technology Infrastructure

Given that Bidco operates regionally, there was need to link the various plants within Kenya and other plants in East Africa i.e. Uganda and Tanzania. However, the network infrastructure was so poor that it could not support the business plan. In order to address this inadequacy, the company had to set up their own Virtual Small Aperture Terminal (VSAT). This vastly added to the implementation cost.

Local Legislation

Being a private company, the local legislation did not have a great impact on ERP implementation and usage. However, interviewees mentioned that they had to configure the system to conform to the taxation policy in Kenya which was cumbersome due to the country's complex taxation policy. Lack of legislation to support the use of electronic documents while submitting tax returns to Kenya Revenue also makes them incur unnecessary printing costs and delay the tax return submission process. However, internally, the company has dramatically reduced the volume of printing by eliminating manual signing and approval of documents.

Incompatibility

Bidco refines edible oil and consumer goods. It also design and manufactures its own packaging for its products. Established customers sometimes buy in large quantities, which give them quite a lot of leverage. One of the ways Bidco has competed is by excelling in the more customised segments of the business and by being able to meet the customised needs of some its customers. The customised needs come in the form of packaging and also product composition. Bidco produces several brands of edible oil with relatively high variation in specifications and relatively little variation in packaging. In addition, Bidco allows customers to specify design alterations in packaging.

Clearly, customisation is a key order winner for Bidco's plant's market segments; however, delivery time and price are equally important. High customisation focus has many implications for the manufacturing environment. Design engineering is a key first-step in the order management process, and engineering consumes a great deal of allowable lead time. Because customised orders are done on order basis, many materials are purchased to order. Manufacturing systems must be flexible in terms of the plant's ability to produce a wide variety of output and also in terms of allowing design changes to open orders.

According to business process in-built in Baan, once there is an actual order, the Sales and Engineering reviews the specifications to make sure pricing is correct. They also review any engineering issues and do preliminary scheduling. The Sales uses a price book for standard orders while central

pricing staff price the non-standard. Then the order moves on to Production engineering. Production engineering checks orders for problems from the design point of view, and they perform another pricing check. Virtually all orders receive at least some modifications in production engineering due to the complexity generated by the diverse models and combinations. Corrections in production engineering often cause adjustments in other areas, for example in accounting or materials management if parts have already been dispatched. When production engineering releases order (one a week), materials requirements are processed by the ERP system.

Ability to highly customise and be flexible gave Bidco a competitive advantage. Delivery time was also essential to win orders. The high degree of customisation means that engineering and procurement can consume a disproportionate amount of allowable lead-time. Over time, the plant had developed many capabilities and practices (informal systems) for coping with the most challenging aspects of its business environment. Many of these practices centre on compressing lead-times for design engineering and procurement work so that adequate manufacturing lead-time is preserved. Maintaining flexibility in materials and order management systems is another key. Two of the informal systems that the plant had evolved to facilitate the delivery of high customisation with short lead times are 'per print' system and culture, and procedures that facilitated utilising its employees' formidable knowledge-base.

In the 'per print' system, because of high customisation, many of the components used at Bidco are purchased specifically for a given order. To implement a new part (for packages) formally requires developing engineering drawings, assigning a number to the part, putting it on the item master file, generating the required routing and sending all that material through costing to get the price. This requires considerable lead-time (as much as 10 days), before the order can be released to manufacturing. Historically, as workaround for many parts, the sales engineering group takes a copy of the drawing for an existing similar part, marks it up, assigns it a special number, and sends it directly to manufacturing. These parts are called 'per print' parts. The 'per print' drawings are kept on file (or ultimately on microfilm), and the 'per print' number is associated with the order. Bidco plant had typically 200 to 300 'per print' parts per week.

These 'per print' parts are invisible to Baan, and cause headaches in pricing the open orders; however, they have allowed Bidco to manufacture what the customer wants very rapidly. This 'per print' system was not viable within Baan: Since the ERP system is so tightly integrated; it is not feasible to have parts outside the system. Therefore the ERP system, in effect, removed one of the ways in which Bidco had previously been able to respond quickly to customers' customisation requests. Baan imposed some requirements on the plant that conflicted with some of these practices.

In response to this problem, engineering has begun working with sales engineering to screen anticipated orders as early as possible. It identifies previous orders that were similar to orders coming up. Engineering pulled all the 'per print' information from these "old" orders, and entered formal

part information into the system in advance. This meant that there were relatively few ‘per print’ parts that had to be formally defined and entered on the system when the orders were actually received. This explains how users re-construct technology based on their previous experiences and practices.

On the other hand, the software increased alignment between certain processes and the plant’s competitive strategy. Prior to ERP, Bidco used discrete bills of materials. Order entry personnel used various selection charts prepared by engineering to develop a bill of materials (BOM) for each order. The problem with the legacy practice was that tens of thousands of different package designs were possible, and in fact thousands were produced. Preparing a separate BOM for each configuration produced was a time-consuming and error prone process. An alternative was made possible via an application Baan provided: a BOM configurator. This module automates parts of the order creation process, creating a dynamic BOM based on the specifications for the products. In addition to saving time, it results in better control of the configuration management process. One of the important, but less obvious, benefits of this for the company is better protection against liability due to design defects. The production team leader said:

You put a unit together with the hope that it would all fit and you wouldn’t be hit with a product liability problem down the line

New processes introduced by the ERP compared to the old processes makes it less likely that a flawed design will be released. As a result ERP improved the plant’s ability to execute the business strategy. The BOM configurator sped BOM construction, and also decreased the probability of mistakes. Since the old process was not particularly appealing to employees (it was cumbersome and error prone), the necessary shifts in individual roles was met with little resistance. In addition, because the new process improved strategic alignment without threatening roles, culture and so on, it was accepted fairly easily.

As mentioned earlier the second practice coping with the business environment was based on employee experience and judgement on the shop floor and in using material planning. Bidco had the advantage of long service of their shop floor employees –people with extensive tacit knowledge in production and with the ability to recognise and avoid problems, even without formal BOMs. The plant did use bills of materials for each order, but the reality was that many BOMs were inaccurate. Everyone understood this and compensated for it. Even though material management personnel complained that without accurate bill of material they could not order for the right material, from the engineering point of view there was not much emphasis on correcting errors. The shop floor personnel were good at building correct packages, with or without bill correct bill of materials.

Some of these guys out in the manufacturing plant will just look at an order and say we know it needs this, and they don’t ever look at the bill of material. Their attitude is, that’s not my job to check and see if the bill of material is correct. My job is to build packages (Team leader, Production).

The management's liberal attitude toward inventory control facilitated these informal systems as suggested by this statement:

The guys doing the general ledger accounting would go to the inventory system and they would see the total [had changed], and we had an inventory adjustment, very simple. The concept wasn't that bad, because a lot of the parts that they couldn't find, they found the next run... so it wasn't that bad.

When the shop floor uses informal systems, instead of formal bill of material routings, and so on, it can create problems for departments such as material planning and accounting that rely on shop floor data. However, the legacy information systems, as well as formal and informal policies, allowed the company to compensate or adjust in other areas. For example, the legacy systems made it easy and efficient for buyers/planners to see the shop orders and customer orders that were driving lower level material requirements. By contrast, the ERP system reduces the opportunities for planners and others to use their judgement to override the system.

Even though purchasers/planners were able to see the ERP action messages (system-generated instructions regarding timing and quantities of orders), they were unable to access information about the nature of the requirements. For example, safety stock information is not displayed with the action messages, and the system is not configured to support order pegging:

In the Baan system, we don't know what those items are for. We are driven by items not by the orders. If we've got, say, 50 of a certain material ordered, we don't know if 10 of them are used on this order and 40 are used on another. It is not apparent to the guy buying the parts." (Assistant Plant Manager).

The BOM's have become more critical because the system removes many of the opportunities for planners and purchasers to use their discretion and judgement, getting valid data from the shop floor. It is not clear whether these other areas are transitioning adequately, as the following statement attests:

You can change the amount you're going to order, but most of the buyers are saying 'this information's got to be correct. Whatever Baan says, that's what I'm going to do.' And that's real good, if all the information going into the system is correct... but the problem is we as buyers are almost having to outsmart the system on a regular basis, because the information coming to us is not correct. It seems harder to me, although issuing just a purchase order is easier (Purchase clerk)

However, there is movement toward a different mentality on complying with the procedures that keep the system accurate. Since everyone understands that now the various operations and procedures are linked together, there is a greater spirit of cooperation and people who are open minded

are ready to say, “Well, what went wrong?” Previous to the Baan system no one wanted to hear about engineering being behind or not having correct bills of materials or manufacturing is using wrong materials. Whereas in the past, the departments seemed almost pitted against each other, an atmosphere of cooperation between departments appears to be developing as ERP embedded structures are transferred into the organisation.

Another problem surfaced after the system had been operational for a short time. A customer asked for changes on the specifications of the packages on a very large order after that order had been released to manufacturing. Always in the past, Bidco had accommodated these requests as long as that aspect of the package had not already been manufactured. However, in the Baan system, no changes could be made to order after they were released. The only way Bidco could have changed this order would have been to cancel the original order, back out all the materials already used, and re-enter a new order. This was unworkable, so the customer was told that they would not be able to change the order.

In response, the customer contacted senior management, who directed that the order be modified per the customer’s request, even if it meant turning off the ERP system. The company worked with the vendor for one additional month in modifying the system to allow modification of orders once they had been released.

In this particular instance, Bidco’s Baan eliminated the option (which was feasible under the old system) of changing customer orders once any production had begun. This technological shift would result in a strategic shift away from flexibility. However, as the case describes, management quickly realised that such a shift was not consistent with the plant’s business strategy. Therefore, they ordered that the ERP package be customised in order to allow changes to re-open orders. Bidco altered the ERP technology (as opposed to its processes, strategy) in order to maintain technology-strategy alignment that existed prior to ERP implementation.

The users’ perspective was that the source of incompatibility was located in the in-built ERP practices which were not flexible. For users, the aim of this strategy was to influence vendors to change ERP’s ‘problematic’ business logic.

Interestingly, we observed that vendors aim was to persuade users to adopt ERP business logic by locating the source of incompatibility in their users’ practices, which were described as not conforming to ‘business logic’.

A.2 Agrochemical and Food Company

A.2.1 implementation practices

ERP Drivers and Background

Prior to the adoption of ERP, ACFC had a section within its finance department which was responsible for data processing. The section had two employees who were responsible for operating the payroll and fixed asset management system. Their main work was data entry and payroll processing at the end of the month. They were also responsible for updating the fixed assets system periodically, using the data acquired from management accountant when a new asset is acquired, or when an asset is disposed, or when an asset depreciates or appreciates in value. In addition, a third party system developed in Ms Access was in use at the weighbridge.

Most of the operations were manual. The organisation did not have a network in place. All the three systems mentioned above – payroll, fixed asset management, weighbridge system – were standalone systems. The payroll system in use prior to ERP, was developed in COBOL with menu-based interface. The fixed asset management system was outsourced from the neighbouring Muhoroni Sugar Company. The majority of the users were computer illiterate. Most senior managers had a low level of education as compared to the mid-level managers.

ERP at ACFC was triggered by the rapid change in technology. This is reflected in the Financial Controller remarks:

The need for modern information technology system at ACFC was identified as long as four years ago. . . technology has evolved so much to an extent that in that in the present world, there is no doubt that our ability to compete will much depend on how fast and reliable our information processing system is.

In February 2000, ACFC embarked on a search for an ERP system by floating an open tender or request for quotation. At the start, the exercise was characterised by careful and cautious selection process that involved several product demonstrations by various vendors offering different ERP systems. Three major ERP systems –SAP, Oracle and JD Edwards –were ruled out on the basis of price. This left Baan, Ebizframe, e-factory, Ramco to choose from. After product demonstrations, ACFC narrowed down on Baan and Ebizframe because they closely matched the functional requirements specified. In order to affirm demonstration of the two candidate ERP systems, ACFC decided to send its users to sites where these systems were implemented and in use. In November 2000, two members of the project committee were sent to New Delhi in India in order to evaluate the performance of Ebizframe software since there was no local implementation. The team visited M/s Sterling tools and ADDI Textile Industries. Other members were sent to Bidco where Baan was in use.

The report by the team from India advised against its adoption citing that the system was not being used in the sites as had been claimed by the vendor. The teams report read in part:

Ebizframe is designed to suit the Indian market and will require a lot of customisation. . . to suit ACFC needs. It was not developed for the global market. . . we would wish to state that based on our site visits, discussions with users, sample reports studied and the demos that we had at ESS, offices, Ebizframe ERP software is still being developed and is still not suitable to satisfy ACFC's information system requirements. Copies of the demo version reports that we have brought along with us are evidently incomplete in a number of modules. . . it would be very risky and costly for ACFC to be a trial site for a software that has no local installation base and support at all in Africa.

In the same period, another team was sent to Bidco oil refineries to assess Baan ERP system where it was operational. The team was impressed at the performance of iBaan at Bidco. The two teams jointly wrote a report and recommended adoption of Baan. The report read in part:

ACFC may go for the Baan solution as the first choice, in spite of the 10% price difference. This product enjoys the wider user acceptance and the package offer presents less investment risks. . . the weightier selection criteria of fitness for the purpose/technical features, functional fit, vendor back-up support and user acceptance are used to arrive at the above recommendation.

However, the recommendation given was not heeded to, instead the company acquired Ebizframe. This is due to lack of transparency in the tendering process in government corporations where money exchange hands. Simply expressed, power and politics in information systems played a major role in the Ebizframe acquisition.

In the initial project team structure, the implementation team included end user representatives, senior finance employees (i.e., financial controller, financial accountant, and the management accountant) and the CEO. Departmental heads were not involved at the beginning of the project. The departmental heads were actually fence sitters in the decision process and questioned the project, which later lead to deterioration of the project. They therefore spent their effort in sabotaging the project rather than building it. Those interviewed said the initial impression was that the project belonged to the finance department.

Being a government corporation, ACFC required customised reporting that could not be easily accomplished without significant customisation to the ERP system. From the start of the project, therefore, there existed significant idiosyncrasies that hindered process integration and limited the process re-engineering. The level of operating complexity in ACFC might not have been as high as that in Bidco, although its specialised reporting needs rendered deployment a difficult task. No

external consultants were hired to assist users in the implementation process. The project team lacked both the in-house technical expertise to match business and system requirements, and also lacked the overall understanding of business processes and how they should be evaluated or re-engineered to successfully implement the system. As a result, the system was greatly customised to fix functional and reporting inadequacies to prepare specialised reports required by governmental reporting requirements.

After 2 years of unsuccessful efforts, in 2003, the implementation team was expanded to include the departmental heads and additional users from various departments. Furthermore, a deadline set for the system to be operational in 12 months, including the completion of all necessary customisations. It is during this period that the researcher was recruited to be in-charge of coordinating ERP activities, and advise on issues relating to implementation. To meet the deadlines, numerous short cuts were followed and workarounds were adopted. Configuration management controls were bypassed and system testing became superficial. The implementation effort was completed and the system was eventually implemented with significant delays and cost overruns. ACFC bought most of the modules, except for production planning and plant maintenance modules. However, the organisation ended up not implementing a number of modules which included: costing module, fixed asset management, and customer management.

End users did not fully accept the system, especially given that they had advised against Ebizframe, and training provided was just designed to train users in specific system functionalities, without learning the system's capability as a whole. Users who resisted the system implementation were threatened by sacking.

The lack of an effective implementation team, led to failure even in meeting the basic objective. For example, system modules were implemented with various degrees of success. The payroll module, for instance, was not an integral part of the organisation's enterprise system. Although billing represented one of the most important modules, it required extensive customisation that was impossible to achieve given the state of the organisation's resources and commitment to the system. Many modules remained as external modules requiring data to be transferred to ERP.

In 2006, the payroll was turned off and the ACFC resorted to the old payroll system. The turning off of the system was triggered by a letter from Kenya Revenue Authority (KRA) penalising the company for what it termed as tax evasion. Organisations in Kenya are required to collect income tax on behalf of KRA and then remit tax collected to KRA. It emerged that the figures generated by ERP were wrong which led to employees underpaying income tax. The company paid the hefty fine then resorted to recover the fine from employees by deducting an agreed amount from salary monthly. The move, however, was met with resistance from unionisable employees who vowed to go on strike if the management dared to deduct their salary, claiming that it was the fault of the payroll system, therefore, they were not ready to take up the responsibility.

In conclusion, ERP project at ACFC was more internally focused in that ACFC wanted to automate

its operations in order to cut-down costs. The employees were less enthusiastic about the project. The implementation was not completed on schedule (it lasted 4 years rather than the expected one year) and ended up costing significantly more than expected.

ERP Post-implementation Activities

During the last visit, the management had unanimously agreed to replace Ebizframe ERP system with a suitable ERP system. The review carried out in 2006 revealed that most employees were not happy with the Ebizframe ERP system. The system is currently being used in some selected departments. Even in some of these departments, they have not done away with manual procedures due to the unreliability of Ebizframe data.

ERP Benefits

ACFC does not carry any formal measurement of business benefits relating to the ERP system. The project was perceived to be successful on the 'go-live' date. There has been no commitment after the system went 'live'.

ERP Implementation Scope

The initial plan was to implement all the Ebizframe modules. The company bought all the 12 modules supplied by the Ebizframe ERP package. However, only the Finance, Human Resource, Sales, Purchasing and Inventory management modules were implemented. Other modules were not implemented due to lack of time. Other modules have been turned off due unreliability of data which can be traced back to data conversion problems experienced during implementation. The IT manager confirmed that ACFC is utilising less than 50% of functionality in those modules implemented. Due to limited implemented functionality, ERP is mainly used for transaction processing and most of the reports were transaction based. No effort has been made to adopt tools which can assist in enhancing the reporting capability of the system in order to improve decision making within the organisation.

Training

One of the complaints by users regarding ERP implementation at ACFC was about training. Most of the users claimed that the training was inadequate and mainly concentrated on how to use the system in carrying out their specific duties. Users interviewed thought that the company tried to cut costs by cutting user training which later on resulted into a major problem. For example, the Account Receivable clerks had three options when receiving payments from customers. The payment can be received against an invoice in which case the payment is matched with the related invoice thereby the invoice gets 'knocked out' of the system. The other option is receiving payments

against the customers account in which case the payment would credit the customer's account. However, the training did not inform the account clerks which of these options should be used, and the effect these two payment options had on the entire system. The Account Receivable clerks were only taught how to receive payments against the customers account, and therefore applied the same the method for all the incoming payments. The overall effect was that the system ended up with 'dirty data' which reduced the reliability of the information from the system. Receiving payments based on customers accounts when the payments related particular invoices produced inaccurate reports on the customers balances. The customer ageing report were also inaccurate because the system showed that the invoices had not been paid yet while in actual fact they were paid for but not matched with the related payments. Due to inadequate training, most of the end users at ACFC have low control over ERP system and work processes, and are not comfortable with ERP. The users were also reluctant to experiment with the system due to the inadequate training given to them.

Users feel that their expertise is more targeted on the basic handling of the system rather than on thorough understanding of its embedded processes: "the training was more on how to use the software, not necessarily how to think through it," observed one of the interviewees. Users acknowledged that they were using the ERP in a fairly limited capacity:

There are a lot of things that I need to learn. I know a lot of reports that are out there, but I don't know how to read them, or use them. I don't feel that I know the system inside out. I feel that I can navigate the system to do what I need to do (Sales clerk).

The use of the ERP system at ACFC was therefore limited to its basic features. Staff are beginning to use ERP. Users find it difficult to experiment with the system. Their level of control and comfort with the system, accordingly, is low. Like initial implementations, ERP initiatives at this level are mainly system-driven.

Therefore, training at ACFC was relating to basic features on how to use the system. Currently due to problems relating to the ERP system usage, ACFC has recognised the need for training for various functional and technical users. Two staff members were sponsored to undertake further training in Oracle reports to be able to create ad hoc reports from the system. Key users have also been identified in various department and are earmarked for training. However, there was no standardised processes in identification of areas where users need to be trained in and who are eligible for this training. In the absense of an organised programme, users have been identifying and attending training courses on their own. The overall management approach lacks any cohesion and there is only sporadic and inconsistent communication on issues and approaches to address training and education

Level of integration

ACFC bought all the module from the same vendor. The management expectation was that once the ERP implementation was complete then the three legacy systems – weighbridge system, payroll, and financial system – would be abandoned. Given that that all the modules were from the same vendor there was no need to create an interface between functional modules embedded within the ERP. However, due to incompatibility issues (discussed later in this section), the company was forced to abandon the ERP payroll module and revert to the legacy payroll system. This necessitated the creation of interface between the legacy payroll system and Ebizframe ERP financial module to allow the posting of employees salaries into the ERP system. However, there was no interface which was created. Instead, users manually post employees salaries into the finance module of the ERP system using journal vouchers at the end of every month. Therefore, there is a manual transfer of data between payroll legacy system and the ERP system. Nevertheless, there exists interface between ERP modules and sub-modules across organisational functions.

A.2.2 Organisational Context

Organisation and IT Strategy Alignment

Document analysis of the business and project reports did not reveal a generally accepted framework for business strategy at ACFC. The documents were more focused on budget, tactical plans, and governance rather than strategic direction of the enterprise. The IT strategy document dating back to 1996, also lacked strategic focus with regard to IT usage in supporting business strategy. Most of the managers interviewed were unwilling to include IT strategy discussions in their respective business areas. The ERP system project and the previous IT investments were not in any way linked to business strategy. The project manager mentioned that due to the short-term view of the ERP project, most of the senior managers perceived the ERP system as an expense rather than as an asset or investment. They lacked the understanding that IT has value beyond a method to cut costs.

Orientation to Change

Some departments within ACFC had experienced more change than others in the past, and these departments were more willing to embrace changes necessitated by ERP system. The more stable departments did not respond as readily. For example, human resource was perceived to be relatively stable without external influences. The human resources department was therefore reluctant to accept the ERP system throughout the project lifetime. On the other hand the purchasing department was prone to frequent changes relating to directive from the ministry. The ERP system was enthusiastically accepted by end users given that it simplified procurement processes but was vehemently resisted by the senior managers within the department as it was perceived to be a

threat to the source of their livelihood because it provided a platform for promoting transparency in transactions hence eliminating corruption. As one team member said, “different streams (divisions) have adapted differently”. For example, the Ebizframe sales and distribution operations function was the most complex to implement and the division responsible had experienced the least change in the past. It had the greatest difficulty in adapting to integrated, common processes. The implementation team had to spend more time building a business case and working with the people in reluctant departments than they had originally anticipated. This ultimately had an adverse effect on the completion schedule of the project which contributed to the project going beyond the deadline and over the budget. The IT manager said that:

(They) adapted very poorly early on. We’ve worked with them and now, 3 years later, they are still not doing fine. They still do not believe the data and are uncomfortable with it.

This was exacerbated in 2006 when ACFC was fined a huge sum of money for tax evasion. However, the organisation absolved itself from the blame claiming that the ERP system was responsible for inaccurate remission of employees pay as you earn tax. On the other hand, the purchasing department was accustomed to change because it operates in an “acquisition and trade environment”. It had an easier time adapting except for the few managers. We heard, “upstream is primarily accounting-based, so with the changing economy they got used to Change”, and have adapted to Ebizframe more readily.

Orientation to change stood out as an important influence on the acquisition process, especially in the case of ACFC, where users had “a lot of power in determining their functionality”. Although ACFC had included business process re-engineering (BPR) as a criterion for the ERP solution they wanted, it would have been very difficult for ACFC’s management to implement organisational change through process redesign. If ACFC had selected SAP as their primary choice, the acquisition team admitted that it would have been very difficult sell to its users. Therefore, the choice of Ebizframe augured well with the organisation because they were able to carry out mass customisation on the system which would have been otherwise impossible or would have lead to additional cost with SAP. According to the IT officer:

SAP is sold as is. You do not change SAP. The organisation has to change its processes to accommodate SAP. If you do not want to change your processes, then you do not buy SAP. If you want the best practices as per SAP and you want a new software, then you buy SAP.

Management’s feeling is that it is harder to change a process than a software, and users at ACFC wanted to change the software because they did not want to change their processes. Hence, the final recommendation of ACFC’s adoption team was influenced by this factor. It also influenced customisation decision. ACFC undertook major customisation in order to make ERP support its old business practices.

Organisational Structure

Before, the ERP implementation, the ACFC organisational structure could be described as decentralised. Most of ACFC's business departments were operating as highly autonomous silos optimising their own goals, resulting in internal competition as espoused in the extract below:

we're really good at competing with each other, but we haven't been as good at competing with external competitors. For example, ACFC alcohol competes with ACFC bakery and yeast for resources (Marketing Manager).

The culture was one in which departments were essentially pitted against each other. They each sought to optimise their own goals, with little awareness of whether they were accomplishing overall organisational goals. Autonomous decision making not only abounded, but was viewed by the departments as necessary for their own survival. Therefore, the cross-divisional collaboration required in an ERP implementation was quite counter to the mindset of those on the team. This culture of internal competition had a negative effect on the requirement elicitation stage of implementation in that it discouraged team members from sharing business process knowledge. Each department viewed information as power and they were not willing to share information across organisational functions. More effort in form of change management had to be put in place to change this attitude. Managers who felt that they were losing their autonomy and control of the departments, tried to sabotage the project.

Information Sharing Perception

Information at ACFC was regarded as a valuable resource by individuals and by the department. For individuals, it was seen as job security guarantee. For the department, it provided a competitive advantage against other departments due to internal competition mentioned above. The project functional teams had difficulty in dealing with this perception among project team members from different functional areas. There was a tendency of information hoarding. This had a negative impact on the ERP implementation. There was suspicion as to the true intent of the project. The majority of the employees had worked in the organisation for more than 20 years. They saw ERP as a threat to their work.

Orientation to Collaboration

Prior to Ebizframe, working in a project team had a negative connotation and, consequently, people did not like to work in teams. "Once someone is on a project, they are always destined to be a project person". It is difficult for a person to go back to their old job once they are pulled out for a project. Teams sometimes, although not always, were used as a dumping ground for weak employees. The culture was one where isolation was more valued than collaboration. Although they

were able to successfully facilitate knowledge sharing in the implementation team at first, they were not able to overcome the culture of isolation and in the long run knowledge sharing required by the ERP team eventually broke down. When the researcher joined the organisation in 2003, he initiated team-bonus as a measure to build collaboration and boost information sharing.

Power Distance

Being a government corporation, ACFC was strictly conforming to the organisational structures and its hierarchies. Seniority and functional distinctions were highly upheld. There was a clear chain of command which had to be followed in carrying out certain duties. ERP project management required senior people to work alongside junior staff on the functional implementation teams, and if the lower level employees had an idea or wanted to try something, the senior people listened to them, and in some cases took direction from them. “In the old culture a lower level person wouldn’t say what they thought in front of a more senior person”. This worked well in the beginning, but as the project progressed, senior people began to resent the fact that junior people knew more than they did about both the processes and the Ebizframe software. Eventually, the attitudes of the senior people created an environment in which the freedom to express ideas was inhibited and this had an adverse effect on the ERP system implementation.

Basis of Truth and Rationality

The organisation valued personal experience which had been accumulated by long serving employees. Hard data was hardly used as the basis of truth or in making major decisions.

A.2.3 ERP Implementation Challenges

Incompatibility

ACFC at the time of implementing ERP in 2003 was the sole producer of alcohol and methylated spirit in the East Africa region. As a result, its products were in high demand nationally and across the East African region. To add to the high demand, some of its products were consumed in Europe. The demand was so high that customers had to pay for the products in advance when the goods were still in production. This was unique in the sense that the business process embedded in the Ebizframe ERP system assumed the standard practice in which sales invoice needs to be raised once the goods had been dispatched and payment made against the invoice. This inherent assumption was against ACFC business practice of receiving payments from customers whose goods were yet to be supplied. The purchasing manager said:

Our case is very unique. . . most of our products are paid for before being supplied; actually 100% of our sales are paid for in advance.

In order to a raise sales invoice in the system, the system required a dispatch note to be raised first. A dispatch note is an accounting document specifying items being supplied, and the quantities. However, given that customers at ACFC were paying for good waiting to be supplied it was impossible to raise the dispatch note and consequently the sales invoice. Theoretically speaking the system was unable to accommodate advance payments from customers. This is consistent with the idea of ‘best practice’ being situated. The assistant purchasing manager exclaimed that:

Given our unique requirement, Ebizframe could not meet our need. The system could not accept advance payments. It required us to raise DN [Delivery Note] first then raise sales invoice and they receive payment against the invoice. We don’t work that way.

For ACFC, the value of the ‘missing’ feature was grounded in its financial effectiveness, and was not reflecting on the reality of the business. The main expectation was that Ebizframe would be ‘flexible’ as their previous system so that they would be able to adapt it to fit their organisations sales and procurement policies and practices. Once users started interacting with it, Ebizframe was no longer interpreted as ‘flexible’ since the software had very ‘rigid’ and ‘limited’ features. The above excerpt is in line with Orlikowski’s (2002) argument about technology affordance. Affordances are the functions and operations which are provided by a technology. A particular technology may be very limited in scope providing only a single function. On the other hand a technology may provide many and varied functionalities being multi-faceted in nature.

In order to make up for the lacking functionality in Ebizframe, users resorted to strategies aimed at restoring the missing functionality in the system. A cost account accountant explained that:

We noted that we could accomplish the same task in a way that was provided by the system by working around it. Something we call workaround which means that something the system does not normally do, you turn around the system because you know functions in the system that can handle this thing.

The cost accountant gave description of the workaround:

We realised that the system could accept advance payment based on customers accounts. . . we therefore instructed all the accounts clerks to receive advance payment based on the customers accounts

The creative use of accepting payments based on customers account to cater for missing functionality or to address incompatibility with the work practice is one of the elements coded as coping strategies. In this case the coping strategy is workaround.

Due to the integrated nature of ERP system, despite all the actions and events reported in this case, advance payment continued to be an issue affecting ERP use. Receiving payments based on customers accounts meant that once the goods had been dispatched and sales invoice raised, there

was no way of 'knocking-out' the sales invoice. They remained in the system as pending or not yet paid for. Usually payments are received against the sales invoice thereby changing their status as having been paid for. A management accountant said:

The system shows that all the sale invoices which were raised since we went live in 2003 are still pending [not yet paid for]. This is because customer paid for the goods in advance and by the time we raise DN and sales invoice, we have no way of knocking-out the sales invoice.

The result is that that management accounts get wrong customer ageing report. The management accountant further commented that:

Because advance payments are received based on customer accounts leaving the associated sale invoice pending, our customer ageing report is inaccurate. This report is very important in accounting practice.

By the user restoring the functionality of ERP system through "workaround" is an acknowledgement that while users can use technologies as they were designed, they also circumvent prescribed ways of using the technologies –either ignoring certain properties of the technology, working around them, or inventing new ones that may go beyond or even contradict designer's expectations and inscriptions.

One of the major motivations for implementation of the Human resource suite of modules at ACFC was to achieve a higher degree of integration between the HR and other functions especially the finance and purchasing modules. The reason for this is because ACFC provides fuel to its employees up to a certain limit depending with their position (grade). When an employee goes above his/her limit per month, the quantity above the limit is billed and gets deducted from the employees' salary for that month. This transaction had an effect on the purchasing module (issuer of the good) and the financial modules (for billing purposes).

The implementation of HR provided an opportunity to extend the functionality beyond that traditionally provided by the ACFC's existing legacy systems. For example, the organisation had its own, custom-designed system for payroll administration. As the payroll clerk we interviewed explained, the move to Ebizframe HR promised a more comprehensive system with integrated functions for performance management, leave administration, recruitment, separations etc. It would also assist in extending the self-service approach to the delivery of HR functions. For example, leave application and administration were traditionally fully manual and paper-based. The ERP offered a fully online, automated computer-based system for staff leave. In short, the Ebizframe HR application represented an opportunity for ACFC to do things smarter than previously and to gain efficiency as a result.

In the case of the payroll module ACFC persevered with it for nine months until a decision was made to turn it off and resort to the old payroll administration module. The decision to disable the payroll

module and revert to the old system in its place provides one example of where the anticipated efficiency gains could not be realised. Rather than leading to a reduction in the amount of labour devoted to processing payroll, a new system of manually posting salaries using journal vouchers into the Ebizframe was established. The decision to customise where necessary was a pragmatic move on the organisation's part and indicated a belief that it should not have to change business practices and processes simply to fit the requirements of the ERP. Had they not effected customisations, users would have lacked confidence in the system and perhaps would have been unable to develop skills necessary to operate it to the benefit of the organisation and in many instances would, where possible, have resisted using it. In addition, it confirms that use of technology is not a choice among predefined possibilities, but a situated and recursive process of constitution which –while may often invoke intended activities or replicate familiar uses –may also and at any time ignore such conventional uses or invent new ones.

Users while interacting with the payroll system at ACFC drew from its inscribed properties and embedded information content, their own experiences with technology, as well as their understanding of their rights and obligations as tax payers, to enact set of tax reporting rules and resources with the software.

Another issue which rose at ACFC is that staff did not like the fact that data entry rules determined by the system were inconsistent with traditional company terminology, processes and procedures and were thus unfamiliar to ACFC users. For example, the system used the term 'Challan' to refer to an invoice. This did not augur well with users who termed the system 'reflecting business scenario in India' where the system was developed. As a result many customisations occurred as a result of negative employee feedback about the new system once it was operationalised.

A.3 KenGen and KPLC

Discussion on Kenya Power and Lighting Company (KPLC) and Kenya Electricity Generating Company (KenGen) is provided under one section because at the time of ERP implementation in 1996, KPLC and KenGen were one company. The company's name at the time of ERP implementation was KPLC and was operating electricity generation, transmission, and distribution business. KPLC was later split in 1997 and two organisations formed out of it, namely: KPLC and KenGen. As a result, the drivers to ERP adoption and the methodology of ERP implementation is the same for both companies. KenGen took over the business of electricity generation while KPLC remained with the business of transmission and distribution of electricity. In the same year, Electricity Regulatory Board (ERB) was formed to oversee the functioning of the two companies and the entire energy sector in Kenya.

A.3.1 ERP implementation practice

ERP Drivers and Background

Structural Adjustment Programmes discussed in the previous chapter was a major influence towards ERP adoption and implementation at KPLC and KenGen. Privatisation of energy was included amongst these conditions during the structural adjustment Programme. Substantial amount of concession loan funding –including eligibility for debt relief –was pegged on achieving privatisation targets. Therefore, privatisations were hastily implemented, with extensive concessions offered to attract investors as governments’ bargaining position is weakened. It was during this period that the government was forced to reduce its shareholding at KPLC effectively transforming it to public limited company. Since then the company shares became listed in the Nairobi Stock Exchange (NSF). In addition, it was required to foster domestic and external competition by liberalising the market. This was another major blow to KPLC which had enjoyed monopoly since its inception in 1955.

Streamlining of the company’s processes coupled with tight control and monitoring was deemed as being essential if KPLC had to survive in the liberalised market and also to comply with the tight budgetary control measures. A programme dubbed Institutional Strengthening Programme (ISP) was formed with the mandate of looking for ways and means of strengthening the company’s operations and management. The ISP commenced in 1995. Its objective was to prepare the KPLC for successful entry into the emerging liberalised market where private sector power companies would play a more significant role. This was to be realised through harnessing and improving its competitive advantages thus allowing them to achieve survival, growth, profitability and stability leading to their eventual dominance in line with their respective corporate missions.

The main objective was to re-engineer existing operational norms and procedures and undertake training and retraining of the human resources of the company which was aimed at dramatic change in corporate culture. The re-engineered operations were to be supported by new tools including computer systems. Members from various functional (departments) units were seconded to the ISP project committee.

ISP targeted the core business areas of generation, transmission, distribution, and generation, as well as support areas of finance, human resource, logistics and transport. The necessary technical infrastructure covering a new computer centre and telecommunications network was to be established. ISP took a strong initiative to automate most of the business activities at KPLC by using relatively latest the ICT technology in order to be effective and efficient in delivery of energy services to the public and remain competitive in the Kenyan market.

A group comprising of the then Managing Director made a site visit to UNION FENOSA, a Spanish-based company operating power generation and distribution business in Spain. UNION FENOSA is involved in electricity trading in Spain and in the European Union. The team was impressed by

ICT installation at UNION FENOSA. Among the application systems that had been implemented at UNION FENOSA was SAP R/3 that was mainly for its support and core services. The visit acted as an eye opener to what IT can do in transforming an utility organisation practices by providing an opportunity for reengineering major organizational processes and for achieving better business outcomes over time as a result of more informed managerial decision making processes.

In addition to structural adjustment programme, Y2K compliance problem facilitate the need for a system which was compliant with the millennium bug. ERP was perceived as a long term solution to the Y2K problem.

Because of the perceived technical and organizational benefits of ERP, the MD and the ERP committee began to view the turn of the millennium as an opportunity rather than a threat. They thus proposed to top management of KPLC to avoid a Y2K conversion altogether and implement instead a Y2K-compliant ERP system that would facilitate:

1. Renewing the hardware at KPLC, from host-centric to network-centric and the software infrastructure at KPLC, from outdated to modern;
2. Supporting the transition of KPLC from single-firm to multi-firm structure and from local to regional operations; and
3. Using the ERP implementation project at KPLC as a pilot from which other members in the government corporations in Kenya can learn.

Once top management approved the ERP implementation, a decision was made to abandon all upgrading of existing systems and to put on hold plans for developing new applications. For example, the company had a billing system known as CUSTIMA. This system was implemented on ICL DRS6000 mini-computer which was not very stable. The application CUSTIMA was maintained by a consulting firm stationed in South Africa. It was realised that this system was not stable and reliable in many ways as far as company business was concerned. Some of the problems mentioned by the interviewees regarding the system were that: it was not performing as expected; it was very slow in processing; it was not stable due to database indexing failing all the time; it had a poor security controls, thus open to fraud; concept of billing was not in line with corporate billing procedures; it could not be integrated; the source code was maintained by the vendor and was quite expensive; it had no cash collection module; and it was hard to interface with hand held sets for electricity meter reading.

The search process that followed, for software and hardware, ended in choosing the SAP R/3 ERP software package from SAP AG, the Oracle DMBS software from Oracle, and the server hardware from HP. The fit between SAP R/3 and KPLC's needs was excellent for the following reasons:

- SAP met the main functional requirements of KPLC because its utility-industry version of R/3 had already quite a number of installations worldwide among them in Spain where the MD and ERP committee visited;

- SAP was holding the biggest market share in the world, in general, and in Kenya with most implementation being by multinationals like Caltex, in particular;
- SAP was investing more in R&D than competitors;
- R/3 was localized in terms of language, currency, and regulations of many countries, including Kenya, where SAP partnered with the SOLUZIONE, an experienced SAP consultancy vendor with whom KPLC has had good relations.

Toward the end of 1995, the resolutions made by top management at KPLC guided the implementation project so as to increase the prospects of reaching successful completion of the SAP R/3 implementation by December, 1997. Oriented towards thorough project and risk management, these resolutions aimed at carefully controlling project size, technology, and structure.

In order to put an upper lid on project size, KPLC chose to concentrate on implementing the functions which were already automated at KPLC (financial accounting, material management (inventory, purchasing and MRP), controlling, treasury and human resources, rather than implementing all SAP R/3 modules. The only exception was plant maintenance and production system. The reason for not implementing production and plant maintenance modules is because they were running specialised softwares for those purposes and they were widely used in utility sector/industry. The finance module had an in-built billing sub-module which even though was implemented, was not used by KPLC because the company felt that billing is such a crucial process that they can not experiment with something which is unknown. KPLC therefore still uses a legacy system which is interfaced with ERP system to carry out billing. In addition, KPLC is not using transport management system despite being one of the modules that was bought and the organisation having large fleet being managed by an old system.

Another critical decision was to avoid parallel implementation and its associated interfacing efforts, opting instead for the more risky “big-bang” transition to SAP R/3. Since IS professionals within KPLC were unfamiliar with SAP R/3 technology, management realized that outsourcing the big-bang implementation project could reduce project risk.

ERP project team prepared a report that recommended contracting SOLUZIONE International and its subsidiary UNION FENOSA to carry out restructuring of the business processes and suggest information systems which could meet KPLC needs. SOLUZIONE International is a Spanish consulting company with vast experience in the field of utility and energy, Infrastructure and transport, telecommunications, and a leading position as a multi-sector information technology consultant. The report was presented before the board of directors for approval. UNION FENOSA (UF) was to be aid in the business re-engineering. UF subcontracted IBERA AFRICA, a power generation company in Spain to carry out the business process re-engineering of power generation, while UF re-engineered the transmission and distribution business processes. By contracting SOLUZIONE and as the implementing vendor, KPLC was able to overcome the pressing need for unique SAP R/3

skills and knowledge. Even though it was resolved that customization of SAP R/3 to KPLC needs should be avoided as much as possible, customization became inevitable due to the fact that KPLC was operating under state corporation act and therefore it had to abide by the regulation stipulated in the Act while conducting business. Project policy discouraged process reengineering and there was willingness on the part of management to reengineer new SAP R/3-supported processes and replace the old unsupportable ones.

Once the implementation commenced, the MD reported once a month to the board of directors about progress made. The CEO was committed to the implementation project and regularly briefed managers at all levels about his vision and expectations. Members of top management became very involved in the implementation project and each was asked to assume responsibility, as a top user, for implementing modules within their functional area. To make sure that implementation ended on time and within budget, the project was broken up into milestones. Since meeting milestone goals and target dates was deemed critical, any delay needed top management approval.

Measures were taken to facilitate prompt decisive action. A steering committee was formed to set priorities, to handle conflict resolution throughout the project, and to promptly respond to problems. For each functional area, a joint team of three, composed of the respective top user, an SAP R/3 expert from IBERA AFRICA, and a systems analyst from KPLC, was created. The team, assigned with responsibility for part of the implementation project, was put in charge of choosing among SAP R/3 processes and reports and setting priorities. Since a significant portion of top-user time was allotted to the implementation, they developed familiarity with the new environment and, later on, became very effective in providing the initial response to problems that emerged. IS professionals were constantly briefed with respect to progress as well as with respect to difficulties and ways to get around them. They were encouraged to report any concern to the respective top manager to insure a fast solution.

As planned, SAP R/3 modifications were limited to the minimum and permitted under exceptional conditions and only with formal CEO approval. The formal procedure, instituted to discourage R/3 modifications, was practiced throughout the project, despite a number of unsuccessful attempts to eliminate it, especially given that KPLC was a government corporation with unique reporting requirements and business practices. Inconsistent with the initial intention to limit customisation to a minimum, a significant processes were customised. Significant reengineering also took place. The reengineered service entry process, for example, was perceived by users to be “the right thing to do” because it was dictated by SAP R/3. They thus willingly adopted it before noticing that, because the new more reliable service entry process was 50% to 60% faster, a few jobs had to be eliminated. In any case, none of the employees whose jobs were eliminated was asked to leave KPLC. Instead, they were transferred to other departments that were hiring at the time.

KPLC was willing to abandon customisation as much as it could, putting a lid on modifications and willing to force modification avoidance except under special circumstances. In an organizational

culture that values labour relations, a threat of labour unrest in the form of a strike presents such special circumstances. The union was therefore consulted whenever avoiding SAP R/3 modifications impacted compensation. In at least one case, the union's disapproval of modification avoidance forced an SAP R/3 modification and labor relations were not hurt. It is noteworthy however that the union was willing, in most cases, to go along with and accept the implications of modification avoidance.

The ERP motivation and implementation discussed above applied to KenGen until 1998, when KPLC was split into two as mentioned earlier. When KenGen was inaugurated in 1998, the company continued with the Institutional Strengthening Project which began in 1995 at KPLC. KPLC, as the manager of KenGen facilities before the split in 1998, implemented ISP activities related to the generation until 1997/98. Under the minute number JISP.16/98, the KenGen Board approved the establishment of a computer centre and implementation of relevant computer applications recommended by the ISP. The product developed by ISP in KPLC for the generation did suffer any alterations but were instead wholly transferred to KenGen. The segregation affected all the support areas of business – finance, human resources, and logistics. Given that these services were being supported by SAP ERP the system needed to be reconfigured in both organisations. Others areas affected by segregation included organisation, hardware/software and telecommunication, and generation.

Because the emerging business was previously managed by KPLC, the implementation of information systems had an effect on both companies as both companies were required to undertake particular tasks for a smooth transition to take place. For example, in the finance area there was need to identify suppliers to be transferred from the accounts receivable module, and need to delete cost centres which were transferred to KenGen in the controlling module. On the other hand there was need for auditing the balance on accounts payable transferred from KPLC, and definition of the new structure of KenGen and its relevant cost centres. The assets were also to be split calling for transferring of assets and adjusting the relevant accounts in the fixed asset module. The norms and procedures, and the company policies had to be defined for KenGen. This required that all forms and internal documents and information had to be defined from the scratch at KenGen. On the other hand, some of the norms and procedures needed to be modified inside KPLC to reflect the new situation calling for users retraining. Given that some staffs were transferred, some positions inside KPLC needed to be filled by new users who needed to be trained. Therefore, SAP ERP adoption at KenGen had mainly to do with system reconfiguration. The company carried on with the consultancy services of SOLUZIONE and IBERA AFRICA in reengineering and implementation of ERP.

The main motivation for ERP system at KenGen and KPLC was the structural adjustment programmes which were sweeping across the entire globe. ERP was seen as a preparation for KenGen and KPLC to enter a competitive environment which was to result from deregulation of sectors formerly controlled by the government. Other main drive for ERP adoption mentioned by the in-

interviewees was the Y2K problem. Problems posed bespoke systems formerly used such redundancy of data and high maintenance costs were also cited as the drivers of ERP adoption at KPLC. The focus of installing SAP R/3 at KenGen and KPLC was to cut costs and improve operations by leveraging common processes within the organisation. ERP system was installed in multiple sites within Kenya.

ERP Post-implementation Activities

Soon after completing ERP reconfiguration in 1999, KenGen embarked on SAP R/3 upgrade program. The upgrade was from version 3.1H, which was inherited from KPLC to version 4.5B. The scope of the upgrade limited to technical. SAP vendor, SAP AG, had discontinued online support for version 3.1H. In addition, the vendor was charging additional 2 per cent on annual maintenance to support the old version of SAP R/3. Even though the upgrade was carried out, majority of the end users were not aware about it. No training was carried for the upgrade. The only noticeable change was on the 'front end' i.e. the SAP user interface. An interviewee made this comment:

...most of us don't know about the upgrade. In fact I am hearing it from you for the first time. May be the technical team were involved but for us the (users) we weren't.

IT manager commented that the upgrade served as a test ground for the company for two reasons 1) no other company had done an upgrade in Kenya, 2) the consultants had no previous experience with SAP upgrade. The upgrade project ended up being expensive with too many resources being used. The company had very few SAP certified employees at that time prompting the company to hire many consultants. The learning curve was high for the team. In 2001 the company carried out a second upgrade, this time upgrading from 4.3i to 4.5B. Like the second upgrade, end users were not involved. Most of them remained unaware of the upgrade. This could be attributed to the fact that the scope was narrow targeting only technical upgrade, leaving out business improvement and knowledge transfer. While carrying out the second upgrade, the company reaped from the previous experience and avoided the pitfalls of the previous upgrade.

ERP upgrade at KPLC was carried out in 2006, nine years after the initial implementation. The first ERP upgrade project began in June 2006, with December 2006 set as the 'going-live' target date. Unlike the initial implementation project, all the business managers were not actively involved and they remained as fence sitters in the project. In addition, outsourcing of ERP functional consultants was ruled out and, instead, the internal IS team was put in charge. The technical upgrade was done offshore by Global solution consultants based in Bangalore, India. The upgrade project was perceived by both business and IS management as a pure IS project, requiring minimal involvement of business management. Thus, the IS Division formed three steering committees, comprised mainly of IS personnel, who met once a week, and the IT manager reported to the top management about progress of the upgrade project once a month.

The message conveyed to employees was that the benefits of the first ERP upgrade project to Version 4.7, being technical in nature, would be limited mainly to improvements in the human computer interface without necessarily solving problems encountered in Version 3.1. Based on the success of dedicated module teams in the initial implementation project, KPLC formed upgrade teams for each module composed of a top user and a system analyst. Yet, unlike in the initial implementation project, it was also pretty clear from the start that the involvement of users in the ERP upgrade project would be minimal and would be required in addition to, and not instead of, their regular duties. Therefore, top users assigned to the joint upgrade teams were reluctant to put in extra effort when required. For example, two testing rounds were required for each upgraded business process. First, according to SAP documentation, even though top users were supposed to scan for each object in Version 3.1 and its respective object in Version 4.7, the IS professionals themselves ended up doing this scanning process prior to installation of Version 4.7. Second, after installation, upgrade teams were supposed to test each module. Middle-management, however, ignored requests from IS management to free top users for testing in both rounds, thus forcing IS professionals to do the testing with the help of an external testing firm, the cost of which was not initially budgeted.

In the absence of top-user involvement, these two testing phases discovered only 30% of the problems, with most of the problems not surfacing during testing but emerging after the upgraded Version 4.7 was up and running. Consequently, the first few days after going live turned out to be traumatic. For example, most users were unable to access the system due to comprehensive changes in authorization procedures. Similarly, users refrained from attending training classes since their managers did not enforce full attendance as they did in the initial implementation project. Version 4.7 went live at KPLC in a somewhat incomplete manner in April 2007, about four months later and at a higher cost than originally planned, for a number of reasons.

First, KPLC ended up spending more than anticipated on training. Second, some of the testing had to be outsourced. Third, despite the pre-emptive actions taken with regard to the IS infrastructure before commencing the first ERP upgrade project, the existing workstations provided poor response time. This difficulty, not previously mentioned by any SAP expert, came as a total surprise to IS management and caused dissatisfaction among users. Since replacing the workstations would have caused a major budget overrun, the solution was to run 3-tier architecture that was novel to KPLC, reducing the workstations to thin clients by purchasing Citrix licenses and servers. It is notable that this three-tier architecture was not widely used before at SAP installations, thus posing a considerable risk to KPLC. In fact, only in 2004 did SAP and Citrix publish a joint manual on these strategies (Haendly, Koopman, & Roberts, 2004). Fourth, employees who refrained from attending the training classes did not know how to operate the new user interface. Fifth, KPLC had developed 300 add-on programs to cater for needs which could not be fulfilled by R/3 which needed to be incorporated into the new version.

Although the upgraded version functioned quite smoothly after solving these and other problems,

management felt that they were much less prepared for the first upgrade project than for the initial implementation project. To them, a supposedly simple and technical upgrade project turned out to be rather complex and resource consuming.

ERP Implementation Scope

ERP implementation at KPLC was more inclined to optimising the support services within the organisation. In the case of KenGen, the key process involves electricity generation and transmission while in the case of KPLC the key process is customer billing. However, both organisations implemented less than the fundamental basics of ERP modules which included Finance, Materials Management, and Human Resource and Payroll. None of the two organisations are using ERP system to support their key processes despite the fact that SAP R/3 has modules which support their key processes. The ERP systems are limited to three departments namely the finance, purchasing and procurement, and human resource departments. Given both KenGen and KPLC have offices nationally, ERP was first implemented at the head office in Nairobi. Subsequent implementation was carried out in major towns in Kenya. KenGen faced major hurdles in the venture of rolling out ERP in regional plants due the fact that electricity generating plants are located in remote areas with poor telecommunication infrastructure and network. Of the modules implemented in both organisations, we estimated that they are using less than 50% of functionality. For instance, the SAP R/3 module has a billing module which is not being used instead the company is still the old legacy system. In both companies, transport management system embedded in the system is not being used and instead a legacy system is being used. The researcher went through the predefined reports available on the system and asked the interviewees (users) whether they were using the reports. Most of them reported that they were not using the reports.

KenGen and KPLC were more concerned with consolidating their internal data rather than extending beyond their four walls. Therefore, in regard to ERP adoption and implementation, it can be concluded that they had an internal focus.

ERP Benefits

Business benefits are measured and some quantifiable gains have been achieved but significant additional opportunities exist for further payback. SAP R/3 has also provided KPLC and KenGen with some tangible savings: the number of pages printed per month was reduced by 80% from about 25000 to about 5000, because of the better ability to query online instead of printing reports. The number of shifts for server operations has gone down from 3 to 1.5 per day. With all batch processes substituted by online ones, information provision has improved in the sense that the raw data is now more up to date. Thus, for example, it is now possible to know in real time (as opposed to twice a week before ERP) what the real inventory levels are and, therefore, KPLC is saving money on inventory without hurting production in any way. Because of the uniformity of screens

for different modules, it is now possible to easily carry a transaction from one module to another (e.g., from a costing screen to a contractor screen). Another improvement has to do with the way materials are ordered from the warehouse. Until the ERP implementation, precious time was wasted when workers came to pick up materials without verifying availability beforehand. Under SAP R/3, pickup from the warehouse is permitted only after availability is verified through remote inquiry.

Training

Training at KenGen and KPLC was carried out before and after ERP implementation. The initial training targeted key users. Key users were employees who were regarded to have sufficient knowledge in their respective functional units. The training was focused on the overall integration of ERP modules and how to use the system in accomplishing tasks. Therefore, training provided for both work processes and IT features. There was awareness of the need for training and education for associated modules throughout the ERP project cycle within the organisation. After the implementation, the company sponsored a number of employees to pursue further training leading to certification their respective functional areas. Given that there is no local SAP offices in Kenya, the employees sponsored had to undertake their training in South Africa. Training initiative was well planned. The organisations first identified individual performance plans of each user. Both companies have consistent communication of the overall training needs and issues and mechanisms of how to address them. Budgets, resources, facilities and trainers are being established to support the training and education program. This is because the companies have realised that in order to optimise the system, there is need have competent users, and also that ERP implementation is not a one-time off event but it is rather continuous process.

A.3.2 Organisational contextual influences

Orientation to Change

KPLC was able to make a number of changes as a result of SAP R/3 implementation, even though it had been largely stable in the past. Prior to SAP R/3, each area was judged based on its own success within its own area of responsibility. However, after the implementation of ERP system, the focus shifted from optimizing each unit's success to optimizing overall corporate success through collaboration and common processes. As one person said,

SAP made my job harder because I came out of a world where I controlled a relatively small team and every aspect of that system. . . . You had control over your own silo. You didn't have a consolidated customer master file, for example.

Thus, the above discourse suggests that managers at KPLC were forced to change from managing autonomous silos to managing pieces that fit into an integrated whole. Given that KPLC

embraced the changes and the fact that KPLC indulged in business process re-engineering before ERP implementation was coded manifestation of being focused in continuous improvement. Change was widely accepted at KPLC because organizational member became accustomed to change and viewed it positively. However, there are some areas which the organisation had to keep unchanged. The reason being that they contradicted the guidelines provided by State Corporation Act which governs KPLC operations. Another area where KPLC users wanted to maintain status quo was in the human resource and payroll practices. Again the reason for this is the fact that SAP R/3 in-built taxation policies did not match the Kenyan Taxation policies as stipulated by Kenya Revenue Authority. The human resource manager mentioned that:

Sometimes you're going to have to bend, but we bent too much... In our payroll module, we've sort of modified our system immensely to match custom and practice and my best example of not going vanilla is we took our payroll system which was developed in Cobol and we've tried to copy the exact thoughts and exact processes into SAP, but then extend it to be a fully integrated is an absolute nightmare.

Rigidity as expressed in the above discourse can have a negative impact on ERP adoption, implementation and upgrade. The effect of focusing on organisational processes and trying to copy them into the SAP was quite disappointing, largely because the existing functional structure was retained. As a result, when ERP was being implemented the tensions between the process and the functional forms of organisation had to be confronted. As an interviewee pointed out

SAP is a process system, and fundamentally we were a functional organisation, despite what we've said about processes and the like. And we were structured as a functional organisation, and we put this process on the top of the function –and it didn't work... That's how I think it developed... One of our problems was that we didn't understand what it wanted from us.

Organisational Structure

KPLC is characterized by autonomous decision making best described as “a loosely organized, decentralized company”, where “individual divisions could make their own decisions”. Top management doesn't dictate unilaterally how things are done in various divisions. The below discourse demonstrates the above claim:

I think we're fairly autonomous, because if we're not happy with what the top management is telling us, we use our knowledge and experience to argue our case. (Marketing Manager, KPLC).

Managers in charge of various divisions had flexibility to pursue ideas and make decisions on their own. Although this facilitated collaboration within units, it also led to autonomous, silo behavior

among business units where common processes and consistent data across the organisation were hard to obtain. However, the procurement process is strictly governed by procurement act given that KPLC is a state corporation.

Orientation to Collaboration

Before ERP was implemented at KPLC, a great deal of emphasis was placed working in isolation and information was viewed as a propriety asset within each unit. It was therefore common for employees to hoard information. For example, one team member stated, “We have a whole lot of individuals contributing or working on their own”, and how well employees work alone, is a performance measure.

The fact that KPLC valued isolation as a way in which work is best achieved contributed negatively to ERP system implementation. Much effort and resources had to be employed to change the employees mindset about collaboration as a way of working. Therefore, ERP implementation team members were encouraged to share ideas and knowledge in all the stages of ERP implementation. When the organisation was carrying business process re-engineering, just before ERP adoption began, an open sitting structure was used, removing walls and partitions, with team members working in small groups in one large open area. This structure helped people to promote collaboration and sharing of knowledge because “sometimes you could learn something just by hearing what the person next to you was talking about”. Proximity encouraged them to share knowledge on the business processes in areas other than their own silos that they otherwise may not have shared if they had had to make the effort to find someone to share it with. Therefore, at the start of ERP implementation, KPLC was inclined to collaboration as a work practice.

Basis of Truth and Rationality

Our observation of how work is done and work processes suggest that decision making in the organisation was not focused on quantification but was linked to the qualitative experience and hunches of long-serving managers. As the director explained:

We like to talk to people. . . I mean data is one thing but nothing beats experience. We have people here who are born entrepreneurs and who would be running other businesses if they were not here. They give us a feel for the market and this helps us. . .
(Financial controller)

The above discourse suggests that rationality for decision making is mainly drawn from personal experience. During ERP implementation, teams were structured so that knowledge sharing of personal experiences as opposed to hard data. As one person at KPLC put it, “it was a great team atmosphere”.

Orientation to Work

Based on how the ERP implementation was carried out, KPLC is regarded as process oriented. The organisation's focus during ERP implementation was on achieving the outcomes deemed important to stakeholders by the most effective methods. Given that ERP implementation was conducted after BPR, the organisation was more concerned with improving their work practices. The interview with the ERP implementation team revealed that they knew about widely publicized failures of other firms' implementation, and their mantra became "keep us out of the papers". They were more process than deadline/results oriented. They delayed some of the implementations when something was not working. For example, they delayed going into production on one module by 3 months because of poor invoice data and engaged in intensive knowledge sharing across the team to find a solution to the problem. In other cases, they had underestimated the scope of processes, and "shuffled the schedule" so they could gather enough knowledge from each other and others in the organization to implement the necessary functionality. "Until we reached the target, we didn't go live". Thus, their focus was on gathering the right knowledge in order to achieve a positive outcome. Their view espouses that "organizations should focus only on process improvement and that by doing so results would follow.

A.3.3 ERP Implementation Challenges

Incompatibility

In another showcase of incompatibility issues, managers at KPLC felt that features incorporated in the ERP such as process-oriented task integration, and removal of reconciliation checks undermined the management control. The organisations were more geared to securing greater control whereas ERP was geared toward empowerment of the employees. The empowerment and control seemed like they are fundamentally incompatible because the exercise of empowerment implies the exclusion of deliberate control over the behaviours of others, since it requires employees to be trusted to perform in ways that serve the organisation's interest. Little was done by the KPLC to change the job scope, reporting structure, or rewarding system. Indeed, the empowering spirit of ERP was consciously resisted. Managers were generally not ready to empower users, as illustrated by a few incidents during ERP usage.

Whereas one could mandate a specific screen flow in the old system, the ERP system now has many drop-down menus and icons and is all up to the user to call up the screen which he wants to see by mastering the transaction codes. But the enhanced flexibility means that we have to rely on the users' discretion to ensure data accuracy (IT manager KPLC).

The flexible screen flow was deemed unacceptable after a series of meetings, and a subsequent software customisation had to be made to restrict the screen flow options, adding to the potential

for future maintenance and upgrading problems. In other instances where such costs were deemed to be too high, e.g. the inability of ERP to accommodate specific rules and procedures to be defaulted as system checks, “we have to rely on the empowered roles of purchase personnel”

We have to convince them (the purchase clerk) that they play a value added role and high light the importance of what they do to ensure that they will carry their tasks well.

Simultaneously, supervisors were instructed to check the users’ work more often and counsel errant users. Thus, rather than leveraging the empowerment features of ERP to expand the users’ roles and responsibilities organisation-wide, the organisation was reproducing what had been done previously through manual workarounds. Even though the role expansions were limited, some employees perceived them as extra work, rather than an opportunity for empowerment. It is clear that ERP empowerment features were consciously suppressed. A possible explanation stems from the structuration model perspective. Human agency chooses to appropriate the aspects of ERP technology that seem to best fit the pre-existing structure or institutional arrangements. These pre-existing structures shape the way people understand and adapt to technology. For KPLC, there were strong structural forces that pre-disposed it to resist ERP-driven empowerment.

SAP R/3 system at KPLC enabled the management to monitor and control the activities of employees. For example the finance manager explained that he was able to view report of all transactions carried out in a particular day. In addition, SAP had an in-built security feature where approval of purchases could be done at different levels using electronic signatures. Purchases not exceeding Kshs. 5,000 could be approved by the head of departments. Purchase not above Kshs. 5,000 and not exceeding Kshs. 20, 000 needed approval of both the head of department and the chief finance manager. Any purchase exceeding Kshs. 20,000 required approvals of the head of department, Chief finance manager, and the managing director. All these approval also referred to as ‘release’ –release 1, release 2, release 3 –were done electronically.

Apparently this feature was readily acceptable to KPLC management. The fact that KPLC is government funded organisations with its historical context of strong public accountability, could explain the apparent legitimacy of greater control exertion. The control measure imposed by ERP seemed to evolve naturally as management/users discovered, learned, and eventually instituted the use of such information formally.

A.3.4 ERP Upgrade Decision Factors

Vendor support was also a major influence on the the decision to upgrade ERP systems by the case study organisations. The organisations are forced to upgrade their ERP systems when vendors impose sunset date afterwhich they cease to support certain versions of their ERP softwares. According to the project manager, vendor support was the key reason why the upgrade was not

truly a choice of KenGen, but rather an ultimatum from the vendor. According to a functional team lead:

We were basically up on our contract with SAP. So, were told we needed to upgrade.

However, upgrading an ERP is a costly project requiring intensive resources. In the case of KPLC, SAP imposed a sunset date on SAP R/3 version 2.11G which the organisation was using in 2001. This implied that they were to lose SAP's online support system for technical support. Due to resource constraints, KPLC was not in a position to upgrade their system then. Instead they opted to continue the de-supported version of SAP R/3 until in 2006 when the organisation decided to upgrade from version 2.11G to 4.7. Although, SAP continued to provide technical support after the sunset date, it had to be purchased at an additional charge, and post-sunset customers were given lower priority than customers with more recent versions. The resource availability formed an important factor influencing ERP system upgrade. For example, one of the reasons why KPLC waited for so long to upgrade is lack of resources.

A.4 Bamburi Cement Limited (BCL)

A.4.1 ERP Implementation Practices

ERP Drivers and Background

Before the implementation of SAP R/3, BCL operated several independent systems. Data had to be collated, re-processed and then combined for management reporting purposes. This was tedious and prone to many reporting errors. The desire for ERP was inspired by audit report by PricewaterhouseCoopers commissioned by Lafarge, the principal shareholder. The term of reference for the auditors was to audit the BCL's business process and practices and to streamline the processes to common language and best practices developed by Lafarge for its operational units. The audit reported problem with the current systems. The systems could not be integrated with the specific systems developed by Lafarge to support particular needs, especially in the manufacturing domain namely PRODIS for Kiln management and MAXIMO for concrete plant management. It highly recommended need for better control, reduction of headcount due to bloated workforce, need for better decision making. The report recommended three initiatives needed to integrate the various functional units and streamline the business operations by using ERP to enable data sharing for day-to-day needs, data analysis, decision support and information delivery in the area of Finance, Sales and Distribution, and manufacturing. In addition, enterprise application integration (EAI) system was recommended to facilitate the transfer of information between applications.

Even though the ERP initiative came from Lafarge, the choice of which ERP system to implement was entirely left for the BCL management to decide. However, in order to improve and facilitate implementation and use of ERP, BCL was required to carry out business process re-engineering

to align the business practices to the common language and best practices developed by Lafarge for its operational units. The main objective of implementing SAP R/3 was to have in place an Information System that would provide BCL with the functionality, integration and potential for future improvements that the company was looking for. It was expected that SAP would help BCL to reduce its headcount, improve sales, purchasing, and inventory management and to provide better business information for decision-making.

BCL contracted PricewaterhouseCoopers as their implementation partner who in turn sub-contracted Siemens Nixdiff Inf. Systems from South Africa and Soluziona, a local consulting firm.

The company requested for quotation from various ERP vendors on their products. After the vendors conducted demos on their products, the choice narrowed down to three standard business application software systems (JD Edwards, Oracle Financials and SAP R/3). Both JD Edwards and Oracle Financials had no local sites or agents with experience on the package. These made it risky implementing any of these two systems, narrowing down the choice to SAP R/3, which was already the leading client server business application software in the world. Locally Caltex was “Live” on SAP R/3 and they were getting support from SNI (Siemens Nixdiff Inf. Systems) of South Africa. Even though Caltex was using its magnitude was regarded as small by BCL. The company needed to evaluate an implementation of a large magnitude which was not available locally. As a result, a team was dispatched to South Africa to visit SAP sites with characteristics and issues comparable to their business (this included a visit to Alpha Cement, owned by the Holderbank Group). Based on the findings from these visits, the company conducted additional research and discussions with SNI who were committed to supporting SAP R/3 in Eastern Africa, BCL decided to implement the system.

The ERP project team was set up. Members were drawn from all the functional areas within the organization. Project manager, was a consultant from SNI. Each module was headed by two functional consultants (external) and two key users who were mainly senior individuals within the department. Key users were those who had an in depth understanding of the business processes within their department. They helped the functional consultants to define the current business processes – ‘AS-IS’ – in addition to assisting in configuring new business processes – ‘TO-BE’. In addition, key users received training from the functional consultants and were responsible for training the end users. Top management was actively involved and the Managing Director’s background greatly boosted the implementation since he is an expert in Information Systems.

The implementation commenced in early 1997 and ended in late 1998. The company went live with the implementation in October 1998. However, the users noted that the system stabilized in 1999. Implementation was marred with lack of skills which led to cost overrun. In addition, SAP R/3 is not Lafarge standard system (endnote: JD Edwards and PeopleSoft are Lafarge’s standard systems for support functions) which resulted to customisation of SAP in order to align it Lafarge best practice and common language. BCL implemented three modules: Financial, Material

Management, and Sales and Distribution. Phased out implementation plan was used to avoid high risk, and also because it is less costly and easy to implement. By using an EAI system developed by Lafarge, the ERP BCL system was integrated with the PRODIS, MAXIMO, and Smart (i.e. human resource and payroll system) although this is proving to be expensive as disclosed in the below excerpt:

Due to a number of factors, not all business operations have been integrated. This has necessitated the implementation of interfaces between SAP R/3 and the other systems installed. These have proved to be costly and difficult to manage. On the other hand SAP is not a Lafarge Cement Division recommended system and this has made it difficult to maximise on the potential of the system. (Systems manager, BCL).

The key users initially faced the hard challenge of training and supporting most users who were initially sceptical and very reluctant to accept the new system. They have successfully managed to get the buy-in from the users who have now embraced the system fully.

Following acquisition of Hima cement in 1999, the management decided to roll out SAP R/3 at Hima Cement in 2000. The project began in June 2000 and was carried out by BCL SAP team, Hima key Users and the SAP consultants. SAP R/3 went “Live” in Hima on the 25th of October 2000, after being implemented in a record of three months.

The transportation sub-module of sales and distribution was not configured and therefore is not in use. The company developed workaround to cater for sell-deliver service (i.e., when cement is sold and transported to customer premise) which needs transport module to be configured. In most cases, customers buy and pick up cement from the warehouse.

Generally users interviewed were satisfied with the system except for few missing functionalities. For example, users in the procurement department noted that the vendor evaluation tool provided by SAP is very basic with emphasis mainly on price, cost, and quality.

The vendor evaluation at Bamburi is very complicated and structured. Vital information such as time taken to deliver, background information of the bidding suppliers, previous dealing with the bidders. . . .The vendor evaluation tool in SAP does not represent the reality of the business. All this information needs to be captured for presentation to the tender committee.

ERP Post-implementation Activities

On completion of implementation, BCL carried out continuous user surveys to gauge the extent to which end users are utilizing the system and work out ways of enhancing this utilization. This was aimed at achieving what the IS manager termed as acceptable user level. In 2003, BCL decided to upgrade their SAP R/3 release 3.1 I to a release that supports E-business in order to have a

competitive edge as far as information technology is concerned. Therefore, BCL carried out an upgrade from 3.1i to 4.6 C.

The users' maturity in using information system was a major driver for the need to upgrade ERP system and acquire additional modules.

Our users are well versed with technology and know what is out there in the market...they needed additional functionality like better credit management, more functionality asset management. Users were the one who requested for acquisition of treasury module.

BCL is in the process of replacing smart pay payroll system with PeopleSoft which is a Lafarge standard system.

BCL is currently in the process of harnessing the information in its database to aid its decision making. The IT manager mentioned the need to be able to know at any given time, customer by regions, key distributors, and market patterns. As a result, BCL implemented SAP Business warehouse. Although users interviewed agreed that SAP business warehouse is very user friendly, they were unanimous it does not provide dynamic information and that the system was too basic to meet the complex reporting needs of the organisation. For example, "they can just answer basic questions like what order, how many orders, how much sales" a user exclaimed.

In order to cater for deficiency in reporting requirement by SAP business warehouse, BCL is set to begin implementing Oracle Business Intelligence. In the pipeline is also the plan to replace PRODIS system with Production Planning module of SAP.

... it became apparent to us that if we were going to do our job right, we had to have the ability to do it. So, we requested that for acquisition of treasury module, strategic management module and business intelligence. Our request has been granted. So far treasury module has been implemented and we are happy with it. Strategic management and business intelligence are on the pipeline and will certainly be implemented early next year.

ERP Benefits

One of the major benefits mentioned by respondents at BCL is reduction of financial closing cycle:

One of the big benefits of this implementation is the timeliness of financial reporting. Whereas we used to take up to three weeks to prepare our financial reports before SAP R/3, these days we take a maximum of 3 days after month-end to prepare the same reports. (Finance Manager).

Planning Engineer added:

We can today control all costs that are charged to cost centres under our control and participate in the reporting cycle albeit in the background

Improved efficiency in inventory management was mentioned repeatedly by those interviewed:

SAP has made our stores requisitioning processes very easy as we can see in advance the position of required spares.

Other benefits the system mentioned by the respondents include:

- Single point of data entry and cross functional integration
- Significantly enhanced accuracy
- Better control and understanding of business
- Easily customizable for unique business requirements like medical invoice processing
- Reduced headcount and automated credit control
- Availability of on-time information which helps decision making

ERP Implementation Scope

The scope of ERP implementation at BCL is regarded in this study as wide spanning across several departments and two nations—Kenya and Uganda. The company has implemented four modules namely Finance, Materials Management, Sales and Distribution, and Business Warehouse. When researcher was on site in 2006, plans were at an advanced stage to implement human resource and payroll module, and production planning module. BCL has also implemented SAP R/3 in multiple sites which includes its plants in Mombasa, Nairobi, and at its regional plant in Hima located in Uganda. The SAP R/3 is also interfaced with Lafarge's information system to enable production of consolidated accounts.

Level of Integration

Given that BCL retained some of its legacy systems, effort were put in place to integrate the SAP R/3 and the legacy systems. The legacy systems in operation include Smart, PRODIS, and MAXIMA which are used for human resource and payroll management, production planning and plant maintenance respectively. There is a periodical batch exchange of data between the legacy system and SAP R/3. The use of interface between the legacy system and the SAP R/3 helps in keeping the system synchronised on daily basis, weekly, or monthly basis. However, no of the systems at BCL are still standalone.

Training

The training at BCL took place in the organisation's training facilities, with representatives of the vendor company conducting the process with support from the organisation's IT unit. The training lasted a week and was conducted on part-time basis during work hours, with trainees taking turns in the training while still conducting their regular duties. During the training, employees were told that the project would result in higher profitability for the company but not necessarily a lighter load for them, because of improved processes, workloads would be reduced and the quality of life at work for employees would improve. However, it was also expected that as a result of implementation, the company would downsize, and, consequently, at least some of the employees who were involved in the implementation would not be there to enjoy the benefits from the new system.

The training covered an overview of the entire SAP R/3 and business processes embedded in SAP R/3. Users were not only trained on how to carry out their activities in system but they were also trained on how their tasks mapped on to achieving particular business process goals. The training was beyond knowing 'how to do it'. As a result most of the users were very comfortable using the system. In fact, some of them even felt comfortable enough to assist users in their own struggles with the system. A user commented that:

We have become trainers in a way. We want to help them get to a point where they can do it themselves.

Users interviewed and observed, experiment and use the system beyond its basic capabilities. They experiment with the system, creating their own ad hoc reports or exploring the content of many of the tables. Generally staffs use ERP as a normal work activity. User modifications of work processes were also typical at BCL. Users mentioned that they had to 'weak' the system. Such "tweaking" also called "workarounds," allowed them to use the system in a slightly different way than it was intended to work, so that they would get things processed in the way wanted them. Another user commented:

Something we call workaround which means that something the system does not normally do, you turn around the system because you know functions in the system that can handle this thing.

A.4.2 Organisational contextual influences

Organisation and IT Strategy Alignment

BCL has a comprehensive IT strategy which spelt the role of IT in realising organisation business strategy. The IT strategy spelt its current and future IT infrastructure. IT was considered central to realising organisations business strategy. In addition, the IT strategy was aligned to Lafarge's IT

strategy which is focused on globalisation and standardisation of business practices across all the regions of its operation. Even though there is no stiff competition in cement production in Kenya at the time this research was being carried out, BCL's IT strategy factored in the possibility of entrance of new competitors and spelt IT as a mitigating solution. In general, BCL's IT strategy was aligned with business strategy, and SAP R/3 investment are linked to corporate strategy of mitigating risk of entrance of new competitors and to the parent company (Lafarge) vision of globalising and standardising operations across the globe.

Orientation to Change

BCL strategy was to avoid customisation as much as possible. They had to follow the system logic to adjust their process of the transactions. Since the analysis and testing was done before the ERP project start, the BCL's business requests had to be considered along with Lafarge's global business strategy by the project team. Processes were changed as a result of ERP implementation. Nevertheless, the BCL still had to adapt into the new system. The interviewed BCL staff said, "It took some time before we learned to use the system. And it takes a little bit more time to input one transaction record than before. The work load has increased. But we are all trying to manage it." As stated by the BCL manager, negative attitude was seldom found in the BCL.

Basis of Truth and Rationality

Team members often felt they could not express ideas without hard data to back them up. Part of this was because the integration partner "was a lot more rigid on things than we were. We were jointly managing the project, but (the partner) took a very hard line in a lot of things". The integration partner's culture did not match the company's culture. One team member indicated that they felt like there were issues that would keep them from making the final implementation date, yet did not express that because "they weren't my issues-they were process team things, and I was technical". One such area was invoicing, which had process oriented post-implementation problems. Even though the integration partner was hired by the company, and was therefore working for the company, it was still able to influence the culture of the project team to the point that experiential knowledge sharing was inhibited. It was able to gain this influence largely because it held more knowledge and had more experience about the software and the process of implementation than the organizational team members. Thus, in spite of a strong organizational orientation toward listening to others ideas, the project team orientation became one of relying on knowledge that consisted of hard data because that was how the group with the most ERP knowledge did things. This suggests that even when organizational culture is one that encourages certain behaviors, the culture of the project team may be quite different when an external integration partner is involved.

Although this is a useful tool for knowledge sharing, BCL's requirement to codify knowledge before any analysis was done may have reduced the sharing of knowledge that was difficult to codify

or back up with hard data. The rigid requirement for hard data may have also inhibited people from expressing ideas based on experience about what might or might not work, thereby limiting knowledge sharing.

Orientation to Work

The company was more process oriented than results oriented. For example, they had two implementations, yet had only planned for one “big bang” implementation when they started the project. Soon after the project began, they began to see that the sales and distribution configuration was far more complex, taking more time and resources than estimated. The team felt that it could not implement that part effectively in the original time frame. So, they postponed it for 1 year in order to be sure they had time to gather enough knowledge to implement that piece of the system so that the organization could effectively use it. Thus, although time was important, the focus was on ensuring that the goals for SAP were met, not on simply getting something implemented. A lot of effort was put to ensure that the business processes were aligned to other Lafarge’s subsidiaries abroad. Therefore, time and work were not given priority but rather the business processes.

Orientation to Collaboration

Prior to SAP R/3, efforts were in place to create a culture that promoted teamwork, where “people are encouraged to share their ideas across functions”. BCL manager specifically emphasized the teamwork mentality inside the company as one of the critical success factors towards ERP implementation at BCL. He said that, “People here work together as a team. Everybody is clear with their own responsibility. We have the same target to work to. Everybody keeps the time schedule, so that the work is done in time. This teamwork mentality is a strong driving force in the ERP project.” To help foster this culture, many facilities moved away from the use of traditional titles that imply a hierarchy. Because no one person on the ERP team knew all the things it took to do the project, “everyone on the team had to rely on everyone else”. Thus, extensive knowledge sharing occurred.

Organisational Structure

BCL decision making style could be described as a blend of decentralised and centralised. The decision to implement ERP was taken by Lafarge which is the principal shareholder in the organisation. However, Lafarge delegated the authority to BCL management to decide which system to implement. This brings out two aspects of decision making. In the steering committee meetings, the decision making style was highly consultative. The decisions regarding the implementation strategies was made centrally by the steering committee. While the decision to adopt ERP was highly concentrated i.e. made by Lafarge, it also enabled BCL to have extensive knowledge sharing,

which is counter to what theory predicts about the role of concentrated decision making in times of extensive organizational change. Theory indicates that autonomous decision making provides the freedom of thinking and idea generation necessary for extensive change to occur. ERP tends to consolidate decision making by integrating processes across intra-organizational boundaries. Because BCL decision making style more closely matched that required by ERP, perhaps this match was more conducive to the knowledge sharing required for ERP implementation.

A.4.3 ERP Upgrade Decision Factors

In order to justify ERP system at BCL, IS manager explained that current SAP R/3 version had become incapable of delivering some of the functionality that business needed:

It was working okay for us, and then we started to acquire more businesses and we were growing. The flexibility that we want to have on our software was not there in the older release. The newer releases were so much better than the old one.

One of the functional team leaders at BCL further recalled that functionality in 4.6C was one of the major reasons that it was adopted:

The bottom line is we need to upgrade because we needed a lot of functionality. We need a lot more functionality, a lot more flexibility with the system.

To meet these business needs, BCL preferred to receive software functionality from the software itself that to develop the functionality through additional programming. Besides, modifications to SAP's core program were forbidden except in rare circumstances. A technical lead explained:

We prefer to not have a lot of custom coding. So if it's something that SAP is going to provide then that's a definite factor in making the decision to go ahead with the upgrade

Thus, the availability of user requested functionalities in later versions of ERP systems as espoused by the above excerpts can be a strong influence over the upgrade decision. Upgrading allowed KPLC, KenGen, and BCL to meet users' needs without any new development effort, and with SAP's support.

Corporate and IT policies to mitigate software risks also emerged from empirical data as a factor influencing decision to upgrade ERP systems. Several of the restrictions on software upgrades were codified in some of the case study organisations policies designed to mitigate the risks of using ERP software. In the case of KenGen, one important policy affected all the softwares used. Adopting unstable software releases produced unacceptable business risks. To protect KenGen from implementing unstable software, KenGen had a policy prohibiting any upgrade of software that was earlier than release 'c' in each version. As the MD explained:

We never go before 'c' because 'a' is the beta, 'b' is the fixes, and 'c' is the stable release...Particularly, we don't want a beta version.

Indeed, their preference was to wait for the other companies of compatible size to perform the upgrade first.

We want to make sure [vendors] have it in production and that other customers are using it before we consider using it.

There were two reasons for this practice: to sort out any known problem in advance, and to learn from another companies upgrade lesson.

Another corporate policy required all softwares to be on vendor support to ensure continuous system operation and timely receipt of vendor support if a problem occurred. Vendor support was important in the case of BCL and KenGen because they relied heavily on SAP's Online Support System (OSS) to solve their technical problems. OSS was a database which contained SAP native code solutions that could be downloaded and applied to fix problems. When IT personel encountered problems, OSS was the firs place they looked for a solution.

Appendix B

Quantitative Data Presentation and Analysis

B.1 Introduction

Data analyses and interpretations presented in Chapter 5 provided the foundation for the phase 3 of this research – quantitative research phase. As stated in Section 3.4.3, methods associated with positivism lend credibility to an assertion that insights obtained in one context might be usefully generalised or transferred, thus increasing the relevancy of those research findings to the practitioner community. Therefore, quantitative research phase was aimed at generalising the research findings. This phase of research corresponds to understanding at the third level in Lee’s framework which requires formulation of testable propositions and then subjecting them to conventional statistical analyses techniques. This phase consisted of five steps namely: formulation of propositions, questionnaire design, sample selection, administration of questionnaire, and data analysis and interpretation. The activities undertaken in each step is discussed in the following Sections.

B.2 Formulation of Propositions

Based on the research findings discussed in Chapter 5, eight propositions were developed in order to enable statistical analyses to be carried out in the phase three of this research.

Research findings from the case study component of this research revealed a distinct difference in ERP implementation practices and outcome amongst public and private organisations in Kenya as discussed in Chapter 5. For example, the case study organisations adopted ERP systems for a variety of reasons. These included the Y2K problem, replacing legacy systems, system simplification and improvement, process and operation improvement, reducing costs of information systems, and structural adjustment programmes.

While there were similarities regarding some aspects of implementation, there were distinct contrasts among the private (BCL and Bidco) and public (KPLC, KenGen, and ACFC) sector case study organisations with regard to motives for implementing ERP systems. ERP adoption at KPLC and KenGen was triggered by the structural adjustment programmes, changes initiated by the World Bank and the IMF in the early 1990s as earlier stated, whereas ERP adoption at ACFC was mainly influenced by inefficiency of manual activities which called for measures to cut down operational costs. On the other hand, ERP adoption at Bidco and BCL was triggered by well defined business needs resulting from continued growth and the need to streamline global operations. ERP was perceived as a ‘must have’ system if the organisations had to thrive in the competitive environment which Bidco was operating.

In order to further investigate these findings, seven propositions relating to the differences between public and private organisations were formulated. These propositions are stated below:

Proposition 1: Implementation of ERP systems by public organisations is motivated by tactical considerations whereas strategic needs are more important for private organisations

Research finding revealed the difference in the magnitude of customisation between public and private organisations. Results show that private organisations are more likely to change their processes to fit the ERP systems as was the case with Bidco and BCL, whereas public organisations are more likely to customise the ERP system as was witnessed in ACFC, KenGen, and KPLC. In other words, private organisations were more inclined to change than public organisations. To further explore this finding, we formulated a proposition stating that:

Proposition 2: Public organisations customise ERP software more while private organisations adopt business processes within ERP systems more

Research finding showed that public organisations have a narrow ERP scope – they employ less ERP functionality – than private organisations. Case study organisations in private and public sectors varied greatly in the number and nature of ERP modules adopted. Among the case study organisations, KPLC and KenGen implemented only two SAP R/3 core modules i.e. the Finance and Material Management Module compared to BCL which besides implementing the two SAP R/3 mentioned above also implemented Sales and Distribution, Treasury, and Production Planning modules. Whereas ACFC bought all the Ebizframe modules, they only managed to successfully configure and run three modules – Finance, Inventory, and Sales modules. The rest of the modules are not being used. Bidco on the other hand has successfully implemented all the modules offered by Baan ERP system. In addition, public organisations seem to favour SAP R/3 while private organisations seem to favour mixing modules from different vendors. Among the case study organisations, the only public organisation which did not implement SAP R/3 is ACFC, probable reason being its small size. We thus propose that:

Proposition 3: Public organisations employ less ERP functionality than private organisations

Another finding showed distinct differences in module implementation strategy between the public and private sector case study organisations. Therefore, the proposition below was formulated:

Proposition 4: Public organisations use an incremental implementation approach by phasing in systems while private organisations adopt more radical implementation approaches such as implementing the entire system or several major modules at the same time (big-bang or the Modular approach).

Lastly, given the disparity between the public and private sector case study organisations in relation to cost and benefits derived from ERP systems, we formulate the below proposition to be investigated further :

Proposition 5: Public organisation report greater benefits than private organisations

Based on the interviews with the respondents, 19 factors were identified which were considered as important indicators of the challenges of ERP implementation in Kenya. These factors are listed in B.11.

To further explore these challenges, we formulated the proposition below:

Proposition 6: The ERP implementation challenges in Kenya can be best represented in higher-order categories that is comprised of at least three dimensions

Five sub-dimensions of ERP implementation scope were derived from this research findings namely: ERP breadth, ERP depth, BPR breadth, and BPR depth, BPR magnitude. These measures are briefly discussed next.

ERP Breadth refers to the extent to which the implementation of an ERP system is diffused horizontally across an organisation. It describes (1) the locations that the ERP system can reach (link), such as departments, divisions, entire company, multiple companies, and so on, and (2) the range of business processes that are shared by ERP implementation. Data on ERP breadth is important as it represents the willingness of an organisation to link or integrate its different functional units within or across different geographic regions. The number of sites across which an ERP is implemented indicates how horizontally widespread that implementation is: an implementation spanning multiple, and geographically dispersed sites can be viewed as having greater breadth than one which is confined to a single site.

ERP Depth refers to the extent to which the implementation of an ERP system is vertically diffused within an organisation. One indication of how deeply an ERP implementation has permeated an organisation is the number of employees it affects at various hierarchical levels. ERP system which is used at all organisational levels (operational, tactical, and strategic level) There was a varied level of vertical diffusion of ERP system within the case study organisations.

BPR Breadth refers to the dispersion of the business process reengineering entailed by an ERP implementation across different departments and sites.

BPR Depth refers to the extent to which the business process re-engineering activities associated with an ERP implementation are vertically diffused in an organisation. Similar to ERP depth, an indicant of BPR depth would be the number of employees affected by BPR in an ERP implementation.

BPR Magnitude refers to the extent to which the business processes of an organisation become more automated via an ERP implementation. BPR exercises are usually undertaken to better rationalise business processes and to render them more efficient through greater integration and automation. Research noted that BPR breadth and depth only reflect how widespread and deep a BPR exercise associated with an ERP implementation affects an organization in terms of the number of different departments, sites and the number of people it affects. However, BPR exercises typically involve major modifications to how people do their work, and as such represent considerable implementation challenges as well as being an important factor influencing the scope of an ERP project. BPR magnitude is supposed to reflect how much change the BPR associated with an ERP implementation brings to employees' work.

In addition to the above discussed ERP implementation scope measures, we included the business automation increase and ERP customisation indicators for ERP implementation scope for factor analysis. This was based on consultants suggestion the business automation increase and ERP customisation can be used as measures of ERP implementation scope. In order to confirm the validity of these measures for their incorporation onto the empirical model, we formulated the proposition below:

Proposition 7: The seven ERP implementation scope measures (ERP breadth, ERP depth, BPR breadth, BPR depth, BPR magnitude, Business automation increase, and ERP customisation) represent at least three dimensions

These propositions will be subject to conventional statistical analyses in this chapter.

B.3 Questionnaire Design

Special emphasis was given to the design and development of the questionnaire in order to obtain a reliable and valid scale. The adopted process was similar to that proposed by Churchill (1979). Figure B.1 illustrates the adopted scale development paradigm. The questionnaire (Appendix E) included questions on organisation and respondent demographics, adoption and selection of a system, implementation, costs and benefits, and post-implementation plans. This questionnaire was designed as an exploratory instrument to collect data to aid statistical generalisation of the case studies findings.

The responses were encoded using a mix of check boxes, open-ended answers, and a Likert scale with measures from 1 to 5. The case studies provided the guidance for the encoding scheme in terms of what type of questions required what responses. For example, the total cost was segmented into buckets because the interviews showed that respondents were more comfortable with providing approximate figures instead of exact values. The ERP motivational, benefits, challenges, and organisational characteristics were encoded using the Likert scale because they were based on factors identified during qualitative data analysis and need to be confirmed. After initial development of the survey questionnaire, it was thoroughly tested by two ERP project leaders from our case study organisations and two consultants, and fine-tuned.

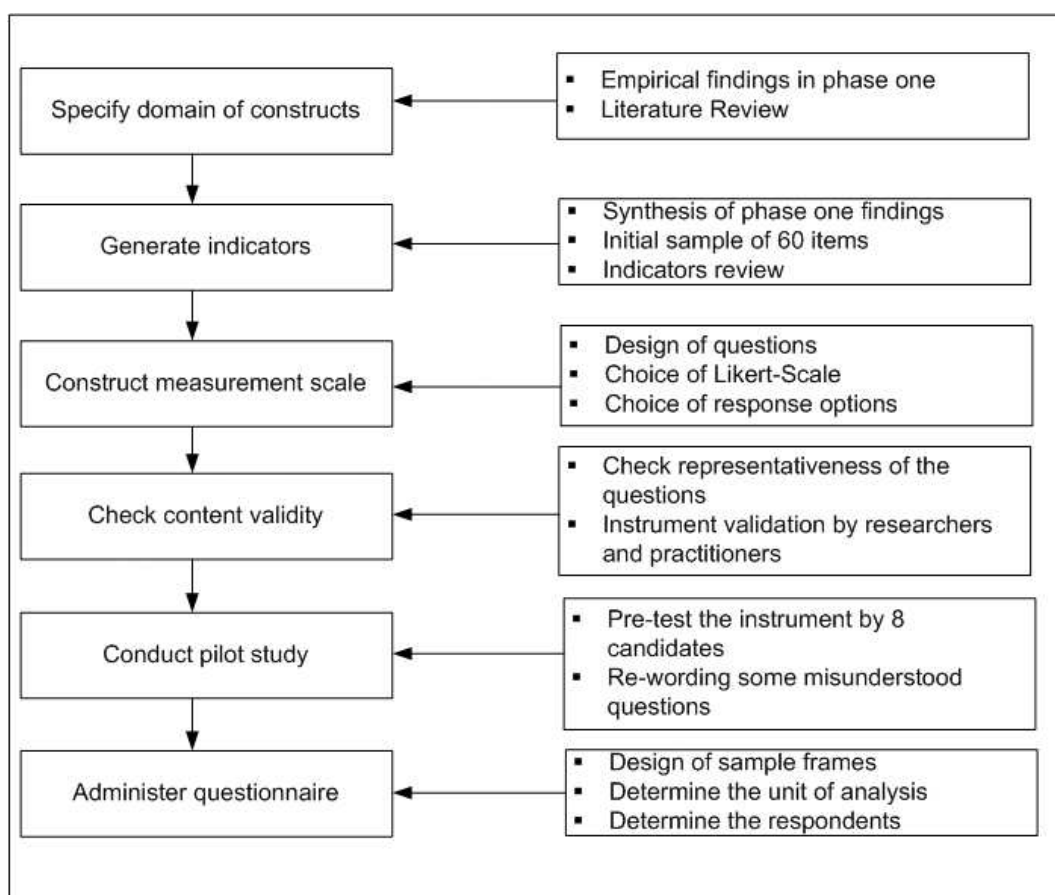


Figure B.1: The adapted measurement development paradigm

B.4 Sample Selection

The study’s population sample was organisations which had implemented ERP system and the implemented ERP system had been operational for at least one year. In each organisation, the respondents were drawn across different organisational hierarchies and departments. There is no

documentation of how many organisations have implemented ERP systems in Kenya. However, a list of companies which had implemented ERP systems was obtained from PricewaterhouseCoopers and Symphony consultants. Given the reputation of these two consultancy companies in ERP implementation, the 30 sampled organisations are likely to be representative of organisations which have implemented ERP in Kenya.

B.5 Administration of Questionnaires—Field Study 2

The questionnaires were administered by email and by hand. 30 Kenyan organisations were surveyed. 10 questionnaires were emailed to each IT manager of 25 Kenyan organisations. The IT managers requested to distribute the questionnaires to the staff members within their organisations.

The researcher also administered 50 questionnaires by hand within the 5 case study organisations during the second field study. This approach was chosen because the researcher was familiar with most of the staff members having carried out first field study.

In total, 300 questionnaires were distributed. A total of 185 people responded.

B.6 Data Analysis

B.6.1 Descriptive Statistics

A total of 185 out of 300 (61%) questionnaires distributed to companies that have implemented ERP were received. The response rate of 61% was much higher than for some studies published in top journals (e.g. response rate for Law & Ngai (2007) was 10.6%). The case study organisations were grouped into two main categories private and limited companies. 35% of the respondents were from the public companies while the remaining 65% were drawn from the private sector. 65% of the companies were locally owned while 45% were either fully owned by foreigners or were subsidiaries of foreign companies as a result of majority shareholding. This underscores the fact that companies which had implemented ERP systems were both locally and foreign owned implying that the need for the ERP systems was not only felt by foreign companies but local ones as well. A total of 30 organisations participated in the survey. Table B.1 gives a summary of the responses as per the two major categories.

The ERP systems implemented by participating companies are presented in Figure B.2.

The study found out that 40% of the ERP systems in Kenya were implemented between 1999 and 2000. 20% were implemented between 1997 and 1998 while 40% were implemented between 2001 and 2004. There seems a marked growth in implementations over the years as organisations

Table B.1: Summary of response rate

Category	Responses	No of Questionnaires distributed	Per sector	Across sector
Public	90	65	72%	35%
Private	210	120	58%	65%
Total	300	185		

may be realising the benefits of ERP systems hence the continued growth in number of companies implementing the systems.

Of the 30 companies surveyed, the most common of the ERP solutions implemented was found to be from SAP. 38% of the ERP solutions implemented indicated that they use SAP followed by 17% who use Oracle financials. Baan represented 13%, Navision 8% and Ebizframe 4%. 21% of the companies also use other ERP solutions that were slowly entering the Kenyan market, for example, Sage line 500, Impact Encore, ORION, Lawson, and Job Definition Format (JDF) systems a product of ScenicSoft inc., USA.

73% (i.e. 21 out of 30) of ERP implementations were carried out by vendors whereas 27% were done by the 3rd party implementers.

B.6.2 Testing of the Propositions

B.6.2.1 Motivation of ERP

Proposition 1: Implementation of ERP systems by public organisations is motivated by tactical considerations whereas strategic needs are more important for private organisations

The questions relating to motivational factors employed a five-point Likert scale (five being very important and one being unimportant) to compare and contrast the ERP implementation between public and private sector organisations. These motivation factors are a mix of IT factors and business identified during the qualitative data analysis stage in the Chapter 5. The responses were analysed as follows: a response of 4 or 5 was considered positive, a 1 or 2 as negative as a 3 as neutral. The neutral responses were not included in the analysis.

Table B.2 presents the summary of the respondents' answers to these questions. The percentages reflect only the positive responses. That is, the percentages indicate the percentage of firms who listed that motivational factor as either important or very important. For example, 85.9% of all organisations listed "Replace Legacy Systems" as either important or very important.

When analysed across organisational sectors, the results show several similarities and differences. The importance of these factors by organization sector was tested using a One-Factor ANOVA on

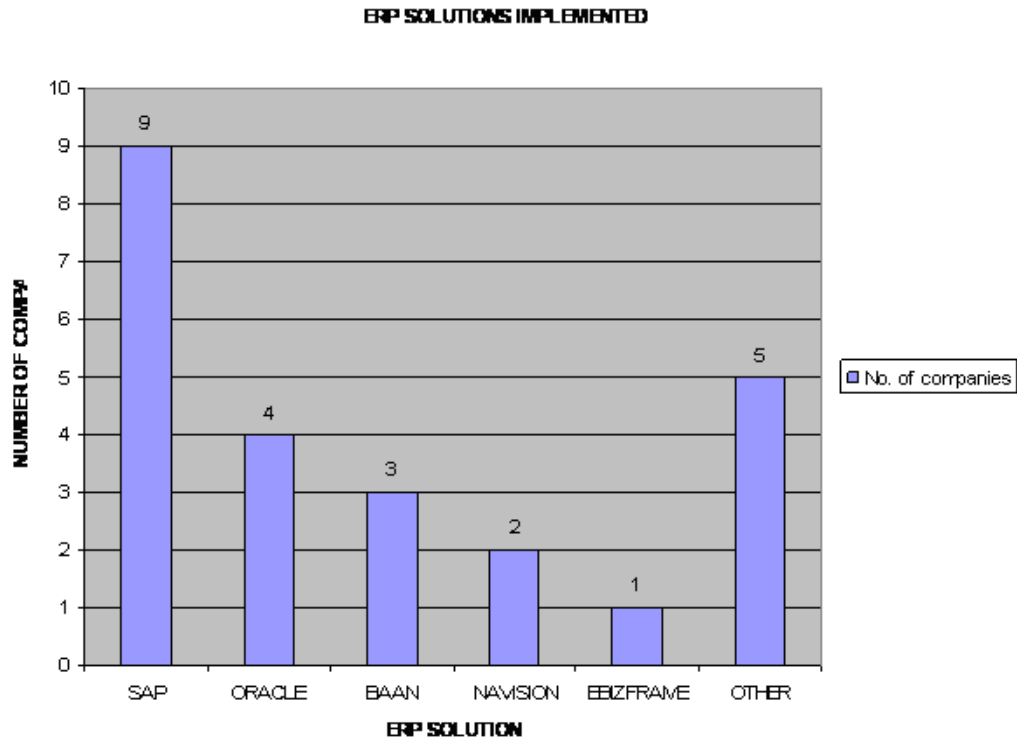


Figure B.2: Frequency distribution graph of ERP solutions implemented

the data from the survey questions. The p -values in Table B.2 are from this ANOVA test. The factors “Replace Legacy Systems” and “Simplify and Standardize Systems” are important to all organisations. These two reasons were important to all of the case study organisations as well. All of them had been operating with a patchwork of legacy systems that were becoming harder to maintain and upgrade. Additionally, the competitive pressures on them increasingly required more responsive systems with real-time integrated information that the legacy systems could not provide easily. Thus, it is not surprising that these two factors are important to all organisations.

However, there is a significant difference (p -value = 0.001) on the importance of the factor “Simplify and Standardise Systems” by organisation sector. Almost all private organisations considered this as an important. In addition to the ANOVA test, pair-wise comparisons were analysed using categorical analysis. The significant p -values reported are from the resulting Chi-square test. These pair-wise comparisons show significant differences between private and public organisations (p -value=0.001). One possible explanation is that private organisations are likely to have a number of legacy systems in place so simplification and standardisation becomes a more important issue. The factor, “Gain Strategic Advantage”, also shows a significant difference by organisation sector. The pair-wise comparisons show a significant difference (p -value=0.008) between private and public organisations. This is surprising because having an ERP system by itself is not likely to give an

Table B.2: Summary responses for motivational factors

Motivation factors	All firms (%)	Public (%)	Private (%)	Statistical significance
Replace legacy systems	85.9	86.8	89.5	No difference
Solve the Y2K problem	56.5	63.1	42.3	0.04
Ease of upgrading systems	44.5	35.3	54.3	0.09
Simplify and standardise systems	83.3	72.4	94.7	0.001
Pressure to keep with competitors	49.2	41.7	59.6	No difference
Improve interactions and communications with suppliers and customers	75.2	70.6	76.1	No difference
Restructure company organisation	32.0	27.0	34.6	No difference
Gain strategic advantage	79.6	70.0	91.8	0.008
Link to global activities	55.5	35.6	73.6	0.0001

organisation any significant strategic advantage since their competitors are likely to have implemented similar systems. For example, over 300 pharmaceutical organisations around the world have implemented ERP systems (www.sap.com, Accessed August 2008). Thus, the ERP system by itself is not likely to provide any significant competitive or strategic advantages. Our case study organisations expected their strategic advantage to come from how they leveraged the vast amounts of operational data generated by their ERP systems. One key use of this operational data is in financial analysis. Both private case study organisations (Bidco and BCL) reported increased efficiencies in budgeting, financial controls and financial close cycles as a result of the information availability from their ERP system. Another area of strategic importance is the use of decision support models and data mining tools. These systems are generally not part of an ERP system but separate systems known as “bolt-ons”. Finally, strategic and competitive advantages can also come from how organisations integrate and manage their specialised strategic systems, such as supply chain management, customer management and e-business systems, with their ERP system.

ERP systems are also important to private organisations for linking their global activities. There is a significant difference (p -value < 0.0001) between private and public organisations. That is to be expected since private organisations are more likely to have global activities. Linking to suppliers and customers was a key objective of both the public and private case study organisations. However, the survey results show that this is of equal importance to all organisations. A surprising result from the survey is that the Y2K issue was ranked very low among motivational factors. Much of the literature cites Y2K as the reason in the upsurge of ERP in the mid-1990s. Solving the Y2K problem was more important to public organisations. One key difference between the private and public case study organisations was that managers in the private organisations expressed more confidence in solving the Y2K problem since they had large number of IT staff whereas the public

Table B.3: Degree of customisation

Overall customisation	All firms (%)	Public (%)	Private (%)
Minor	61.11	46.67	72.86
Significant	29.44	41.67	22.86
Major	7.78	10.00	2.86
Others	1.68	1.67	1.43

organisations did not have such dedicated resources and looked more at the ERP system to solve that problem.

B.6.2.2 Extent of customisation

Proposition 2: Public organisations customise ERP software more while private organisations adopt business processes within ERP systems more

The common hypothesis is that organisations are generally more willing to change their operating processes than customise their ERP packages. Research survey results, however, indicate that almost all organisations went through some form of customisation, as shown in Table B.3. The survey results confirm the case study findings that the degree of customisation varies significantly across sector of organisation. Public organisations customise more. There is significant difference between public and private organisations (Chi-square p -value < 0.001). The survey results show that over 40% of the public organisations did either significant or major modifications whereas most private organisations only made minor modifications. For the public organisations, it may not be possible to avoid customisation.

This observation was attributed to the control government exerts on public organisations and the fact that they are inclined to maintaining the status quo in the way they operate. In addition, their complex operations and organisational structure tend to increase the pressure for more custom-build processes and reports. An interesting observation from the case studies was that organisations that started their implementations earlier (in 1990s) tended to customise more. Some of the managers have hypothesised that the evolution of ERP systems through the late 1990s had “improved” the systems to a point where it was no longer necessary to customise as much, while others think that the knowledge base among consultants and vendors had improved significantly over time, minimising the need for customisation. Human resource is the most customised module as shown in Table B.4.

Human resource modules had the second highest degree of customisation, followed by production planning modules. One out of every five implementations is customised to some degree for medium and large organisations in these two categories. Multiple plants, geographical dispersion (at times

Table B.4: Module Customisation

Overall customisation	All firms (%)	Public (%)	Private (%)
Payroll	33.86	33.85	31.58
Human resource	21.36	23.08	11.58
Production planning	16.15	21.54	5.26

globally) and different production processes for multiple product lines could be attributed to this finding.

B.6.2.3 ERP Implementation Scope

Proposition 3: Public organisations employ less ERP functionality than public organisations

We listed 24 generic modules of ERP, spanning all functional areas within the survey organisations. B.5 depicts the percentage of respondents using each of these modules.

Further analysis indicates that on average our participants use 10.51% ERP modules, which represents an un-weighted **average of 43.8% of the full range of 24 generic Modules**. Of course some ERP vendors do not offer this full breadth of functionality and some organisations do not require all modules. Project Management, Product Configuration and Distribution Requirements Planning are good examples of modules where there was very limited penetration with only a few manufacturing organisations. However, if ERP is implemented and the General Ledger module is not being used, chances are General Ledger is being done either by a corporate system or a stand-alone “best of breed” application. For core functionality required by any business (those modules shown in bold letters in table B.5) –core financial applications, purchasing, order management, inventory control and payroll –only ACFC (which is a small-sized organisation) was able to function without automating some of these functions. Our survey then delved a bit deeper in quantifying the average use of ERP. Recognising that the implementation of a module does not necessarily indicate full usage of its functionality, we asked what percentage of the functionality was used of those modules implemented. On average our respondents indicated they used about 63%. When we apply this percentage to our un-weighted average usage, we find participants use on **average 27.6% of the available ERP functionality**, higher than the generally accepted view, but still a relatively low level of use.

The issue of which ERP package to implement is an important decision for any organisation not only for functionality and ease of implementation but also for future upgrades and for using other specialised packages with the ERP system. Tables B.6 and B.7 present organisation based data for adoption of different ERP packages. Table B.6 also includes the global market shares of each package. Overall, the penetration of ERP packages in Kenyan organisations appears to be very dissimilar to overall global market shares reported (a Chi-Square test was insignificant). The only

Table B.5: ERP Module Adoption Rates

Technology Solution Area	% Implemented
General Ledger	93%
Accounts Payable	93%
Accounts Receivable	92%
Fixed Assets	43%
MRP (Materials Management Planning)	79%
DRP (Distribution Requirement Planning)	23%
MPS (Master Production Scheduling)	19%
Forecasting and Demand Planning	37%
Human Resource Management	49%
Order Management	80%
Project Management	3%
Shop Floor Control	7%
Purchasing	94%
Inventory control	92%
After Market Service	2%
Engineering Change Management	18%
Enterprise Asset Management	1%
Supplier Collaboration/Scheduling	4%
Workflow Technologies	18%
Sales and Marketing	42%
Production Configuration	15%
Payroll	24%

Table B.6: Summary responses for package adoption

ERP package	Overall (%)	Public (%)	Private (%)	Market Shares
SAP	25.0	41.5	10.5	32.7
Oracle	14.6	13.8	11.8	13
Baan	9.4	6.2	14.5	7
JDE	6.8	0.0	10.5	7
Ebizframe	3.6	1.5	0.0	3
Orion	2.6	0.0	1.3	9
PeopleSoft	2.1	6.2	2.6	2
Navision	1.6	0.0	3.9	1
Other/Multiple	34.4	23.1	44.6	26

Table B.7: Summary of responses for package implementation

Overall customisation	All firms (%)	Public (%)	Private (%)
Single ERP Package	40.6	56.6	27.7
Best-of-Breed from different packages	4.2	1.3	9.2
Single ERP with other systems	48.4	36.8	52.8
Multiple ERP with other systems	5.2	3.9	9.2

exception is Peoplesoft, which has only an 8.6% share in Kenyan organisations versus an overall market share of 9%. That is to be expected since its traditional strengths are in human resources hence the likely reason for large adoption. There are clear differences across the different sectors on the packages they adopt. The Chi-Square test between private and public organisations was significant (p -values < 0.001).

Survey findings confirmed case study findings indicating that public organisations favour SAP R/3 more than private organisations (41.5% vs. 10.5%). Over 72% of the public organisations use just five different packages (SAP, Oracle, Baan, JD Edwards and SSA) as compared to 27% for the private organisations. Everdingen *et al.* (2000b) in his survey found that “best fit” with “current business practices” and “package flexibility” were the key criteria in the package adoption decision. Since many of the “smaller” ERP systems, such as MAPICS and QAD, have evolved directly from MRP II packages, organisations looking for a good fit with their current business practices are more likely to adopt ERP systems that have evolved from their MRP II systems. Even though none of our two private case studies implemented SAP R/3 and Baan, some of the private organisations in the survey chose to go with ERP systems from the vendors of their original MRP II system for precisely that reason.

There are also key differences (shown in Table B.7) among organisations on the configuration of the

Table B.8: Implementation strategies

Motivation factors	All firms (%)	Public (%)	Private (%)
Big-Bang	32.32	47.37	14.06
Mini big-bang	17.37	23.68	9.38
Phased-In-By-Module	17.37	19.74	20.31
Phased-In-By-Site	25.79	7.39	48.44
Others	3.16	1.32	7.81

ERP system implemented. Over 56% of public organisations use only a single ERP package whereas only 28% of the private organisations use this approach whereas 71% of the private organisations use multiple systems compared to only 42% of the public organisations. One clear distinction driving this is the complexity of the organisation. Private organisations are more likely to have more global operations, more sites and generally more complex operations. Even though ERP systems by themselves may not be able to provide the functionality required to manage these complex enterprises. To remedy such shortcomings, organisations are increasingly using either self-contained add-on ERP modules or extension systems, called bolt-ons, for such functions as demand planning, order tracking, warehouse management, supply chain management, customer relationship management, on-line collaboration, e-procurement and online business-to-business transactions. Not every ERP system can support these specialised add-ons. Thus, the use of these specialised packages then becomes a key decision factor for not only which system is adopted, but also for how the package is implemented, and future enhancements and upgrades.

B.6.2.4 Implementation Strategy

Proposition 4: Public organisations use an incremental implementation approach by phasing in systems while private organisations adopt more radical implementation approaches such as implementing the entire system or several major modules at the same time (big-bang or the Mini big-bang approach).

For both the case study and the survey, approximately half the implementations used one of the two big-bang approaches and half used one of the Phased-In approaches. However, as Table B.8 shows, there are very clear differences in the implementation strategies by sector of organisation. Over two-thirds (69%) of implementations in public organisations were phased in either by module or by site whereas over 70% of private one of the big-bang approaches. The difference in strategies between both private and public organisations was statistically significant (Chi-square p -values < 0.0001).

Table B.9: Summary responses for performance measures

Outcomes	All firms (%)	Public (%)	Private (%)
Reduced direct operating costs	85.9	86.8	89.5
Quickened information response time	56.5	63.1	42.3
Improved order management/order cycle	44.5	35.3	54.3
Lowered inventory levels	83.3	72.4	94.7
Increase interaction across enterprise	49.2	41.7	59.6
Decreased financial close cycle	75.2	70.6	76.1
Improved on-time delivery	32.0	27.0	34.6
Improved cash management	79.6	70.0	91.8
Improved interaction with suppliers	55.5	35.6	73.6
Improved interaction with customers	55.5	35.6	73.6

B.6.2.5 ERP Benefits

Proposition 5: Public organisation report greater benefits than private organisations

Getting a measure of success and contribution for an ERP implementation is difficult, given the scope, complexity and timing of this type of project. Many of these systems have been implemented only recently so it may be too early to judge the full impact of an ERP package at this stage. Table B.9 summarises the impact of ERP systems on the performance measures of key operating areas. The most improvements are in “Increased Interaction across the Enterprise”, and “Quicker Response Times for Information”. There are also improvements in order management, on-time deliveries, customer interaction and financial close cycles.

The least improvements are in traditional cost measures such as direct operating costs, inventory levels and cash management. The ANOVA test across survey sample organisations showed no significant differences. However, there are key differences between private and public sector organisations on several metrics. These pair-wise comparisons were analysed using categorical analysis. Public organisations report better improvements in the financial close cycle (p -value = 0.023). On the other hand, private organisations have more improvements in order management (p -value=0.08), on-time deliveries (p -value = 0.026) and customer interactions (p -value= 0.057). Table B.10 summarises the areas benefiting the most from ERP systems.

As expected, integration of business processes, availability of information and quality of information are the areas most positively impacted. The areas benefiting the least are the costs of information technology and personnel management. There are also several differences here between public and private organisations. More public organisations report benefits in financial management (p -value = 0.06) and personnel management (p -value = 0.08) than private organisations. On the other hand, private organisations report higher benefits than large in inventory management (p -value = 0.04) and procurement (p -value = 0.08). Overall, both the case study and the surveyed organisations

Table B.10: Summary responses for areas benefiting in percentage

Benefit areas	All firms	Public	Private
Integration of business operations/processes	85.9	86.8	89.5
Availability of information	56.5	63.1	42.3
Quality of information	44.5	35.3	54.3
Customer responsiveness/flexibility	83.3	72.4	94.7
Financial management	49.2	41.7	59.6
Personnel management	75.2	70.6	76.1
Decrease information technology costs	32.0	27.0	34.6
Inventory management	79.6	70.0	91.8
Supplier management/procurement	55.5	35.6	73.6

reported very similar trends on the impact of ERP systems on performance.

None of the case study organisations had done some form of ROI or economic value added analysis to justify their ERP system. Surprisingly, approximately 30% of the survey organisations reported doing an ROI or any form of capital investment analysis. An approximate weighted ROI for those organisations who responded is approximately 20%. There were no statistical differences across the public and private organisations on this dimension. This ROI is different from what has been reported in several publications. For example, the Meta Group Wheatley (June 2000) reported the NPV of an implementation is a negative \$1.5 million. Most organisations view their ERP system to be a long-term investment. The expected life of an ERP system is just over 8 years, a value considered very high for a software system. Over 80% of all organisations indicted an expected life of over 5 years. Approximately a third expects the life of their ERP system to be longer than 10 years.

Additional interviews was carried out to ascertain the benefits of ERP systems to the case study organisations during the second field study. These results support the case study and survey findings. The benefits across the case study organisations was analysed. The summary of results which lighten the differences discussed is summarised below. The benefits were grouped into three cost saving benefits (IT costs, administrative costs, personnel costs, and sales costs), process improvement benefits (purchase management, warehouse management, customer relations, supplier relations, availability of information, and decision making) and process flexibility benefits (production and order management flexibility). These benefits are compared across the case study organisations.

IT Costs

Four organisations namely KPLC, KenGen, ACFC, and BCL expected information technology costs to decrease as a result of implementing ERP system. BCL justified this expectation with the fact that it would be cheaper to maintain one system instead of many different systems. However,

information costs were not affected in this case. This is mainly because the case study organisations did not get rid of the legacy systems they were using before ERP implementation. KPLC, KenGen, and BCL were all using plant maintenance and production systems MAXIMA and PRODIS respectively which they retained after implementing ERP. BCL in addition retained a human resource management system called SMART whereas KenGen and KPLC retained additional bespoke systems. Bidco experienced a positive unexpected effect derived from the fact that maintenance of the system is much simpler today having discarded all the bespoke systems which were operational before ERP implementation. ACFC on the other hand experienced negative unexpected results. The total cost of the implementation project turned out to be much higher than what was budgeted for.

Administrative costs

Four case study organisations –Bidco, BCL, KenGen, and KPLC –expected administrative cost to decrease. These expectation were based on the assumption that administrative work would be more effective and streamlined using an ERP system. Two of these organisations –Bidco and BCL –did experience decreased administrative costs to a great extent. Bidco believed that better co-ordination between order, warehouse and delivery due to the ERP system was the reason for diminished administrative costs. On the other hand, KenGen and KPLC did not realise reduced administrative costs. They attributed this to the influence the government had on their operations such as procurement. ACFC experienced increased administrative costs due to the ERP implementation. They claimed this was due to the fact that project implementation was poorly managed. The Ebizframe was heavily customised to fit old processes, and almost no process were changed. This resulted in more complicated processes and to the need for more administrative personnel, which resulted in increased administrative costs. The fact that the system need to use pre-print papers increased paper usage thereby resulting increased administrative costs. This was the same case with KenGen and KPLC which are government corporations operating in an environment where electronic records are still not acceptable. However, there was a considerable reduction in the usage of paper at both Bidco and BCL where electronic records are acceptable, which lead to reduction costs for paper.

Paperless operation was achieved at 30% cost savings in 2005 compared to 40 % expectation (Finance manager, BCL)

Personnel costs

Only Bidco did not have any expectation of realising cost reduction on personnel. Cost reduction were not the main motives for implementing the system, therefore they did not consider that possibility. The remaining case study organisations saw the possibility to reduce personnel costs due to the expectation that fewer people would be needed for administrative work. Only BCL realised these expectation to a certain extent. Fewer people were needed to perform the same

tasks. However, the main reason for the personnel reduction was the fact that when an employee retired no one was hired to do his/her job and saving on salary allocation. This was also the case for Bidco that did not expect a cost reduction but experienced one.

Salary allocation savings in 2005 was only 5% compared to 30% expectation. The reason for this limited savings is that ERP does not actually lessen job positions but it only improves business and resource management (Sales Team Leader, Bidco)

The remaining three organisations –KenGen, KPLC, and ACFC –did not meet their expectation regarding personnel cost reduction due to different market conditions. KenGen was carved out of KPLC in the eve of the new millennium and thereafter experienced a considerable growth, which makes it difficult for them to connect personnel costs with their ERP system. ACFC expected reduced personnel costs, but experienced the opposite. Costs increased because of a great need for hiring additional people after implementing the system. Purchase, sales and administrative departments had problems with the system and had to be reinforced.

Sales costs

BCL and Bidco expected the system to help them reduce sales costs. This was due to the real time data, which would facilitate decision-making due to more updated facts and actual information. With this information as a base, they believed that they would be able to plan their sales more accurately and thereby decrease expenses. This expectation was met at Bidco but was not met at BCL. The primary reason for not realising sales cost reduction outcome at BCL was due to lack of business intelligence system. Respondents mentioned lack of personnel training and understanding of the system as an obstacle to meeting sales cost reductions. As a result, BCL embarked on installing Oracle Business Intelligence in the year 2006 when the researcher was carrying out the second field study. Bidco's success in reducing sales cost could also be attributed to its ambitious project of creating joint ventures by connecting its ERP system with that of retail supermarkets in Kenya to allow automatic replenishing of the supermarkets when they reach reorder level. This is the first ever venture of this nature to be carried out in Kenya indicating that many organisations may follow suite which in turn will lead to a value-chain creation.

Sales cost savings reached 80%. This is because some business transactions requiring personal appearance were eliminated, and the middlemen in sales chain were also eliminated. (Sales team leader, Bidco)

The remaining case study organisations did not experience this effect for various reasons. KenGen is not involved with selling electricity because it only sells electricity to one customer which is KPLC. On the other hand KPLC did not adopt the sales and distribution module of SAP R/3 and therefore could not comment on the effect. ACFC experienced increased costs in the area as well, because of management problems when implementing the system.

Purchase management

All the case study organisations expected positive effects on purchase management due to simplification and increased visibility of the purchasing process. Only Bidco considered these expectations to be completely fulfilled. Bidco justified their satisfaction with increased efficiency due to automation. Everything from purchase requests to supplier invoices changed to electronic format after the implementation of Baan.

BCL partly realised the expected outcome on purchase management. For one of these, expectations were fulfilled regarding purchase management of material used for manufacturing, but not regarding purchase management of other materials such as office materials. The reason for this was according to the respondent, lack of adequate user training. In the case of KenGen, KPLC, and KenGen, the ERP system was not able to meet the strict procurement procedures set out by the directorate of state corporations. They therefore in some cases were forced to go back to a paper based variant. ACFC did not have any expectation on purchase management but experienced negative effects they did not count on. They argued that it is easier to make serious mistakes than they had anticipated as expressed in the discourse below:

If the wrong price is entered in the system during the purchasing process, the consequences can be enormous. The inventory value become incorrect, and then you try to correct it in the wrong way.

However, they admitted that this problem is due to lack of employee training, nonetheless the problem was greater than expected.

Warehouse Management

All the case study organisations had expectations from warehouse management. These expectations included the ability to consolidate the amount of warehouses, increase inventory turnover velocity, routine simplification and increase quality of inventory inspections. All the case study organisations considered their expectations fulfilled. In addition, Bidco and BCL reported that they were able to standardise entire document flows and achieve better inventory quality inspections.

This was derived from discourses which suggested that ERP enables easy and comprehensive reporting, access to real-time information, visibility into cross-departmental information, and the ability to gauge the impact of business decisions.

Customer relations

BCL and Baan expected their ERP systems to improve customer relations with the belief that ERP is more flexible than legacy systems and would enable sales personnel to handle discounts and price agreements more easily. They both met these expectations. KenGen and KPLC stated non-expected positive effects which have contribute to improved customer service such as fewer

price errors, higher quality of data and higher quality of order flow. ACFC also experienced a non-expected positive effect due to the ERP system. It indicated that Ebizframe supports electronic suborders and electronic invoicing, which simplified order management for customers. All the case study organisations stated that customer relations had improved due to faster order management, faster delivery, more accurate information to customers and more effective routines. All the case study organisations expected to improve customer service primarily regarding the compilation of reports and statistics that customers demand. All the organisations stated that customer service improvement was also realised due easier access to information by all employees that resulted in the fact that all employees were able to answer questions about prices, not only sales personnel. In general, customers have become less dependent on specific sales persons since information is accessible to all employees in the ERP system.

Supplier Relations

None of the case study organisations had any expectations regarding supplier relations. However, Bidco has experienced enormous positive effects on supplier relations in the same way as regarding customer relations, as noted above. This is attributed to the fact that Bidco implemented a supplier chain management (SCM) system which is an extension of ERP system.

Availability of Information

All the case study organisations saw the opportunity of being able to increase the availability of information to employees, and also experienced this positive effect. The information in the systems is always available for anyone who has got access rights to it. This fact has made it easier when doing business, because the necessary information is always available in your system. Organisations also admitted experiencing negative outcome, due to the fact that mistakes are easily spread throughout the system and result in misleading data.

Decision Making

Only Bidco had expectations on receiving better basic data for decision making. The time required for this process is unchanged, but the information available is more accurate, even though the organisation refers to difficulties finding the right information.

“Before we implemented our ERP system, the worst part was reporting. We were responding months if not years after data input. Now, I can get information to the executives: ‘here’s what you are going to do next year based on deposits we have now. It allows us to be more proactive in terms of decisions we make in marketing, employment levels, cost, operations. . . we are now looking at today and tomorrow because we have real-time data, not data that is a year old. Everything is coming together” (MD, Bidco).

BCL experienced non-expected outcome in this area which refers to improved data quality leading

in turn to improved decision-making. Additionally, KenGen and KPLC claimed to have better data for decision making nowadays, but “that did not derive from the ERP system, but the process...”

Production and order management flexibility

Only Bidco implemented the production module of Baan and therefore could comment on the production flexibility. One of the expected effects was, due to shorter lead times, the ability to adjust to quickly adjust the production to changed demand. Other planned effects were increased visibility, which would result in increased production flexibility, simplified order management due to integration between sales offices, online order confirmation, and the benefit of working in only one system.

This section has answered the research question which is interested in finding out if there is a difference between public and private organisations. The survey results support the case study results that public and private organisations in Kenya approach ERP implementation differently.

B.6.2.6 ERP Implementation Challenges

Proposition 6: The ERP implementation challenges in Kenya can be best represented in higher-order categories that is comprised of at least three dimensions

The factors identified in Chapter 5 (see Table 5.7) were included in the questionnaire and respondents were asked to state the extent to which they disagreed or agreed with the statements in a likert scale of 1-strongly disagree, 2- Disagree, 3- Indifferent, 4-Agree and 5-Strongly agree. The factors were analysed using SPSS.

In an attempt to reduce the number of items (challenges), and to understand their underlying structure, a factor analysis (FA) was performed using principal component analysis. Principal Components Analysis (PCA) was performed on the respondents' scores. FA is a data reduction technique that uses correlations between data variables. The underlying assumption of FA is that a number of factors exist to explain the correlations or inter-relationships among observed variables.

Principal Components Analysis (PCA) was performed on the respondents' scores. The goal of this method is to extract maximum variance from the data set within each factor. It is basically used to reduce a large number of variables down to a smaller number of components. The measure of sampling adequacy for the twenty items was 0.87 indicating that the items were suitable for factoring (Kaiser, 1974).

A three-stage factor analysis was conducted with an orthogonal (varimax) rotation to obtain a stable factor structure, resulting in easily interpretable factors. Under this three-round factor analysis, items were omitted according to the following two criteria: (1) no loading greater than 0.45, or (2) loading greater than 0.45 on two or more factors.

Table B.11 shows the results of this analysis. A first factor analysis was conducted and produced five factors. According to the two criteria, two items were dropped. A second factor analysis on the remaining 17 items resulted in six factors and the dropping of one item. Finally, a three-factor structure was derived which kept a total of 16 items after three iterations. The minimum eigenvalue from a varimax rotation for which a factor was to be retained was set at 1.0 in order to satisfy the minimum eigenvalue criterion Nunnally (1987).

Cronbach alpha coefficients were calculated to test the reliability of these challenges, as shown in the last row of Table B.11. The reliability of coefficients obtained ranges from 0.58 (factor 6) to 0.76 (factor 1). Srinivasan (1985) proposed that a coefficient of 0.7 or higher is acceptable, while a coefficient of 0.5 or higher is considered sufficient when dealing with exploratory research combined with unvalidated data. Thus, the reliability coefficients in this study are deemed acceptable. The strength of factor analysis is that it provides a basis for data reduction. Therefore rather than looking at all nineteen items, just six factors can be examined. That simplifies the rankings and clarifies the most important items. Rather than focusing on individual items, practitioners and researchers can focus on the broad set of items represented by the essential factors.

Factor 1, named “Integration and incompatibility issues”, comprises three items relating to integration related issues such as data and file conversion, and work practices incompatibility: incompatibility with work, data conversation problems, and integration problems.

Benefits of an ERP application are limited unless it is seamlessly integrated with other information systems. Organisations face many challenges relating to ERP integration: (1) the challenges of integrating various functional ERP modules, (2) the challenge of integration with other e-business software applications, (3) the challenge of integration with legacy systems. Organisations noted that legacy systems have accumulated vast amount of data vital to the survival and operations.

Integration of ERP systems with legacy systems is more complex than the integration of ERP modules and integration of e-business applications. It routinely requires the installation of third-party interface software for communication between ERP software systems and legacy systems. Second generation ERP systems use relational database management system (RDBMS) to store enterprise data. Data conversion from legacy systems to RDBMS is often a time-consuming and tedious process. Integration of the business processes also faced additional challenges related to new rules built into ERP software being incompatible with the established ways of thinking and the norms of behaviour embedded in the existing work routines. This incompatibility was so pronounced that it warranted a discussion on a separate section. As such incompatibility issues identified in the case studies is presented in the next section. This finding is consistent with the idea of ‘best practice’ being situated and supports that ERP systems face additional challenges in developing countries. The assistant purchasing manager in one of the organisations while explaining that ERP could not accommodate their work practice said that:

Given our unique requirement, Ebizframe could not meet our need. The system

Table B.11: Results of factor analysis

Challenge	Mean	F1	F2	F3	F4	F5	F6
Lack of skills	4.99					.792	
Insufficient training	4.94					.682	
Incompatibility with work	4.83	.689					
Data conversion problems	4.81	.610					
High system cost	4.71		.500				
Long customization period	4.68		.733				
Integration problems	4.67	.651					
Benefits not recognised	4.61			.591			
High user resistance	4.56			.912			
Inadequate preparation by employees	4.50					.792	
High staff turnover	4.34					.792	
Organisational changes	4.33			.699			
Complexity of ERP	4.29						.815
System insecure	4.23						.678
Staff layoff	4.20					.792	
Vendors unreliability	4.10				.814		
Poor ERP quality	3.17				.790		
Eigenvalue		3.52	3.00	2.05	1.63	1.45	1.24
Percentage of variance		18.5	15.54	10.78	8.56	7.61	6.52
Cummulative percentage of variance		16.47	28.66	40.16	49.78	59.18	67.51
Cronbach alpha coefficient		0.76	0.74	0.70	0.63	0.59	0.58

could not accept advance payments. It required us to raise DN [Delivery Note] first then raise sales invoice and they receive payment against the invoice. We don't work that way.

Factor 2, named "High cost further escalated by extensive customization", comprises two items relating to ERP system cost: High system cost and long customisation period. Cost is a major impediment to the implementation and use of ERP systems. Both the respondents in organisations that were interviewed alluded to this fact. The cost of ERP systems implementation averages between Kshs. 100 to 500 million (USD 1.4 – USD 7 million). However, the cost of ERP implementation varies from one ERP to another. Baan and SAP R/3, two of the ERP systems implemented by case organisations, software license fee charged based on: 1) the number users, 2) the type of users, 3) the number of master records in the database. Users are categorised based on what they can do or not do in the system.

Cost continues to be a concern for many organisations. In the case of SAP R/3, their costing model seemed not to favour Africa. For example, the cost charged per day per consultant is USD 1,200 plus and an additional hotel and overnight stay allowance of USD 400 charged per night. This is three times above the amount charged in the Asian continent countries like in India that is USD 600 per day. Implementation costs were found to be, on average 25% percent over budget. Organisations under-estimated support costs for the year following initial implementation by an average of 20%. IS maturity had a major influence on support cost for the year following initial implementation. Organisations with low IS maturity experienced an increase in support cost whereas IS mature organisations experienced a decrease in costs. This disparity can be traced, in part, to the widely varying maturity of pre-ERP environments. Lack of regional standardisation and low budget for IT within Kenya and other African nations makes it difficult for ERP companies to find markets with enough potential to justify investing in costly customisations of the products.

Factor 3, named "Poor change management and failure to realise ERP benefits", comprises four items relating to organisational changes triggered by ERP, resulting user resistance, and lack of realisation of benefits once ERP is operational: inadequate preparation by employees, organisational changes, benefits not recognised, and high user resistance.

Implementing an ERP will bring in changes to the way people work within the organisation, processes will change and there may be job cuts and rationalisation of responsibilities within departments. All this will definitely evoke resistance from the employees and this has to be managed effectively before, during and after the implementation of the ERP package. Respondents noted that they were inadequately prepared for the major undertaking of ERP implementation. Most respondents noted that they were neither aware of the reasons for the implementation nor the business benefits that can be expected by implementing a new ERP package. ERP projects are therefore perceived as a cost cutting measure by organisations which lead to mass staff layoff. Respondents noted that there was no strong change management team in place to oversee to approve, imple-

ment and track the changes in the organisation, which includes the impact and detailed structure associated with the life cycle of the ERP project.

Factor 4, named “Unreliability of vendors and poor quality of some ERP systems” comprises two items relating to poor services by ERP vendors and consultants, and some ERP systems being sub-standard: vendors are unreliable and the ERP quality is poor. Respondents noted that the quality of some ERP systems is not to standard hence not giving many users the desired results as they are inflexible and lack some functionality. This factor was more prevalent with organisations whose ERP systems had not matured or were relatively new such as ORION and EBIZFRAME. Organisations which were running SAP R/3, Baan and Oracle Financials disagree with the statement that expressed this factor.

The respondents also felt that the vendor representatives were unreliable and lacked knowledge of ERP. Most of the consultants were always communication with their counterparts in the vendor headquarters using telephone conference to try to implement the modifications and customisations. The communication cost is meant to be catered for by the implementing company and is part of contractual agreement. One obstacle was that the people who were available in Kenya did not understand the software. IT manager interviewed described the lack of experience on the part of a consultant in Kenya as follows:

The consultant in Kenya had limited experience. He always contacted the headquarters in India and held conferences. After 3 years of hard work without any result, we got upset. The vendor company then sent a new consultant which meant changes in the Implementation team.

The lack of confidence in knowledge of the consultant respondents noted often leads to ERP failure. The use of foreign experts in implementing the ERP software as well as the reliance on their headquarters abroad often leads to lack of confidence in ERP consultants in Kenya. Therefore vendors suffer from a lack of local expertise in their software.

Factor 5, named “Lack of skills by both users and high staff turnover” comprises three items relating to lack of capacity to cope with ERP on the part of all organisational members at all levels due to lack of training and high staff turnover: insufficient training, high staff turnover, and lack of skills by users.

An all common complaint was the frequency with which the case study organisations lose key personnel experienced with ERP or supporting technologies. Frequently reported problems were: (1) losing key IT specialists and user representatives working on the project while the project was going on, often despite handsome retention bonuses, (2) losing experienced people after the project was complete. Many IT specialists thrive on project work and view assignment as a ‘competence centre’ and springboard to lucrative opportunities.

One of the major challenges facing ERP systems implementation in Kenya is the non-existence of well-qualified employees in implementing organisations to manage the implementation process of the system. In one of the case organisations, the ERP project was supervised by the financial controller (the ERP Project Manager) and the heads of administrations (the key users). None of them had any knowledge about the computer or the ERP software. The organisations use India and South Africa as a resource base for implementation. The MIS General Manager said:

All of the company's leaders were not qualified to use the computer... They only trained on the beginnings of Windows and DOS... Training was internal in finance department for one week. One week was not enough. It was just background information.

Factor 6, named "Complexity of ERP system further compromising its security" comprises two items relating to complexity of ERP and security threat exposure in using ERP: complexity of ERP and system insecure. Complexity refers to the degree to which an ERP is perceived as being difficult to understand and use. Most respondents agreed that ERP system complexity discouraged its adoption and lead to greater difficulty in its implementation and further usage. The ERP systems are too complex for most users and thus users need to be trained adequately on how to use them. The implementation of ERP systems is quite an involving exercise that calls for co-operation between the vendors, the project teams and the management. One respondent commented that:

ERP has been notorious for its complexity. For example, SAP R/3 has more than 3000 configuration tables. We spent more than a year on only going through these tables

Respondents noted the complexity of ERP systems also leads to security vulnerabilities. ERP systems must be able to process a wide array of business transactions and implement a complex security mechanism that provides a granular-level access to users. For example, in SAP R/3, hundreds of authorisation objects are used to allow access to various actions in the system. A small or medium sized organisation may have 100 transactions that are commonly used, and each transaction typically requires at least two authorisation objects. If the company has 200 end users who fill a total of 20 different roles and responsibilities, there are approximately 800,000 ($100 \times 2 \times 20 \times 200$) ways to configure security in the ERP system—and this scenario excludes other complexity factors, such as multiple transactions sharing the same authorisation objects, an authorisation object having up to 10 fields that can be assigned various values, and the possibility of using position-based security.

B.6.2.7 ERP Implementation Scope Measures

Proposition 7: The seven ERP implementation scope measures (ERP breadth, ERP depth, BPR breadth, BPR depth, BPR magnitude, Business automation increase, and ERP customisation) represent at least three dimensions

In order to explore how well the seven identified ERP implementation scope dimensions discussed in Section 5.2 correlate to each other and whether they represented reliable measure for ERP implementation scope, we carried out exploratory factor analysis. The test of reliability was conducted to verify how well these measures quantify the ERP implementation scope variable. Cronbach's coefficient was computed. The reliability turned out to be low since the alpha value was 0.456. The low cronbach's alpha was obtained due to the fact that the data is multidimensional. The factor analysis was conducted in order to check the multi-dimensionality of data.

An exploratory factor analysis with Varimax rotation of the categories resulted in three factors with eigenvalues greater than one as shown in B.12. All variables loaded heavily onto their respective factors while their loadings on the other factors were negligible, and they explained 75% of the common variance.

The three factors were also interpretable and suggested a three-dimensional view of ERP scope: ER breadth, BPR magnitude and ERP depth.

The first factor was labeled Breadth as ERP Breadth and BPR Breadth had loadings of .95 and .90, respectively on this factor. ERP Customisation also had a loading of .35 on this factor. Recall that ERP Customisation was assessed as the extent of modification done to the ERP software so as to customise it to the organisation. The fact that the extent of ERP customisation moderately loads on the same factor with the two breadth variables suggests that more widespread and geographically dispersed ERP implementations tend to go together with greater software customisation. This may in part suggest that the variety in the business processes and organisational requirements of multiple sites across different geographical locations may at times be too great and difficult to homogenise via extensive BPR in all locations, thus requiring at least some customisation of the ERP software. The second factor was labeled Magnitude as BPR Automation Increase and BPR Magnitude had loadings of .83 and .69 on this factor, while ERP Customisation had a loading of -.73. The negative loading of this variable onto the magnitude factor is logical because, as mentioned above, ERP customisation is an indicant of the extent of BPR. As such, it can be expected to negatively correlate with ERP software customisation, i.e., extensive ERP software customization would mean little BPR, since it is the software rather than the organization's processes that are being modified. Conversely, little ERP customisation would mean significant BPR in order to fit the organization to the ERP software. Finally, the third factor was labeled Depth as ERP Depth and BPR Depth had loadings of .86 and .81, respectively on this factor. The above results indicate that the seven ERP implementation scope categories identified during qualitative data analysis can be viewed as aligned along three dimensions that can be labeled ERP Implementation Breadth, Magnitude, and Depth. Given that the seven measured characteristics reflect different aspects of an ERP implementation's scope or size, the factor analysis results suggest that conceptualising ERP implementation scope along these three dimensions would be theoretically meaningful and thus will be incorporated in the empirical mode to be developed in Chapter 7.

Table B.12: Factor Analysis of ERP implementation scope categories

	breadth	Magnitude	Depth
ERP breadth	.95	-.14	-.03
BPR breadth	.90	.07	.13
BP automation increase	24	.83	-12
BPR magnitude	-.08	.69	.42
ERP customisation	.35	-.73	.05
ERP depth	.04	.03	.81
BPR depth	.06	-.00	.86
Eigenvalue	2.02	1.84	1.38
Percentage of variance	29	26	20
Cummulative percentage of variance	17	23	35
Cronbach alpha coefficient	0.86	0.79	0.76

B.7 Summary

The findings from the quantitative research further supported the observations and insights gained from the qualitative phase of this research. The findings confirm the variation in ERP implementation practices among the public and the private companies in Kenya. Furthermore, the qualitative findings in this chapter confirms that Kenyan firms face additional challenges during ERP implementation relating incompatibility issues and the cost of ERP. Finally, the results presented in this chapter indicate that proposition 7 (Section 6.2) identified ERP implementation scope measures which are aligned along three dimensions.

Appendix C

Pilot Study Data Collection Collection Questionnaire

A. GENERAL IMPLEMENTATION PROCESS

A1. Which ERP system(s) is your company currently using? (Check all that apply)

- SAP
- J.D. Edwards
- Oracle
- PeopleSoft
- Baan
- Other, please specify:

A2. What ERP functions / modules are currently implemented at your company? (Check all that apply)

- All ERP functions
- Financial Accounting
- Management Accounting (controlling)
- Production Management
- Sales and Distribution
- Human Resource Management
- Payroll

- Industry Solutions
- Workflow
- Other, please specify:

A3. What reasons justified the implementation of the ERP system? (Check all that apply)

- Standardisation of processes
- Adaptation of processes to international best practice
- Improvement of existing customer-facing services
- Creation of new types of customer-facing services
- Improved internal logistical processes
- Improved management controls
- Enabling of future growth
- Increasing the firm's flexibility to respond to new market opportunities
- Other, please specify:

A4. What was the total cost of implementation of the ERP system?

A5. Which approach was adopted during the implementation? (Check which one (s) applies?)

- Best of breed approach
- Vanilla approach
- Big-Bang approach
- Module by Module approach
- Customised approach

A6. If the company adopted "Vanilla approach" were there conflicts emerging from company-specific requirements and the functionalities provided by ERP system?

Yes

No

A7. If yes, Please specify the degree to which conflicts between functional departments emerged during the implementation phase by ticking the appropriate cells:

	PM	PF	MF	MS	SF	HRF	Other
Cross-functional relationship does not exist in the ERP implementation project							
No conflicts emerged							
Conflicts emerged which were quickly settled by the project team							
Major conflicts emerged which had to be resolved by the steering committee							
Major conflicts emerged which have not yet been resolved							

B. PROJECT OUTCOME

B1. If the project implementation was not completed in time, for how long was did it delay?

More than 3 months over schedule

More than 1 month over schedule

Less than 1 month over schedule

B2. If the actual project budget exceeded the planned budget, by what estimate did it exceed?

More than 10% over planned budget

More than 5% over planned budget

Less than 5% over planned budget

B3. What has been the general outcome of the implementation project with regard to original expectations?

- Outcome surpassed original expectations
- Outcome met original expectations
- Outcome below original expectations but still some improvements realised
- No improvements realised

C. DEMOGRAPHICS

C1. Who owns your firm (in percent)?

- State Collective entity Private Kenyan entity Foreign entity public

C2. Approximately, what was your company's total revenue for the last fiscal year?

C3. Approximately, how much were your company's total assets at the end of the last fiscal year?

C4. What is your company's total number of full-time employees?

C5. What is the average percentage of your IT budget (for HW and SW) with respect to your firm's revenues?

- Less than 1% 1-2% 2-3% 3-4% 4%

C6. Did your company have a computer-based information system before ERP was adopted?

Yes

No

C7. If yes, please indicate computer-based information systems, which have been used prior to the ERP implementation project

Appendix D

Field Study One – Interview Protocol

1. How detailed was the planning stage of the project initiation?
 - Was there an analysis of the users of the existing systems?
 - Was there any formal process of analysing the users of the system before the implementation commenced?
 - What was the scope of the project – did you target some parts of the organisation or overall organisation? Did you consider upgrading your IT infrastructure?
 - What was the driving force or motivation to adopt ERP system in your organisation?
 - Kindly describe the process of acquiring ERP system from the time the idea was conceived to when it was installed? Approach: project team.
 - Were there business processes which ERP system could not support yet they were essential to the organisation? If yes, how did you resolve the conflicts?
 - How were the decisions made when changes were needed in the ERP?
 - What were the considerations for choosing the ERP software?
2. How successful do you feel the implementation has been thus far?
 - What types of things were documented as success factors for the implementation?
 - What types of success factors were identified for the each module portion of the implementation?
 - How was this information gathered to identify the success measures for this project?
 - Was there any type of analysis of the users and people that this implementation would impact?
3. Is/was the implementation of ERP on Schedule?

- Given that, is the project likely to on budget?
4. Has the introduction of SAP/Baan had a significant impact on how the majority of users complete their work tasks?
 - Specific examples? Feedback from Development teams?
 5. What (in your perspective) has been the biggest impediment to the implementation so far?
 - User interaction? Technical Issues? Organisational issues?
 6. Who else could I talk to about the initial planning stages of the implementation?
 7. Which module implemented first?
 - Was there a reason for it being implemented first?
 8. To what extent was ERP package module(s) customised?
 9. What lead to these customisations being recommended / completed?
 - Due to some form of requirements analysis?
 - Were the types of users taken into account?
 - Was the objective to change the software to fit the organisational procedures, or was it the other way around?
 10. What was the reason for the development of the Web face?
 - Was this linked to the needs of users?
 11. What input did you have in the development of the user training?
 12. Was the feedback from the User Training incorporated into the design and implementation of the ERP Modules? item Was there any formal process of analysing the users of the system before the implementation commenced?
 13. What type of feedback have you received from your users about the implementation?
 - Any resistance to change?
 14. How were the resources allocated for the support for users?
 15. Was the ERP implementation team involved in the User's Role analysis?
 16. With respect to the Role Analysis, did the users have any involvement in the identification of roles, in order to identify the specific configuration of ERP?

17. What was the impact of each group of users upon the physical design of the ERP system?
 - Did the needs of your department affect the design in a way that was contrary to the needs of other business users?
 - Who made these design decisions?
18. Have you received feedback from the users regarding the changes to their view of the ERP system?
 - Difference in the feedback of certain users?
19. Have you noticed a difference between the reactions of the different User's to the new system?
 - What do you attribute this to?
 - Have the user reactions been different to any other comparable projects you have been involved in?
20. Is/was the implementation of the ERP on track?
 - What have been the main problems?
21. Do you feel the implementation could have been improved?
 - What Information do you think could have assisted the project?
 - Do you think the implementation was carried out in the most effective way?

Appendix E

Survey Questionnaire – Field Study 2

A. DEMOGRAPHICS

A1. Who owns your firm (in percent)?

State Collective entity Private Kenyan entity Foreign entity public

A2. Approximately, what was your company's total revenue for the last fiscal year?

A3. Approximately, how much were your company's total assets at the end of the last fiscal year?

A4. What is your company's total number of full-time employees?

A5. What is the average percentage of your IT budget (for HW and SW) with respect to your firm's revenues?

Less than 1% 1-2% 2-3% 3-4% 4%

A6. Did your company have a computer-based information system before ERP was adopted?

Yes

No

B. ERP Motivation

B1. How much do you agree or disagree with the following statements as motivations towards implementing ERP system in your organisation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
Replace legacy systems							
Solve the Y2K problem							
Ease of upgrading systems							
Simplify and standardise systems							
Pressure to keep with competitors							
Improve interactions and communications with suppliers and customers							
Restructure company organisation							
Gain strategic advantage							
Link to global activities							

C. Extent of Cusotmisation

C1. To what extent was the ERP system customised in your organisation?

Minor Significant Major Others:

C2. What ERP functions / Modules were customised most in your company?

- All ERP functions
- Financial Accounting
- Management Accounting (controlling)
- Production Management
- Sales and Distribution
- Human Resource Management
- Payroll
- Industry Solutions
- Workflow
- Other, please specify:

D. ERP Implementation Scope

D1. What ERP functions / modules are currently implemented at your company? (Check **all** that apply)

- All ERP functions
- Financial Accounting
- Management Accounting (controlling)
- Production Management
- Sales and Distribution
- Human Resource Management
- Payroll
- Industry Solutions
- Workflow
- Other, please specify:

D2. Which ERP system(s) did your company implement? (Check **all** that apply)

- SAP
- J.D. Edwards
- Oracle
- PeopleSoft
- Baan
- Other, please specify:

D3. Which approach was adopted during the implementation (Check which one(s) applies?)

- Single ERP Package
- Best-of-Breed from different packages
- Single ERP with other systems
- Multiple ERP with other systems

E. ERP Implementation Strategies

E1. Which go-live strategy was adopted during the implementation? (Check which one (s) applies?)

- Big-Bang
- Mini big-bang
- Phased-In-By-Module
- Phased-In-By-Site
- Others

F. ERP Benefits

F1. Indicate whether you agree or disagree as to whether the following benefits have been achieved by your organisation

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
Reduced direct operating costs							
Quickened information response time							
Improved order management/order cycle							
Lowered inventory levels							
Increase interaction across enterprise							
Decreased financial close cycle							
Improved on-time delivery							
Improved cash management							
Improved interaction with suppliers							
Improved interaction with customers							

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	None
Integration of business operations/processes	
Availability of information	
Quality of information	
Customer responsiveness/flexibility	
Financial management	
Personnel management	
Decrease information technology costs	
Inventory management	
Supplier management/procurement	

F2. Which of these areas, in the table above) have benefited most as a result of ERP system implementation and usage?

G. ERP Challenges

G1. How much do you agree or disagree with the following statements about the challenges faced by your organisation during ERP implementation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
Integration of different types of data was a big problem							
Staff turnover after implementation was high							
ERP system too complex							
Users not well trained to use the system							
The system led to major organisational changes							
System led to many staff layoff							
Security of the system easily compromised							
Vendors are very unreliable							
There was lack of skills for implementing and using ERP							
Benefits of system not recognisable							
There were many problems during file conversion							
Resistance to the system was high							
Not enough time to implement the system							
Employees inadequately prepared for new system							
ERP incompatible with functional systems							
Customisation of ERP to organisational needs took too long							
Quality of ERP not to standard							

H. ERP Implementation Scope Measures

H1. ERP breadth

H1 (a) How many ERP modules are currently installed?

H1 (b) How many sites is the ERP system implemented?

H2. BPR breadth

H2 (a) How much do you agree or disagree with the following statements about the ERP breadth in your organisation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
BPR was carried out across modules							
BPR was carried out in multiple sites / departments/ divisions							

H3. BPR Automation Increase

H3 (a) To what extent do you agree or disagree with the below statement?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
ERP led to increased business process automation							

H4. BPR Magnitude H4 (a) To what extent do you agree or disagree with the below statements relating to the BPR magnitude in your organisation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
Business processes were extensively changed to align them with those offered by ERP system							
The BPs were only not changed in cases where the processes had competitive advantage to the organisation							

H5. ERP Customisation

H5 (a) To what extent do you agree or disagree with the below statements relating to the ERP customisation in your organisation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
ERP was heavily customised							
ERP was slightly customised							

H6. ERP depth

H6 (a) To what extent do you agree or disagree with the below statements relating to the ERP depth (vertical penetration of ERP) in your organisation?

DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
ERP is at all levels of organisation (i.e. operational, tactical, and strategic level)							
Analytic tools for reporting are installed and are being used by senior managers							

H7. BPR depth

H7 (a) To what extent do you agree or disagree with the below statements relating to the depth in your organisation?

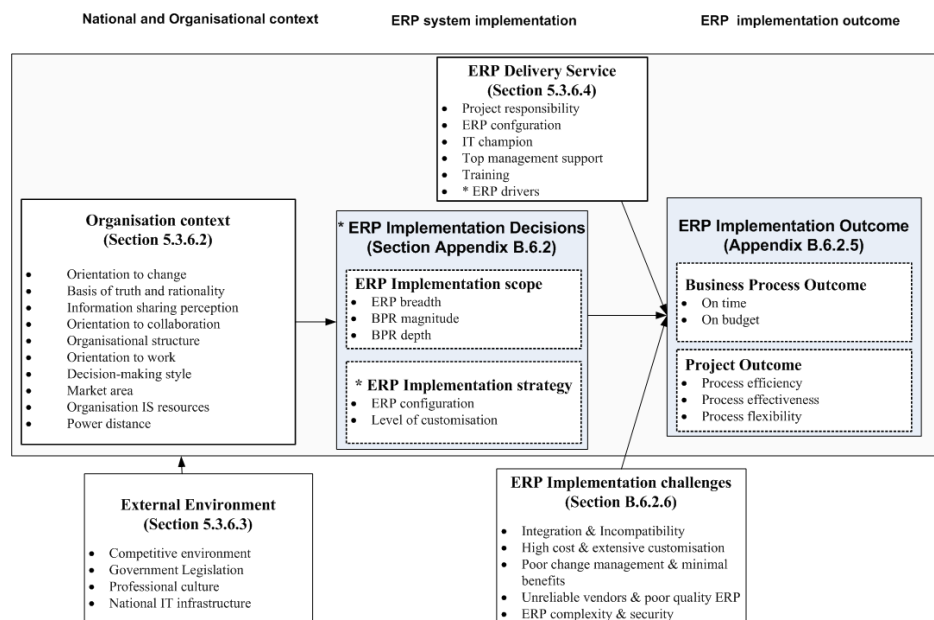
DDD=Strongly disagree; DD=Disagree; D=Disagree; N=Neutral; A=Slightly agree; AA=Agree; AAA=Strongly agree	DDD	DD	D	N	A	AA	AAA
Job description of many employees changed as a result of ERP							
New job positions were created as a result of ERP system							

Appendix F

Critical Group Discussion Guide

ERP IMPLEMENTATION MODEL

The Figure F.1 represents ERP implementation model developed in this study. It shows the influence organisational and national context has on ERP Implementation and ERP delivery, and subsequently ERP implementation outcome (project outcome and business process outcome). It shows organisational context as construct as being multidimensional. These dimensions have values which can positively or negatively influence ERP implementation decision and ERP delivery. ERP delivery is used to denote the ERP project management process and it moderates the ERP implementation outcome. In other words, if project is carried out well, then it can have positive influence and vice versa.



* Construct not directly derived from Table 5.5

Figure F.1: ERP Implementation Model

From your understanding of the constructs and dimensions involved in the model, please let us know your opinions in the following areas:

1. Based on your understanding of ERP implementation, please assess how workable this model is.

Highly workable

Workable

Unworkable

Highly workable

2. Please give a short explanation for your choice

3. The constructs and dimensions of the model and their interaction as described in Figure F.1 make sense to me

Strongly Agree

Agree

Disagree

Strongly Disagree

4. Please provide a brief explanation or comment / clarification for your choice

Please let us know your views on:

(a) How the workability of the model can be enhanced

(b) What names (descriptive words/phrases) do you think would be most suitable for the model constructs and dimensions of this nature?

(c) What would you consider to be the major deficiencies of the model?

ERP UPGRADE MODEL

The Figure F.2 represents ERP Upgrade decision model. It shows the factors which influence organisations to make decisions to carry out ERP systems upgrade. Organisations resources is shown as having a mediating effect on ERP upgrade decisions.

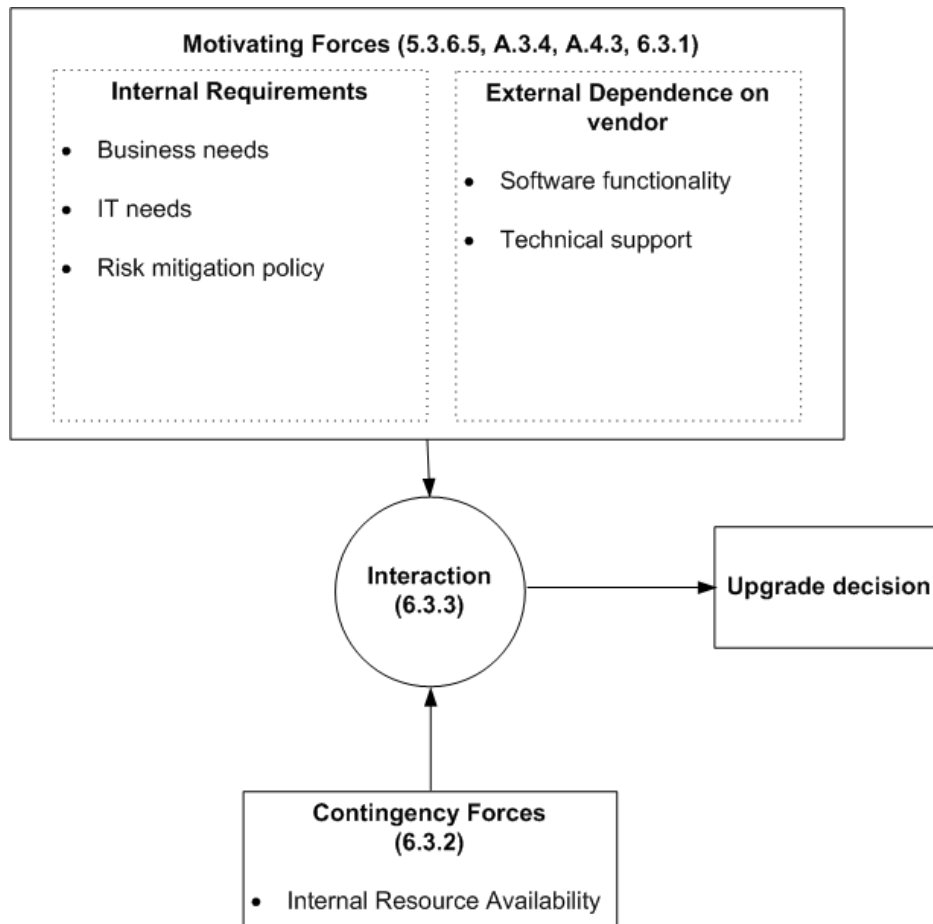


Figure F.2: Model of the upgrade decision process

From your understanding of the constructs and dimensions involved in the model, please let us know your opinions in the following areas:

1. Based on your understanding of ERP implementation and upgrade practices, please assess how workable this model is.

- Highly workable
- Workable
- Unworkable
- Highly workable

2. Please give a short explanation for your choice

3. The constructs and dimensions of the model and their interaction as described in Figure F.2 make sense to me

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

4. Please provide a brief explanation or comment / clarification for your choice

Please let us know your views on:

- (a) How the workability of the model can be enhanced

- (b) What names (descriptive words/phrases) do you think would be most suitable for the model constructs and dimensions of this nature?

- (c) What would you consider to be the major deficiencies of the model?

Appendix G

IT Strategy Framework

The IT strategy framework is tailored into four-phases: strategic vision, IT assessment, IT architecture, and IT plan. This four-phase approach can result in an IT strategy that is business-driven, comprehensive and pragmatic for organisations which are implementing ERP systems.

Clearly outlining the strategic vision of the organisation should be the starting point. The main sources of information which can be used in the Strategic Vision Phase are: organisation’s business plan; interviews with senior managers of the organisation, desk research on industry trends, and the organisation’s corporate objectives.

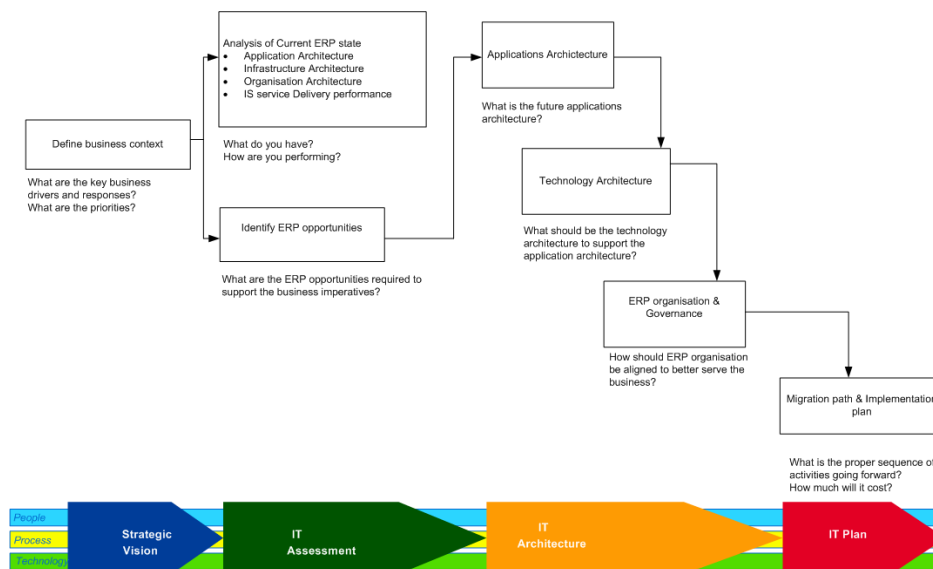


Figure G.1: Proposed IT strategy analysis framework

The IT Assessment should focus on five areas: (i) Systems – whether the application functionality is sufficient and cost effective, whether there are any deficiencies in the information provided by

them, and what unsatisfied demand exists in the context of the organisation's business model; (ii) People – how well the organisation manages its human resources in relation to IT (skills, attitude, responsiveness, process effectiveness); (iii) Technology –identifying technology trends and determining whether the IT architecture is effective. It is also important to determine how responsive is the technology infrastructure to the changing needs of the business; (iv) Delivery – determine how resources organised, monitored and controlled in a way that delivers IT services in the most efficient way, how the value of IT services measured and monitored, and how the value of IT perceived; (v) Strategy – this should aim at determining what must or needs to be done to ensure that the IT function effectively supports the business, and to ensure that IT is aligned with the business goals. The main sources of information which can used in the IT Assessment Phase are: structured interviews with organisations' personnel, IT Questionnaires, user questionnaires, desk research of the organisation's documentation.

The IT Architecture gives a 'picture' of the future/desired IT environment to guide investments and allocation of resources over the coming years. The IT Architecture should cover three components: (i) the application architecture –the ERP system that will be used; (ii) the infrastructure architecture –the hardware and communication that will be used; (iii) the organisation architecture –what the IT organisation will look like in order to develop and maintain the previous two components. The main sources of information which can be used in the IT Architecture Phase are: outputs from Strategic Vision and IT Assessment phases, workshop and discussions with the organisations' Project teams, desk research, and request for information on selected vendors.

The results of the three phases discussed can then be used to formulate the IT Plan based on the IT opportunities available and how well the opportunities support the organisation's strategic vision.