AN INVESTIGATION INTO THE CRITICAL SUCCESS FACTORS FOR EFFECTIVE ENTERPRISE RESOURCE PLANNING (ERP) IMPLEMENTATION IN THE PRINTING INDUSTRY: CASE OF PRINTFLOW PRIVATE LIMITED ZIMBABWE (2009 – 2013)

TENDAI JOANA TAZVIVINGA (R081981H)

A dissertation submitted in partial fulfillment of the Requirements for the degree of Masters of Business Administration

2013

Graduate School of Management

University of Zimbabwe

Supervisor Prof. Gabriel Kabanda
Dedication

I dedicate my dissertation work to my late father Martin Pondombiri Tazvivinga who tenaciously urged his children to pursue studies to the highest level possible which I still hope to achieve. I also dedicate this dissertation work to my loving husband Stanley Tsakatsa, my two lovely daughters Michelle Makanaka and Nicole Makomborero Tsakatsa whose valuable support, love and encouragement helped me to get through this project.

My mother, Catherine Tazvivinga, my sisters and my brother have also been a source of encouragement as I struggled through this difficult journey and their sacrifices along the way are most appreciated. They instilled a sense of urgency, discipline and whose amazing encouragement, love and strength guided me in completing this dissertation.
Declaration

I, **TENDAI JOANA TAZVIVINGA**, do hereby declare that this dissertation is the result of my own investigation and research, except to the extent indicated in the references included in the body of the report, and that this report has not been submitted in part or in full for any other degree programme to any other University or College.

Student’s signature: ____________________ Date: ____________________

Supervisor’s signature: ____________________ Date: ____________________
Acknowledgement

I thank my supervisor Professor G. Kabanda, who was a magnificent inspiration and shared his time and knowledge throughout the entire process. I also wish to express my gratitude to Printflow (Private) Limited staff members who supported me in this effort. Special thanks goes to Printflow Management for their understanding considering that this project required extensive use of computing resources such as internet facilities in search of valuable information as well as a great deal of time some of which came at the expense of the company.

My gratitude also extends to Mr Isaac Kwesu whose amazing encouragement, sense of urgency guided me through to finish this dissertation work.
Abstract

ERP projects are complex, integrated, enterprise-wide systems which influence main internal and external operations of an organization. This research investigates the critical success factors for an effective ERP implementation. The research conducts a literature review of the concepts applied in the research. The research examines the historical background of ERP systems and the implementation process. This research also critically reviews different critical success factors model for ERP implementation and also reviews relevant general and empirical literature on ERP implementation models. The research is based on a case study methodology of a partial ERP implementation. The research outlines the analytical framework of the research philosophy and research design chosen. The primary data used was collected using self and interviewer administered questionnaire from the employees of the case study organization. The research presents findings and analyses the data captured in line with other findings from several studies as well as linking them to the research objectives. The findings are represented together with a descriptive analysis, bar charts and statistical analysis tools. The study proposes that worked with functionality, maintained scope, top management support, user training and adequate testing are critical to a successful ERP implementation. Project management, change management, consultants, business process reengineering, budgeting, organizational diversity, and development are other important factors that are contributing to effective ERP implementation.
# Table of Contents

Dedication.................................................................................................................... i
Declaration.................................................................................................................... ii
Acknowledgement....................................................................................................... iii
Abstract......................................................................................................................... iv
Table of Contents.......................................................................................................... v
List of Tables................................................................................................................... ix
List of Figures................................................................................................................ x

1 CHAPTER 1 - INTRODUCTION................................................................................. 1
   1.1 Introduction............................................................................................................ 1
   1.2 Background of Printflow (Pvt) Ltd................................................................. 2
       1.2.1 The Corporate Strategy ........................................................................... 2
       1.2.2 SWOT Analysis for Printflow (Pvt) Ltd................................................. 3
   1.3 Background of ERP System in Printflow (Pvt) Ltd......................... 6
   1.4 Statement of the Problem ............................................................................... 9
   1.5 Research Objectives......................................................................................... 9
   1.6 Research Questions......................................................................................... 9
   1.7 Research Hypothesis....................................................................................... 10
       1.7.1 Null Hypothesis....................................................................................... 10
       1.7.2 Alternative Hypothesis........................................................................... 10
   1.8 Scope of Research.......................................................................................... 10
   1.9 Delimitations.................................................................................................... 11
   1.10 Limitations...................................................................................................... 11
   1.11 Justification of Research............................................................................... 11
   1.12 Structure of the Research............................................................................. 12

2 CHAPTER 2 – LITERATURE REVIEW.................................................................... 14
   2.1 Introduction....................................................................................................... 14
   2.2 Information Systems in General..................................................................... 14
   2.3 Historical Background of ERP System....................................................... 16
   2.4 Definitions of ERP System............................................................................ 18
   2.5 Components of an ERP System.................................................................... 19
List of Tables

Table 1.1: SWOT Analysis for Printflow (Pvt) Ltd, (2013) ......................................................... 3
Table 3.1: Quantitative and Qualitative Research Designs .......................................................... 43
Table 4.1: Summary of Research Response Rate ......................................................................... 58
Table 4.2: Cronbach’s Alpha Variable Reliability Test ................................................................. 60
Table 4.3: Tests of Normality ........................................................................................................ 61
Table 4.4: Top Management Support and Project Management .................................................. 62
Table 4.5: Top Management Support and User Training ............................................................. 63
Table 4.6: Top Management Support and Change Management ................................................. 65
Table 4.7: Top Management Support and Consultants ............................................................... 66
Table 4.8: Top Management Support and BPR .......................................................................... 67
Table 4.9: Top Management Support and Adequate Testing ....................................................... 68
Table 4.10: Top Management Support and Budgeting ............................................................... 69
Table 4.11: Regression Analysis Model Summary ....................................................................... 71
Table 4.12: ANOVA Table ........................................................................................................... 71
Table 4.13: Coefficients Table ...................................................................................................... 72
List of Figures

Figure 2.1: Information System Components ...................................................... 14
Figure 2.2: Information Systems Types .............................................................. 15
Figure 2.3: Evolution of ERP .............................................................................. 18
Figure 2.4: ERP System Modules/ Components .................................................. 20
Figure 2.5: Synthesised Process Model for ERP Implementation ....................... 21
Figure 2.6: A CSF Model with Strategic and Tactical Factors ............................ 24
Figure 2.7: Framework for ERP Implementation .................................................. 25
Figure 2.8: Conceptual Model ............................................................................ 36
Figure 3.1: The Research Cycle ............................................................................. 39
Figure 4.1: Respondent’s Department ................................................................. 58
Figure 4.2: Respondent’s Number of Years using Pecas Vision II ...................... 59
Figure 5.1: Modified Conceptual Model .............................................................. 75
1 CHAPTER 1 - INTRODUCTION

1.1 Introduction

Information Technology (IT) plays a vital role in business management in the modern age. It supports various activities of organisations and these ranges from the functional level right up to the strategic levels. Due to this support of various levels in an organisation, changing environments and circumstances have necessitated the need for proper dissemination of information among various levels of management. For an organisation to have better planning, better decision making and better results, there is need to develop and make use of Management Information System (MIS) which is a modern phenomenon concerned with the use of appropriate information.

An MIS is an integrated, user-machine system for providing information to support operations management and decision making functions in an organisation (Davis & Olson, 1985).

ERP is one of the latest technologies that many organisations have undertaken due to its ability to link several modules which include among others human resources, procurement, sales, finance, production, and warehouse. They can be customized to meet the user requirements. An ERP system is a comprehensive, packaged software solution seeking to integrate the complete range of a business's processes and functions in order to present a holistic view of the business from a single information and Information Technology (IT) architecture” (Klaus, Rosemann, & Gable, 2000).

These systems are getting more and more vital for modern companies as the competition is fierce on printing sectors and concentration on core competencies is leading to wide partner networks. In this kind of business environment, managing business information is very important for companies’ competitiveness. Therefore, by using ERP systems, companies can manage and utilize information efficiently.

This chapter outlines the background of the study. The chapter sets out the statement of the problem, outlines the research objectives and research questions. It also provides the justifications of the research as well as the structure of the research.
1.2 Background of Printflow (Pvt) Ltd

Printflow (Pvt) Ltd was formed through the Department of Printing and Stationery (Commercialisation) Act, 1999. It commenced full scale operations as a company on the 1st of December 2004. The company’s core business is to service government ministries and departments with in-house printed matter, publications such as the government gazette, acts and statutory instruments, outsourced and scholastic stationery, computers and computer consumables. The head office and the production plant are in Harare, other distribution outlets are in Harare, Bulawayo, Gweru, Mutare and Masvingo.

1.2.1 The Corporate Strategy

Printflow (Pvt) Ltd developed its corporate strategy in December 2004. The company’s vision is to be a leader in total printing solutions. The mission is to produce quality printed products timeously in an environmentally sustainable manner, by using the latest technology through an empowered workforce. The company’s shared values are that in achieving their vision they believe in honesty, integrity, transparency, customer focus, team work, innovation, discipline, people centeredness and being results driven.

The corporate strategy has undergone a number of reviews, the latest being in January 2009. The theme of the current three year strategy for the period starting in January 2009 is code named the “Business Navigator”. That is the background under which this research is being carried out.

Most organisations are investing substantial financial and human resources in ERP to streamline and integrate operations, processes and information flows. This synergizes the resources of an organisation namely men, material, money and machine. By implementing ERP, an organisation achieves a competitive advantage in areas of business such as accurate and timely information for strategic decision making, business process improvement and a strong client focus. With this in mind, Printflow (Pvt) Ltd is among other companies in the printing industry in Zimbabwe to implement ERP so that it can gain competitive advantage and improve productivity of the organisation. Management decided to take this decision in line with its vision of
becoming a total printing solution with modern technology, which increases efficiency resulting in the company becoming more competitive and productive. The concept of combining multiple processes into a single whole will allow the company to become successful in the long term.

1.2.2 SWOT Analysis for Printflow (Pvt) Ltd

Cole, (1994) explained that the combined analysis of external and internal issues affecting organisational performance is known as the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. He said most organisations are likely to select just a few key factors and relevant to them and will then analyse them systematically in terms of strengths, weaknesses, opportunities and threats. SWOT analysis helps to focus senior managers’ attention on major strategic issues, enable possible problems to be identified before they occur and provide an opportunity to identify organisational strengths (Cole, 1994).

The SWOT analysis which was conducted for PPL during the research is given in Table 1.1 below.

### Table 1.1: SWOT Analysis for Printflow (Pvt) Ltd, (2013)

<table>
<thead>
<tr>
<th>STRENGTH</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>o <strong>Customer base</strong> - Regular customers, the government departments.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Product Range Attractiveness</strong> - Diverse product range in form of printed matter, electronic goods and outsourced stationery.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Staff efficiency</strong> - High recruitment standards through staff training and regular manager training and briefing.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Financial position</strong> - Slow but</td>
<td></td>
</tr>
<tr>
<td>o <strong>Customer base</strong> - Concentration of risk due to the narrow segment of government departments.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Product Range Attractiveness</strong> – Poor customer focus.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Staff efficiency</strong> – Lack of adequate incentives for staff retention. Slow implementation of Performance Management System.</td>
<td></td>
</tr>
<tr>
<td>o <strong>Financial position</strong> – Low working capital.</td>
<td></td>
</tr>
</tbody>
</table>
steady growth in sales.
- **Procurement** - Trained and experienced personnel.
- **Technology** - Large inventory of printing equipment. Availability of an Enterprise Resource Planning (ERP) system.
- **Management systems** - High level of communication. Can Manage Strenuous situations with rapid response. A stable structure exists

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREATS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Product Range Attractiveness</strong> – Strategic alliances with foreigners show the potential to widen the product range.</td>
<td>- <strong>Product Range Attractiveness</strong> – Flooding of the Zimbabwean market with cheaper foreign substitute goods of similar quality.</td>
</tr>
<tr>
<td>- <strong>Staff efficiency</strong> – Company facilities and personnel are ideal for continuous recruitment and training. Potential to create brain gain through incentives offer.</td>
<td>- <strong>Staff efficiency</strong> – Brain drain to occur as the trained and highly skilled personnel migrate to competitors and abroad for assumed better working conditions.</td>
</tr>
<tr>
<td>- <strong>Financial position</strong> – New products</td>
<td></td>
</tr>
</tbody>
</table>
and markets to increase turnover. To improve costing and pricing. Pursue Strategic alliances, mergers and acquisitions.

- **Procurement** – Lower costs attained through direct importation of raw materials, components and accessories.
- **Technology** – New machinery acquisitions currently being carried out.
- **Processes** – Continual improvement due to periodical internal, external financial and QMS audits.
- **Management systems** – Decision making to drastically improve through utilisation of the new ERP.

- **Financial position** – Inconsistent government policies on taxation.
- **Procurement** – The State Procurement Board sanctioned process is too long.
- **Technology** – First mover advantage by competitors.
- **Processes** – Competitor Innovation
- **Management systems** – Brain Drain

An ERP system streamlines and integrates operations, processes and information flows thereby increasing overall business efficiency. Competitive advantage in areas of business such as accurate and timely information for strategic decision making, business process improvement and a strong client focus is attained when an organisation has implemented an ERP successfully. ERP system is one of the opportunities from SWOT analysis for Pintflow (Pvt) Ltd. The company has to make sure that the ERP is up and running without any challenges so that the company can enjoy those benefits which comes with it.
1.3 Background of ERP System in Printflow (Pvt) Ltd

The relationship between Information System (IS) functions and corporate strategy was not of much interest to top management of firms in recent years and so many problems due to failure in achieving strategies. Modern organizations are increasingly seen as knowledge-based enterprises in which proactive knowledge management is important for competitiveness (Holsapple, 2000). In intense competition ERP plays a critical role in supporting the knowledge management functions in organisations.

An Information System is a system which makes use of formalized procedures to provide management at all levels in all functions with appropriate information based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible (Argyris, 1991). O’Brien (2002) states: “a system is a group of interrelated components working toward the attainment of a common goal by accepting inputs and producing outputs in an organized transformation process.”

Most of ERP applications are developed to be off-the-shelf packages, resulting in many companies often finding this software application too complex to install and run. The reason being that ERP systems can change how people work and how businesses are run. ERP implementation is a large IT project that has higher chances of failure than most people expect. In the last decades, many studies have identified that the success rate is approximately 25%, the failure rate is also about 25%, and partial successes and failures exist around 50% (Kozak-Holland, 2007).

The ERP system (Pecas Vision II) was implemented in 2008 and during that year of implementation Zimbabwe’s economy was under a deep recession. Before the company decided to implement Pecas Vision II which is a windows based system, it was using Pecas which was more of command based system using terminals. During this period of recession the company could not pay for the Pecas ERP license which was paid in foreign currency since the service provider was based in United Kingdom. They used to rely on foreign currency from Reserve Bank of Zimbabwe. This shortage of foreign currency necessitated the need for a new ERP that’s when management decided to buy a new ERP system Pecas Vision II in South Africa. The question is why
then they decided to buy from South Africa where again there was need for foreign currency. The reason to go for a new foreign owned system was the issue of arrears which the company had incurred which were far way higher than to purchase a new system. They had to go for a year using the Pecas ERP system with expired license. During the first stage of implementation that was in August 2008, the Zimbabwean dollar had a number of zeros where we were now using trillions and quadrillions which the system could not cater for and this forced the project to go on a halt and it was later resumed in mid January 2009 when the country dollarised. It took two weeks to implement the system and the system went live on the first of March 2009.

It has been found out that in most cases, the cost of a full-scale ERP implementation in a large organization can easily exceed $100 million, and the implementation usually takes not less than two years to complete. For the company under study the implementation process took only two weeks to implement and they have budgeted R100 000 for the implementation which is way far below the general average time and budget for an ERP implementation. A recent survey revealed that 65 percent of executives believe ERP implementation has at least a moderate chance of damaging their business. Obviously, it is very important to identify and understand the factors that impact heavily on the success or failure of ERP implementation (Umble & Umble, 2002)

Some of the problems which are being faced at the company of study with the ERP system are as follows:

- **Inadequate user training** – this might be the reason why the company is experiencing incorrect postings by the system users since the system was implemented within a short period of time as compared to literature. The supplier/consultant was onsite for three weeks to install, train and test the system. Because of the limited time one key user from each department was trained and almost all of these key users have left the organisation and some have passed on with their knowledge. Some of the incorrect postings are also due to human error due to inadequate appreciation of the system. This inadequate user training might also be causing wrong financial reports as the
users post their transactions wrongly. For example debtors’ ledger not balancing with the General ledger.

- **Improperly integrated modules** – the costing department sometimes experience errors in their cost figures due to the improper integration of the inventory module and the costing module since all purchased items are entered at cost in the inventory module. Sometimes the system provides wrong information in the cost sheets and some other time there will be nothing on the cost sheets yet there will be some items which will have been posted. This problem results in under pricing the items thereby prejudicing the company for its revenue.

- **Improper setup of modules** – the estimation module is producing wrong estimates since the day of implementation and the organisation under study has resorted to use excel generated estimates for customers instead of system generated estimates. The reason why this module is not working properly might be due to improper setup of variables in the module. This improper setting can be a result of limited resources during the implementation period. The costing module is also having challenges on machine rates as they are being shown in the system but on printing the time sheets it does not show.

- **Some modules not working** – the Estimation, Procurement, Production and Customer Relationship Management (CRM) modules are not currently working. The production, CRM and procurement modules are not yet setup. These modules which are not yet linked with other modules are preventing the organisation to really enjoy the benefits of a fully working ERP system. Some of these modules provide key inputs to other modules and this slows the whole process yet the company was supposed to benefit from increased efficiencies.

Literature on assessing ERP implementation critical success factors has been conducted in other parts of the world for companies such as Elevatorco in China and Oilco in Australia. There are, however, no critical success factors for ERP implementation literature on Zimbabwe in general and printing companies in particular.
1.4 Statement of the Problem

Despite having implemented ERP system in 2008 Printflow (Pvt) Ltd is yet to fully operationalise the system. Printflow (Pvt) Ltd is still experiencing many challenges that include improperly integrated modules, some transactions are not posting through to their correct accounts resulting in wrong financial reports, some modules are not working since 2008 when the system was implemented, and users do not have an appreciation of the system hence a lot of human errors arise in the system. Did Printflow consider critical success factors prior to project take off? What should Printflow do to bring its ERP project under control? It is against this background that this research investigates the critical success factors which facilitate effective implementation of ERP in the printing industry with special reference to Printflow (Pvt) Ltd.

1.5 Research Objectives

The objectives of the study are:

- To identify the conditions that facilitates the effectiveness of an ERP implementation.
- To determine the critical success factors for ERP implementation.
- To ascertain the factors to be considered prior to the project take off.
- To determine measures that can be taken to curtail troubled ERP projects.

1.6 Research Questions

- What factors facilitates the effectiveness of an ERP implementation?
- What are the critical success factors for ERP implementation that management should know?
- What factors need to be considered prior to the project take off?
- How can ERP systems be implemented effectively?
- What actions can be taken to bring troubled ERP projects under control?
1.7 Research Hypothesis

1.7.1 Null Hypothesis

- **H1**: $H_0 = $ Project management has a positive impact on ERP implementation success.
- **H2**: $H_0 = $ User Training has a positive impact on ERP implementation success.
- **H3**: $H_0 = $ Change Management has a positive impact on ERP implementation success.
- **H4**: $H_0 = $ Consultants has a positive impact on ERP implementation success.
- **H5**: $H_0 = $ Business Process Reengineering has a positive impact on ERP implementation success.
- **H6**: $H_0 = $ Adequate Testing has a positive impact on ERP implementation success.
- **H7**: $H_0 = $ Budgeting has a positive impact on ERP implementation success.

1.7.2 Alternative Hypothesis

- **H12**: $H_A = $ Project management has a negative impact on ERP implementation success.
- **H22**: $H_A = $ User Training has a negative impact on ERP implementation success.
- **H23**: $H_A = $ Change Management has a negative impact on ERP implementation success.
- **H24**: $H_A = $ Consultants has a negative impact on ERP implementation success.
- **H25**: $H_A = $ Business Process Reengineering has a negative impact on ERP implementation success.
- **H26**: $H_A = $ Adequate Testing has a negative impact on ERP implementation success.
- **H27**: $H_A = $ Budgeting has a negative impact on ERP implementation success.

1.8 Scope of Research

This research study will focus on the printing industry. It will concentrate on Printflow (Pvt) Ltd as the case study. The study will focus on the operations of the entire
organization in the post dollarization period that is from 2009 to current. A survey to be carried out will center on the Head Office since it is the one running the Pecas Vision II ERP system, the other branches have point of sale system running since they are just into selling the final product.

1.9 Delimitations

The research will be based on a single case study of Printflow (Pvt) Ltd in Harare.

1.10 Limitations

- Time limitations, a totally perfect research project of this nature would require a substantial amount of time far much more than the time available to undertake this study.
- The unavailability of adequate funds to undertake this study.
- The researcher is likely to face problems in getting all the documentation prior to the ERP implementation since most of the employees involved in the project have left the organisation and there are no any filed documents to that.

1.11 Justification of Research

This study will help Printflow (Pvt) Ltd to assess or revisit its ERP implementation process which it embarked on in 2008 and make all corrects based on the critical success factors for an ERP implementation. It will also help management to know the critical success factors for ERP implementation for their future encounters. Through the use of a fully implemented ERP the organisation will be more efficient resulting in increased organisational performance hence increasing its competitiveness. It will also help management how to deal with change management. This study will contribute to the existing wealth of knowledge and will contribute in literature on business process reengineering and organizational development.

This study will also enhance the researcher’s academic knowledge and expertise
in the area of ERP implementation and any other related IT projects implementation. It also encourages a practical application of the theories and concepts covered under the period of study. The study is also a basic requirement for the fulfillment of the Masters in Business Administration.

1.12 Structure of the Research

This research is organized as follows:

Chapter 1

The chapter outlines the background of the study. It sets out the statement of the problem, outlines the research objectives and research questions. It also provides the justifications of the research as well as the structure of the research.

Chapter 2

This chapter critically reviews critical success factors models for ERP implementation. The chapter also reviews relevant general and empirical literature on ERP. This chapter examines the historical background of ERP systems, the implementation process of ERP.

Chapter 3

The chapter discusses the research methodology that was adopted for this research in achieving the objectives of the problem under study and justifications for the methods chosen. It also outlines the analytical framework of the research philosophy, research design chosen, the justification for a single case study approach, the preparation for data collection, the main sources of data collection, and the data collection process and data analysis.

Chapter 4

The chapter presents findings on the investigation of critical success factors for ERP. It analyses the data as captured in the questionnaire in line with findings from other studies as highlighted in the Literature Review as well as linking them to the research objectives stated in the introductory chapter. This chapter applies the
conceptual framework from Chapter 2 to the case study, and will see how the selected theory can explain the results obtained from case study. These findings are presented together with a descriptive analysis in the form of bar graphs and statistical analysis tools.

Chapter 5

The chapter makes inferences and conclusions based on findings in Chapter 4 in answering the major research question. Recommendations and areas of further study will also be highlighted in this chapter.
2 CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction
Chapter 1 highlighted the need for the research and in this chapter the researcher conducted a literature review of the concepts applied in the research. The chapter critically reviews different critical success factors models for ERP implementation. This chapter also reviews relevant general and empirical literature on ERP. This research examines the historical background of ERP systems and the implementation process of ERP.

2.2 Information Systems in General
An information system is an organized combination of people, hardware, software, communication networks, and data resources that stores and retrieves, transforms and disseminates information in an organization (O’Brien & Marakus, 2006).

Information system components and resources are hardware resources, software resources, people resources and network resources.

Figure 2.1: Information System Components: (O’Brien & Marakus, 2006)
He further defines three major roles for an information system: a) Support of strategic advantage, b) Support of managerial decision making, and c) Support of business operations.

In strategic level information system support long-range planning of senior management. For supporting managerial decision making level information systems will support monitoring, controlling, decision-making, and administration by middle management and at business operations level it produces routine answers and works as nuts and bolts of the business (Laudon & Laudon, 2006).

O’Brien (2002) divides information systems in two types according to their supporting objectives which are Operations support systems and Management support systems.


According to Laudon & Laudon (2006), functional information systems are divided into four types according to the business function they support which are Sales and Marketing, Manufacturing and Production, Finance and Accounting, and Human Resources. Each business function has its own specialized information systems at each level. Not all business activities are contained within a single functional area, so it is not possible to just identify applications by areas of functionality. This matter created the
need to identify systems by processes. This regard to processes is important because some business tasks are subsets of a business process and some processes are cross-functional (Laudon & Laudon, 2006).

Laudon & Laudon (2006) define process as a manner in which work is organized, coordinated, and focused to produce a valuable product or service and state that there is transcend boundary between sales, marketing, manufacturing, and research and development that build cross-functional business processes.

According to Laudon & Laudon (2006) many processes are larger than one division and so they divide cross-functional information systems to two types:

- If it goes across entire enterprise, it is called an “Enterprise System” (ERP)
- If across multiple firm site is referred to as an “Inter-organisational System” (IOS).
- Enterprise Resource Planning (ERP) system software packages are highly integrated, complex systems for business, and thousands of businesses are running them successfully worldwide (Koch, 1996).

2.3 Historical Background of ERP System

Davenport (1998) believed that ERP systems can be considered as the most important development in technology in 1990s. ERP software programs enable organisations to control business processes by using a standard database operating on a normal information technology platform and shared management reporting applications. ERP evolution started with Materials Requirement Planning (MRP) as universal manufacturing equation (Wallace & Kremzar, 2001).

Materials Requirement Planning (MRP I) systems, were introduced in the 1960s and they are computer-based systems for inventory control and managing production schedules. As data from the factory floor, warehouse, or distribution center began to affect more areas of the company, the need to distribute these data across the entire enterprise demanded that other business area databases interrelate with the MRP I system. However, MRP I systems had limitations on this functionality leading to the development of Closed-Loop MRP where tools were developed such as Sales & Operations Planning, Master scheduling, Demand management and Rough-Cut Capacity Planning (Wallace & Kremzar, 2001).
The fundamentals of ERP are the same as with MRP II. However, Lall & Teyarachaku, (2006) stated that ERP software distinguish itself from MRP and MRP II software in several features that are:

- They allow all business areas to access a centralized database thereby eliminating redundant data and improving information float, data accuracy and availability.
- They are general purpose software that can be implemented in any business.
- ERP systems group business processes into modules such as accounting and finance, sales and distribution, human resources, production and materials management.
- ERP systems process and distribute information on a real-time or near real-time basis. This helps businesses achieve a higher level of customer service by being more responsive to customer needs. Additionally, most ERP systems have multilingual capabilities and make use of powerful graphical user interface (GUI).

According to Wallace & Kremzar (2001), ERP is direct outgrowth and extension of MRP and, as such, includes all of MRP’s capabilities. They further noted that, ERP is more powerful in that it applies a single set of resource planning tools cross the entire enterprise, provides real-time integration of sales, operating, and financial data and connects resource planning approaches to the extended supply chain of customers and suppliers.
The following Figure 2.3 shows the evolution of ERP systems.

![EVOLUTION OF ERP](image)

**Figure 2.3: Evolution of ERP: (Wallace & Kremzar, 2001)**

### 2.4 Definitions of ERP System

Wallace & Kremzar, (2001) described ERP as an enterprise-wide set of management tools that balances demand and supply, containing the ability to link customers and suppliers into a complete supply chain, employing proven business processes for decision making, providing high degrees of cross-functional integration among sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development, and human resources, thereby enabling people to run their business with high levels of customer service and productivity, and simultaneously lower costs and inventories; and providing the foundations for effective e-commerce.

Wier, Hunton, & HassabElnaby, (2007), said ERP systems aim to integrate business processes and Information and Communication Technology (ICT) into a synchronized suite of procedures, applications and metrics which goes over firms’ boundaries. Verville *et al.*, (2007), states that ERP systems have increased the productivity of organisational functions by increasing their continuous access to real time information and enabling them to plan well-timed and efficient tasks.

An ERP system is a business management system comprising integrated sets of comprehensive software that can be used, when successfully implemented, to manage
and integrate all business process and functions within an organisation (Shehab et al., 2004, Ehie & Madsen, 2005). They usually include a set of mature business applications and tools for financial and cost accounting, sales and distribution, management of materials, human resources, production planning and computer integrated manufacturing, supply chain, and customer information (Boykin, 2001; Koh & Saad, 2006, Motwani, Subramaniam, & Gopalakrishna, 2005). According to Lall (2006), ERP is a software suite that integrates back-office operations such as manufacturing, finance, accounting, sales, distribution and human resources in an enterprise and links these operations to the front-office and supply chains.

Lall (2006); Boykin, (2001); Koh & Saad, 2006; and Motwani, Subramaniam, & Gopalakrishna, (2005) all mentioned about the integration of applications and tools for finance and accounting, human resources, sales, planning, supply chain and customer information. From these definitions this research defines an ERP as a business management system that when successfully implemented integrates back-office operations like finance, cost accounting, manufacturing, production, planning, human resources, sales and distribution, customer relationship management, purchasing, to the front-office and supply chains.

2.5 Components of an ERP System

According to Shehab, Sharp, Supramaniam, & Spedding, (2004) the modules/components of an ERP system are as follows:

- Financial and Accounting;
- Sales and Distribution;
- Materials Management;
- Quality Management;
- Human Resources and;
- Project Management.

These components/modules and their sub components/modules are depicted in Figure 2.4 on the next page.
The following diagram Figure 2.4 shows the ERP system components/modules.

Figure 2.4: ERP System Modules/Components: (Shehab, Sharp, Supramaniam, & Spedding, 2004).
2.6 ERP Implementation Process

The following diagram Figure 2.5 is the synthesised process model for ERP Implementation.

![Diagram](image)

**Figure 2.5: Synthesised Process Model for ERP Implementation: (Shanks, Parr, Hu, Corbit, Thanasankit, & Seddon, 2000)**

The ERP implementation process concerns all aspects of implementation including developing the initial business case and planning the project, configuring and implementing the packaged software, and subsequent improvements to business processes. ERP implementation should therefore be considered a “business project rather than a technological initiative” (Markus & Tanis, 1999).

2.6.1 Panning Phase

ERP packages provide a lot of customising possibilities which enhance the configuration of the software. But they make assumptions of the data flow which are often not corresponding to the legacy system data flow (Ross, 1999). Process change is a key decision during the planning stage of an ERP project (Ross, 1999). A clear project goal and objectives should be defined by the project management in this stage. According to Markus & Tanis (2000), this phase is called the chartering phase. Key
activities in this phase are building a business case for enterprise systems, selecting a software package, identifying a project manager and approving a budget and a project schedule. According to Shanks et al. (2000), the planning phase is mostly concerned with selecting the ERP system, scoping the project, formulating the system architecture, development of the business case, identification of a project manager and approval of budget and schedule.

2.6.2 Implementation Phase

According to Ross (1999), even with careful planning and training, going live usually can be highly disruptive. An ERP is a commitment to a new way of doing business and employees need training to do their jobs. This phase, which is called project phase according to Markus & Tanis (2000), comprises activities intended to get the system up and running in one or more organisational units. Every ERP project needs an implementation phase in which the changes of the system or the new functionality used is going live. Key activities are software configuration, system integration, testing, data conversion, training, and rollout. A large number of errors and problems can occur (Markus & Tanis, 2000).

2.6.3 Stabilisation and Improvement Phase

Characteristic activities in the stabilisation/improvement phase include bug fixing and rework, system performance tuning, retraining, staffing up to handle temporary inefficiencies, continuous business improvement, additional user skill building and post implementation benefit assessment. This is the phase in which the errors of prior phases are felt in the form of reduced productivity or business disruption. But it is also possible that new errors can occur in this phase also (Markus & Tanis, 2000). During stabilisation the project team should clean up processes and data and performance of the systems should be improved. Ross (1999) notes that organizations may stay in stabilisation stage for months, sometimes for years. When the business environment changes, technology also changes or changes in user community will directly result in adding-on in the ERP systems. These add-ons are referred to as system upgrades. After stabilization, continuous improvement is needed. That means that the functionality
should be increased and other improvements should be implemented by the project team (Ross, 1999). Improvement phase is where the targeted requirement has been met. Ross (1999) believes that transformation phase arrives when the improvement phase has accomplished.

2.7 Critical Success Factors for ERP Implementation

ERP systems implementation is a complex exercise in technology innovation and organizational change management (Kumar, Maheshwari, & Kumar, 2002; Markus & Tanis, 2000) and it is not a painless assignment. It requires the bringing together of many activities of an organization and a close collaboration of employees, IT specialists, managers, consultants, business analysts, and trading partners (Sambamurthy & Kirsch, 2000). It therefore means that ERP system implementation is not possible through an On/Off button approach whereby rollout of the new system will necessarily capitulate the desired and expected outcome. Furthermore, the ERP systems implementation differs from traditional systems implementation in complexity, scale, organizational impact, cost, user’s participation, and business impact (Grabski & Leech, 2007).

Understanding the implementation process through a balanced perspective will therefore prevent any unpleasant surprise, and will ensure and guide the change process to be embedded in a painless fashion (Al-Mudimigh, Zairi, & Al-Mshiri, 2001). According to Gargeya & Brady (2005), an ERP success can be a complete success which is one in which everything goes off without a hitch, or one in which there are few alignment problems, resulting in minor inconvenience or downtime. As ERP plays a very important role in business, ERP implementation and its critical issues, success factors and implementation problems have been investigated in the past (Parr and Shanks, 2000; Majed, Bdullah & Mohamed, 2003; Soh, Sia, & Tay-Yap, 2000; Sumner, 2000). Critical success factors are these areas and operations which should be focused on primarily in order to achieve the most satisfying results of the ERP systems implementation (Ziemba & Papaj, 2012, and Ziemba & Papaj, 2013).

There is a lack of proven scientific theories and experiences on the implementation of ERP systems in printing industry. These all create the need for
research on the implementation of ERP systems in printing industry. To ensure effective implementation, there are critical issues that must be carefully considered and managed (Bingi, Sharma, & Godla, 1999). Recent researches (from 2000 until now) have increasingly studied critical success factors in ERP implementation in different circumstances. An important challenge from these researches is to identify the factors that determine the success of the implementation of systems in printing industry. We are confident that the theory of critical success factors gives good basis for stating what criteria should be followed during ERP systems implementation. Literature varies regarding which variables are required for implementation success or responsible for failure.

2.7.1 Critical Success Factors Models

There have been a number of researches recently published on the critical factors contributing to ERP implementation. Holland, Light & Gibson, (1999) consider strategic and tactical factors for implementing ERP and propose a critical success factor model. Their model is shown on Figure 2.6 below.

![Figure 2.6: A CSF Model with Strategic and Tactical Factors: (Holland, Light, & Gibson, 1999)](image)

Huang & Palvia (2001) proposed ten factors (at the national/environmental and organizational level) concerning ERP implementation by making a comparison of advanced and developing countries. The national/environmental factors identified by
them are economy and economic growth, infrastructure, regional environment, government regulations, and manufacturing strengths. They also noted that information technology maturity, computer culture, business size, business process re-engineering experience, and management commitment are the organizational level factors. This model can be seen on Figure 2.7 below.

Figure 2.7: Framework for ERP Implementation: (Huang & Palvia, 2001)

The success of ERP implementation has variety of factors, that are considered to be critical and many researches are trying to list them. Al-Mashari, Al-Mudimigh, & Ziri, (2003) suggests that “clear vision and business direction is fundamental for the success of ERP system implementation”. Umble, Haft, & Umble, (2003) summarized the most prominent critical success factors for implementing ERP as follows:

- Clear understanding of strategic goals,
- Commitment by top management,
- Excellent project management,
- Organisational change management,
- A great implementation team,
- Data accuracy,
- Extensive education and training,
- Focused performance measures, and
- Multi-site issues.

Mabert, Soni & Venkataramanan (2003) summarized critical success factors from three case studies based on different organisations implementing ERP systems. They found similarities between those organisations in which implementation were successful. They listed the following factors:

- Senior executives were very involved throughout the project, from the outset to completion, and also established clear priorities.
- A cross-functional ERP Steering Committee with executive leadership was established to oversee the project. The Steering Committee was empowered to make key decisions, both during the planning and implementing stages.
- The implementation team spent extra time up front to define in great detail exactly how the implementation would be carried out.
- These companies laid out clear guidelines on performance measurements.
- Modifications to the ERP system code were kept to a minimum.
- Organizational change and training strategies were developed in advance and were continually updated during the implementation.
- Key technology issues, such as data integrity and technology infrastructure, were addressed early.
- Only minor re-engineering efforts were carried out up front.
- The implementation plan and subsequent progress was communicated regularly to employees, suppliers and customers.

According to Stratman & Roth (2002) through a questionnaire survey of 79 North American manufacturing users of ERP systems, they identified eight generic constructs which are hypothesized to be associated with successful ERP implementation. The generic constructs are as follows:

- Strategic information technology planning,
Executive commitment,
Project management,
Information technology skills,
Business process skills,
ERP training,
Learning, and
Change readiness.

Gargeya & Brady (2005) by using content analysis model and searching more than 100 articles and books proposed the following critical success factors for ERP implementation:

- Worked with functionality / Maintained Scope
- Project team / Management Support / Consultants
- Internal Readiness / Training
- Deal with Organisational Diversity
- Planning / Development / Budgeting
- Adequate testing

According to (Ngai, Law, & Wat, 2008; Al-Mashari, Al-Mudimigh, & Ziri, 2003) they came up with certain roles to possess higher places through ranking for success factors of ERP implementation which studies has highlighted as follows:

- Top management perception and support,
- Business process reengineering (BPR),
- User involvement,
- Effective project management,
- Education and training of staff, and
- Vendor support

Somers & Nelson (2001) summarize a comprehensive list of 22 critical success factors during ERP implementation. The list is based on factors that may affect the ERP implementation process and the probability of conversion success has been identified in
the Information Technology implementation, Information Technology failures, and business process reengineering. Among the more important factors are:

- Top management support and involvement,
- The need for a project champion,
- User training,
- Technological competence,
- Process delineation,
- Project planning,
- Change management, and
- Project management.

Bradford & Frorin (2003) test those eight critical success factors and they have proven their significance for the success implementation. In addition to those, the rest of 22 critical success factors are:

- Management of expectations
- Vendor/customer partnerships
- Use of vendors’ development tools
- Careful selection of the appropriate package
- Steering committee
- Use of consultants
- Minimal customization
- Data analysis and conversion
- Defining the architecture
- Dedicated resources
- Clear goals and objectives
- Interdepartmental communication
- Interdepartmental cooperation
- Ongoing vendor support

Dong (2001); Umble, Haft, & Umble, (2003); Mabert, Soni & Venkataramanan (2003); Stratman & Roth (2002); Gargeya & Brady (2005); Ngai, Law, & Wat (2008); Al-Mashari, Al-Mudimigh, & Ziri, (2003); Somers & Nelson (2001); Bradford & Frorin
(2003); Gupta (2000); Alaskari, Ahmad, Dhafr, & Pinedo-Cuenca (2012); Nah & Lau, (2001); Shanks et al., (2000); Parr & Shanks, (2000); Holland & Light (1999), and Huang & Palvia (2001), subscribe to the notion that top management support is the most critical factor of them all for effective ERP implementation.


In other studies by Holland & Light (1999), Umble, Haft, & Umble, (2003); Stratman & Roth (2002); Ngai, Law, & Wat, (2008); Al-Mashari, Al-Mudimigh, & Ziri, (2003); Alaskari, Ahmad, Dhafr, & Pinedo-Cuenca (2012), Somers & Nelson (2001), Shanks et al., (2000), and Nah et al. (2001), conclude that project management is critical for effective ERP implementation.

Umble Haft, & Umble, (2003), Somers & Nelson (2001); Parr & Shanks, (2000); Markus, Axline, Petrie, & Tanis, (2000); and Mabert, Soni & Venkataramanan, (2003), think that change management is critical for a successful ERP implementation. Ngai, Law, & Wat, (2008), and Gargeya & Brady (2005), concur that user involvement and adequate testing respectively are critical for effective ERP implementation.

According to Gargeya & Brady (2005), they propose that maintained scope, worked with functionality and adequate budget are critical for effective ERP implementation even though they concur with other authors on factors such as management involvement, adequate testing, and user training.

Proper project planning is a critical success factor for ERP implementation and this is proposed by Somers & Nelson (2001); Holland and Light (1999); Aladhwani (2001); Mabert, Soni & Venkataramanan (2003); Stratman & Roth (2002); and Gargeya & Brady (2005).

According to Holland & Light (1999); Huang & Palvia (2001); Mabert, Soni & Venkataramanan (2003); Stratman & Roth (2002); Parr & Shanks, (2000); Alaskari,
Ahmad, Dhafr, & Pinedo-Cuenca (2012); and Nah et al. (2001), confirm that business process reengineering a critical success factor for effective ERP implementation.

However, Umble, Law, & Wat, (2003) and Mabert, Soni & Venkataramanan (2003), argue that data accuracy and integrity are critical for ERP implementation. In other studies by Umble, Law, & Wat, (2003), Holland & Light (1999), and Bradford & Frorin (2003), propose the idea of a clear understanding of strategic goals and a great implementation team as critical for effective ERP implementation.

Gargeya & Brady (2005), Ngai, Law, & Wat, (2008), and Somers & Nelson (2001), concur that vendor support / involvement is critical for effective ERP implementation. However, Somers & Nelson (2001) argues that technological competence and process delineation are critical for a successful ERP implementation.

Aladwani (2001) described an integrated, process-oriented approach for facing the complex social problem of workers’ resistance to ERP systems. Holland & Light (1999, concur with Aladwani (2001) that client acceptance is critical for a successful ERP implementation. In other studies it has been found that the mismatch between ERP and organisation has significant impact on organisational adoption, and this could be the main reason causing the ERP implementation failure (Umble, Haft, & Umble, 2003).

According to a study carried by Davison (2002), ERP implementation can result in cultural impacts. Martinsons (2004), supports Davison (2002) that cultural differences are critical to ERP implementation success. Corporate culture rather than national culture shows more association with ERP implementation problems (Krumbholz et al., 2000). Awareness of cultural differences and preferences will certainly improve the assessment of ERP suitability and any subsequent implementation (Davison, 2002).

2.8 Variables

2.8.1 Top Management Support

Many studies have stressed the importance of top management support as a necessary ingredient in successful ERP implementation (Umble, Haft, & Umble, (2003), Mabert, Soni & Venkataramanan (2003), and Ngai, Law, & Wat, (2008)). It is a necessary condition for ERP implementation success. Top Management has to support the whole implementation process and the project needs to be authorised by them.
(Bingi, Sharma, & Godla, 1999). Bingi, Sharma, & Godla (1999) state that top management needs to constantly monitor the progress of the project. Therefore, it is critical to have support and approval from top management for an ERP implementation. The project must be clearly and explicitly designated as top priority by top management.

Top management must be willing to allocate valuable resources (time, money, personnel, and equipment) necessary for the ERP implementation project. Top management should be an advocate for the project and must continually manage resistance and change. Their support can play a functional role in setting disputes and in providing clear signals to any doubts. Top management support is the dependent variable for this research study as a lot of studies have proposed that it is the main of them all.

2.8.2 Project Management

Project management coordinates the use of skills and knowledge. Furthermore, it monitors the progress and the achievement of objectives of the according ERP project. The formal implementation plan defines milestones like project activities, personnel planning on activities and organizes the ERP project process (Bhatti, 2005). ERP systems implementation is a set of complex activities, involving all business functions and often requiring between one and two years of effort, thus companies should have an effective project management strategy to control the implementation process, avoiding overrun of budget and ensuring the implementation within schedule. Therefore the management of risk is needed to minimise the impact of unplanned incidents by identifying potential risks before negative consequences occur (Bhatti, 2005).

Project management consists of the following critical success factors: good project scope management, formalised project plan / schedule, definition of scope and goals, risk management, “alignment of people, process and technology” and agree on different project steps.

2.8.3 User Training

User training refers to the process of providing management and employees with the logic and overall concepts of ERP system (Sum, Ang, & Yeo, 1997). This enables
users to have a better understanding of how their jobs are related to other functional areas within the company. The main rationale for training is to increase the expertise and knowledge level of the people within the company. If a training program is not available there, it will result in low acceptance and curbs the progress of the project (Haag, Baltzan, & Phillips, 2005). This means re-skilling users in new technologies and training in the use of specific application modules (Sumner, 2000). Key users of a company should not only be experts in the company’s processes but also be aware of the knowledge of information systems in the specific branch. Involving users can decrease their resistance to the potential ERP system, if users have feelings that they are the people who choose and make the decision (Zhang, Mathew, Zhang, & Banerjee, 2003).

2.8.4 Change Management

Fulla (2007), define change management as ‘the act of managing modifications to an organization’s culture, hierarchy, and/or business processes in order to achieve a desired outcome.’ In her opinion, change management should be seen as a continual process or method rather than a series of tools or exercises. For many companies the hardest challenge in implementing ERP is change management (Hoffman, 2007). One researcher estimates that there are six stages to technology implementation: pre-adoption, adoption, pre-implementation, pilot study implementation, and post implementation. Change management is a process that should be maintained throughout each of these stages with its ultimate goal of achieving ‘equilibrium’ as quickly as possible. When a change is introduced into an organization, it is logical to think that there will be an adjustment period where people must adapt to the new processes/procedures.

2.8.5 Consultants

The ERP implementer-vendor partnership is a key success factor influencing ERP implementation success (Nah & Lau, 2001), (Ranzhe & Xun, 2007), (Zhang, Mathew, Zhang, & Banerjee, 2003) and (Somers & Nelson, 2001). Every enterprise has its own ideas how to implement and adopt a system. Ideas of the ERP-vendor can contrast with the customer’s wishes and synthesising these differences is hard work (Al-
Mudimigh, Zairi, & Al-Mshiri, 2001). This critical success factor consists of vendor support, vendor’s tools and the use of vendor’s development tools.

The transmission of knowledge further surfaces the intellectual dimension of knowledge integration. It is necessary to create “common knowledge” (Demsetz, 1991) through synthesizing differentiated expertise (Lawrence & Lorsch, 1967), such as the expertise of ERP implementation possessed by the external consultant/vendor team. The use of knowledge and experience of external consultants becomes key since the ERP implementation is a complex project for most of the organisation, products, and services. The use of external consultant acts as a link for an organisation to improve their learning process during and after implementation.

2.8.6 Business Process Reengineering (BPR)

Business process re-engineering (BPR) is defined by Hammer & Champy (2001) as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed”. Enterprise system vendors have designed “best practices” by consulting with customers and many of these best practices can be used for BPR. Otherwise customisation and adoption is needed to change the business processes implemented in the ERP software (Esteves, Pastor, & Casanovas, 2002) and (Van Stijn & Wensley, 2005). ERP systems are built on best practices for the specific industry, and to effectively install ERP, all the processes in a company have to conform to the ERP model (Bosilj-Vuksic & Spremic, 2005) and (Jarrar, Al-Mudimigh, & Zairi, 2000).

Implementing an ERP system involves reengineering the existing business process to the best business process standard (Holland, Light, & Gibson, 1999), (Motwani, Mirchandani, Madan, & Gunasekaran, 2002), and (Bingi, Sharma, & Godla, 1999). One of the principal reasons why ERP and other large technologically sophisticated systems fail is that organizations simply underestimate the extent to which they have to change and re-engineer the existing business processes in order to accommodate their purchase. ERP systems are built on best practices that are followed in the industry and all the processes in a company must conform to the ERP model. This is one of the
reasons why many consulting firms deliver standard systems which are called vanilla ERP (Parr & Shanks, 2000).

2.8.7 Adequate Testing
System testing has proven to be the key element of success for some companies and a direct cause of failure for others (Gargeya & Brandy, 2005). Gargeya & Brandy, (2005) argue that after months or years of development, it may be feasible to assume that both team members as well as executive management are tired of dealing with the project and just want it to be completed. The result of this myopic thinking, however, is that testing is reduced or ignored and “red flags” are disregarded. Quick response, patience, perseverance, problem solving and firefighting capabilities are important (Rosario, 2000). Vigorous and sophisticated software testing eases implementation (Rosario, 2000).

Holland, Light, & Gibson, (1999) states that troubleshooting errors is critical and organisations should work hand in hand with vendors and consultants to resolve software problems. There should be a platform for migrating and cleaning up data (Rosario, 2000). Scheer & Habermann, (2000) indicate that modelling methods, architecture, and tools are critical. Requirements definition can be created and system requirements definition can be documented. Proper tools and techniques and skill to use those tools will aid in ERP success (Rosario, 2000).

2.8.8 Budgeting
Implementation can become very costly, despite all efforts at developing a solid plan. Many projects, especially failed ones, find themselves over budget, some by as much as 189 percent (Gargeya & Brandy, 2005). May, (1998), state that only one sixth of projects are completed on time and within budget.
2.9 Case Studies
A number of studies have been carried out to find out the critical success factors for effective ERP implementation. These includes research done by Zhang, L; Lee M, K. O.; Zhang, Z and Banerjee on Critical Success Factors for ERP implementation Success in China. Kalbasi, H. carried a thesis on Assessing ERP Implementation Critical Success Factors. Shanks, G.; Parr, A.; Hu, B.; Corbit, B.; Thanasankit, T.; and Seddon, P. (2000) have studied the critical success factors in ERP system implementation in Australia and China, but their study was mainly based on the cultural analysis. Another study was carried out by Tang, Y. (2007) on ERP implementation and CSFs based on Shanks ERP model on Lenovo.

2.10 Literature Synthesis and Conceptual Model
The conceptual model for CSFs which is going to be used in this research has been adopted from three different authors which are (Somers & Nelson, 2001), (Gargeya & Brandy, 2005) and (Ngai, Law, & Wat, 2008). Therefore, the critical success factors for this research will be as follows with top management being the primary factor:

- Top Management Support
- Project management
- User Training
- Change Management.
- Consultants
- Business Process Reengineering
- Adequate Testing
- Budgeting
The following **Figure 2.8** shows the Conceptual Model for the research project.

**Figure 2.8: Conceptual Model**

These factors will be tested on the case study organisation and find out if they have a positive impact on the effectiveness of ERP implementation.

2.10.1 **Crystalisation of Research Question**

The research is to be conducted to address what factors facilitate the success of an ERP implementation. What actions can be taken to bring troubled ERP projects under control? What factors need to be considered prior to the project take off? What are the critical success factors for effective ERP implementation management should know? How can ERP systems be implemented effectively?
2.10.2 Summary of the Hypothesis
Project management, User Training, Change Management, Consultants, Business Process Reengineering, Adequate Testing and Budgeting have a positive impact on ERP implementation success.

2.11 Chapter Summary
In brief, there is no general consensus as to which set of factors are the keys to success in ERP implementation. It is probably a combination of factors that are important in explaining success rather than single elements as other researchers have suggested. The exact combination of factors varies over time and should be decided regarding a given specific set of company circumstances.
3 CHAPTER 3 - RESEARCH METHODOLOGY

3.1 Introduction

The preceeding chapter critically analysed relevant literature on the critical success factors for ERP implementation. This chapter discusses the research methodology that was adopted for this research in achieving the objectives of the problem under study and justifications for the methods chosen. It also outlines the analytical framework of the research philosophy, research design chosen, the justification for a single case study approach, the preparation for data collection, the main sources of data collection, and the data collection process and data analysis.

An appropriate methodology has to be selected and a suitable research design has to be adopted so as to satisfy the information needs of any study or research project (Mouton, 2001). Kidder (1981) notes that a methodology has a bearing on the quality and reliability of the conclusions, hence a research is as good or bad as its methodology. Gill & Johnson, (1991) argued that, the best approach is based on the discretion of the researcher to adopt an approach which produces optimum results tailor made to suit the problem as there is not a single best approach to use. Hancock, (2002) defines research methodology in its broadest sense as the processes and procedures by which systematic research is conducted using scientific principles. According to Saunders, Lewis, & Thornhill, (2009) research process or design are in capsules in the research methodology.
The following diagram **Figure 3.1** is a typical research cycle by Neuman (2006).

**Figure 3.1: The Research Cycle: Neuman (2006).**

### 3.2 Research Philosophy

Saunders, Lewis, & Thornhill (2003) states that, research philosophy depends on how the researcher thinks about the development of knowledge. Essentially, there are about three schools of thoughts about the research philosophy that control the literature which are: i) positivism (qualitative), ii) realism and, iii) phenomenological (qualitative) research. They hold diametrically different opinions about the way in which knowledge is developed and judged as being acceptable. Considerably, all have an important part to play in business and management research.

According to Saunders *et al.* (2007), the research procedure is layered like an onion. The layers include research philosophy, research strategies and data collection methods. The researcher’s experience, understanding of philosophy and personal beliefs may also have some bearing on the method adopted. However, these ideas have areas of consideration when deciding on a research method: the philosophical paradigm and goal of the research, the nature of the phenomenon of interest, the level
and nature of the research questions, and practical consideration related to the research environment and the efficient use of resources.

Easterby-Smith, Thorpe, & Lowe (1997) identified three reasons why the exploration of philosophy may be significant with particular reference to research methodology. The three reasons are as follows:

- The researcher can be assisted to refine and specify the research methods to be used in a study, that is, to clarify the broad research strategy to be used. This usually would include the type of evidence collected and its origin, the way in which such evidence is interpreted, and how it helps to answer the research questions posed;
- Knowledge of research philosophy enables and aids the researcher to assess different methodologies and methods and avoid inappropriate use and unnecessary work by identifying the limitations of particular approaches at an early stage; and
- The researcher may be helped to be creative and innovative in either selection or adaptation of methods that were previously outside his or her experiences.

3.2.1 Positivism Research

Positivist research is in general quantitative and involves the use of numerical measurement and statistical analysis of measurement to examine phenomena. This views reality as consisting phenomena that can be observed and measured (Remenyi, Williams, Money, & Swartz, 1998). Researchers have one or more than one hypotheses. These are the questions they want to address which incorporate predictions about possible relationships between the things they need to investigate (variables). In order to get answers to these questions, the researcher should have a number of instruments and materials like paper or computer tests, observation check lists and a clearly defined plan of action. Data is collected by various means following a strict process and prepared for statistical analysis.
Thus according to Gill & Johnson, (1991) the researcher is independent of and neither affects nor is affected by the subject of the research. The advantages of this approach are that it places great premium on objectivity and reliability of results and promotes replication. If it is applied to social sciences and business management research, positivism may not necessarily appropriate, as all social phenomena cannot be accurately and reliably measured, thus reducing the validity of the results. The researcher used this research philosophy for this study because of the advantages mentioned above and the nature of the research under study.

3.2.2 Phenomenological Research

As opposed to positivism, phenomenological or qualitative researchers argue that the world is socially constructed and that science is driven by human interests and that the researcher, as a subjective entity, is part of the world being observed (Easterby-Smith et al., 1997). Total objectivity, is thus an impossible aim. The advantages of this qualitative, interpretive orientation in research are that the results usually have a greater validity and less artificiality at the procedure of observing phenomena in natural, real-life settings often allows researchers to build up a more accurate understanding of those phenomena.

3.2.3 Realism Research

According to Saunders et al., (2007) realism is based on the belief that reality exists and is independent of human thoughts and beliefs. Taking into consideration the weaknesses and strengths that flow from positivism and phenomenological bias in research, a lot of researchers adopts a mixed approach that draws from both extremes. This approach is considered to be adequate as it enables the researcher to increase the reliability and validity of the results because weaknesses of one method are balanced by the strengths of the other method.
3.3 Research Design

The research design is the logical chain that connects the empirical data to the study's preliminary research questions and eventually to its conclusions (Yin, 2003). The research design was viewed by Cooper & Schindler (2001) as the blueprint for the collection, measurement and analysis of data. Yin (2003) further elaborates that it also leads the researcher in the progression of collecting, analysing and interpreting observations, allowing them to portray inferences concerning fundamental relations amongst the variables underneath investigation. Thus, in order to get answers to the research questions, the map and structure used is the research design. The selection of the research design relies on the applicability of the design to the design objectives of the study and the setting of the study (Cooper & Schindler, 2001).

There are two types of research paradigms, which are quantitative and qualitative (Leedy, 1997). Qualitative research tries to understand meanings that people offer to their deeds or to social phenomena. Quantitative research is generally an iterative procedure whereby proof is evaluated; theories and hypothesis are polished and test. Statistics is the mainly widely used branch of mathematics in quantitative research (Leedy, 1997).
The following Table 3.1 shows the differences between quantitative and qualitative research designs.

### Table 3.1: Quantitative and Qualitative Research Designs: Business Research Methods Lecture notes, 2012

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Subjective</td>
</tr>
<tr>
<td>“Hard” science</td>
<td>“Soft” science</td>
</tr>
<tr>
<td><strong>Literature review must be done early in study.</strong></td>
<td>Literature review may be done s study progress or afterwards</td>
</tr>
<tr>
<td><strong>Test theory</strong></td>
<td>Develops theory</td>
</tr>
<tr>
<td><strong>One reality: focus is concise and narrow</strong></td>
<td>Multiple realities: focus is complex</td>
</tr>
<tr>
<td><strong>Facts are value free and unbiased</strong></td>
<td>Facts are value-laden and biased</td>
</tr>
<tr>
<td><strong>Reduction, control and precision</strong></td>
<td>Discovery, description, understanding, shared and interpretation</td>
</tr>
<tr>
<td><strong>Measurable</strong></td>
<td>Interpretive</td>
</tr>
<tr>
<td><strong>Mechanistic: parts equal the whole</strong></td>
<td>Organismic: whole is greater than parts</td>
</tr>
<tr>
<td><strong>Report Statistical analysis</strong></td>
<td>Report rich, narrative, individual, interpretation</td>
</tr>
<tr>
<td><strong>Basic element of analysis is numbers</strong></td>
<td>Basic element of analysis is words/ideas</td>
</tr>
<tr>
<td><strong>Researcher is separate</strong></td>
<td>Researcher is part of process</td>
</tr>
<tr>
<td><strong>Subjects</strong></td>
<td>Participants</td>
</tr>
<tr>
<td><strong>Context free</strong></td>
<td>Context dependent</td>
</tr>
<tr>
<td><strong>Hypothesis</strong></td>
<td>Research questions</td>
</tr>
<tr>
<td><strong>Reasoning is logistic and deductive</strong></td>
<td>Reasoning is dialectic and inductive</td>
</tr>
<tr>
<td><strong>Establishes relationships, causation</strong></td>
<td>Describes meaning, discovery</td>
</tr>
<tr>
<td><strong>Uses in instruments</strong></td>
<td>Does not use instruments</td>
</tr>
<tr>
<td><strong>Generalization leading to prediction, explanation and understanding</strong></td>
<td>Strives for uniqueness, patterns and theories developed for understanding</td>
</tr>
<tr>
<td><strong>Highly controlled setting: Experimental setting (Outcome oriented)</strong></td>
<td>Flexible approach: natural setting (process oriented)</td>
</tr>
<tr>
<td><strong>Sample size is required (should be representative)</strong></td>
<td>Sample size is not a concern; seeks informal rich sample</td>
</tr>
<tr>
<td><strong>Counts the beans</strong></td>
<td>Provides information as to ‘which beans are worth counting’</td>
</tr>
</tbody>
</table>

3.3.1 3.4.1 Research Purpose

According to Yin (2003), the purpose of an academic study can be exploratory, descriptive, or explanatory.

- **Exploratory studies** are practical if you wish to clarify your understanding of a problem (Saunders, Lewis & Thornhill, 2000). Robson (1993, cited by Saunders, Lewis & Thornhill, 2000) describes exploratory studies as a
method of finding out “what is happening; to seek new insights; to ask questions and to assess phenomena in a new light”

- **Descriptive studies** are appropriate when you wish to portray phenomenon such as events, situations or process. Furthermore, a descriptive study is also appropriate when the problem is clearly structured, but the intention is not to conduct research about the connections between causes and symptoms.

- **Explanatory studies** are useful when you wish to establish casual relationships between variables. The emphasis in this sort of study is to examine a situation or a problem in order to explain the relationships between variables (Saunders, Lewis & Thornhill, 2000).

The purpose of this research is somewhat exploratory since it wishes to investigate into an ERP implementation in light of critical success factors and understands what is happening in an ERP implementation case. The research is partly descriptive because it is necessary to have a clear picture of the phenomena on which the researcher wishes to collect data prior to the collection of data and the research purpose is clearly structured. Also, it is somehow explanatory, because sometimes it examines a situation or a problem in order to explain the relationships between variables.

### 3.3.2 Research Approach

Saunders, Lewis, & Thornhill, (2007), posit that there are basically two kinds of research approaches, that is, the deductive and inductive approaches. According to Donald & Pamela (2003), the approaches are based on the inquirer’s values, assumptions, and beliefs. Theory and hypothesis is developed first, followed by the designing of the research strategy so as to test the hypothesis according to the deductive approach. According to Burney (2008), deductive approach, stipulates that data is collected initially, then theory development follows after data analysis, this approach is sometimes referred to as a top down approach.

Contrary to the former approach inductive reasoning moves from specific observations to broader generalizations and theories, this approach is at times referred
to as the bottom up approach. This approach involves a high degree of uncertainty (Burney, 2008). The researcher adopted the deductive (top-down) approach that is the quantitative approach. The aim of this study is to identify ERP implementation critical success factors and compare them with theory. The aim of the researcher is to make generalization. Instead, by using small-scale studies the researcher could investigate certain variables in depth and thus, provide a better understanding of the research area.

3.3.3 Research Strategy

According to Saunders, Lewis, & Thornhill, (2009), a research strategy is a plan of action on how to answer the research questions in the study. There are five major research strategies which can be used in a research and these are experiment, survey, case study, action research, and grounded theory. Research strategy has peculiar advantages and disadvantages, depending on three conditions which are: i) the type of research question; ii) the control the investigator has over actual behavioural events; and iii) the focus on contemporary as opposed to historical phenomena (Yin, 2003). Saunders, Lewis, & Thornhill, (2007) states that the choice of research strategy is dependent upon research questions, objectives, extent of the existing knowledge, amount of time as well as philosophical underpinnings. However, many projects integrate two or more of these so as to obtain the best results.

For the purpose of this study the researcher chose the case study strategy due to its suitability to the type of study that was undertaken. Case studies further contribute exclusively to our knowledge of individual, organizational, social and political occurrence; and allow an investigator to retain holistic and meaningful characteristics of real life events, such as individual life cycles and organizational and managerial processes. It also allows the researcher to explore, in a historical, holistic and current way, the key research questions: what factors facilitates the success of an ERP implementation? What are the critical success factors for ERP implementation management should know? The research was conducted at Printflow Pvt Ltd which was experiencing problems with the ERP system since its implementation.
3.3.4 Research Design

The research design chosen for the study is the case study because it was the most suitable strategy for the research. According to Yin (2003) the case study answers “how” and “why” questions about a contemporary set of events, over which the investigator has little or no control. Yin also emphasizes that a case study is an empirical 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 approach also has considerable ability to generate answers to the question ‘why’ as well as ‘what’ and ‘how’ questions (Robson, 1993). A case study can include data from direct observation and systematic interviewing as well as from public and private archives. In fact any fact relevant to the stream of events describing the phenomena is a potential datum in a case study, since it is important.

The case study research strategy enabled the researcher to obtain an in-depth knowledge of the critical success factors for ERP implementation in Printflow (Pvt) Ltd using quantitative method. The researcher also selected the case study strategy because of the limited time to carry out the research and accessibility to research information.

3.3.5 Disadvantages of Case Study

The greatest concern about the use of the case study has been the lack of rigor of the strategy (Yin, 2003). He also adds that the lack of rigor is less likely to be present when using other strategies possibly because of the existence of a number of methodological texts that provide researchers with specific procedures to follow. However, White (2000) defends the use of case studies by stating that people fail to distinguish a case study research from case studying teaching. Case study teaching may involve making alterations to the research material in order to demonstrate a concept more effectively, which however is not permissible in case study research.

Case studies have also been criticised because they provide little basis for scientific generalisation. However, case studies like experiments are generalised to theoretical propositions and not to populations or universes (Yin, 2003). The case study,
therefore, does not represent a sample but the goal is to expand and generalise theories and not to enumerate frequencies.

3.4 Population and Sampling Techniques

3.4.1 Population
According to Wegner (2000) population refers to the whole group of elements from which the researcher needs to get information. Population can also be defined as the individuals in the creation who have certain characteristics (Parker, 1997). Population is defined by Polit & Hunger, (1999) as the totality of the subjects that conform to a set of specifications, comprising the whole group of persons that is of concern to the researcher and to whom the research results can be generalized. Research population was employees of Printflow (Pvt) Ltd. In this research, the sample constituted the Printflow senior management and users of the ERP system who were drawn from the Printflow population. In studying population our main focus is on one or more characteristics or properties of the units in the population (McClave, Benson, & Sincich, 2007). The reason for selecting the senior management was that they are directly involved in the strategic planning process within the organisation.

3.4.2 Sampling Techniques
Sampling techniques offer a collection of methods that permits you to reduce the quantity of data you require to gather by considering data only collected from sub-group rather than all viable cases or elements (Saunders, Lewis & Thornhill, 2000). It is pragmatic to survey an entire population for some research questions as the size will be manageable. For many research questions and objectives, however, it will be impractical to either collect or analyse available data due to time, money, and often accessibility limitations. Saunders, Lewis, & Thornhill, (2007) encourages researchers to employ sampling techniques in order to circumvent the limitations. According to Henry (1990) sampling is, therefore, likely to be cheaper, less time consuming, availability of manageable data and more precise results than a population.

Sampling techniques can be sub-divided into two categories namely:
i) Probability and,

ii) Non-probability sampling.

**Probability Sampling** is based on a concept of random selection procedure which ensures that each element of the population is given a known chance of selection and is usually equivalent for all cases. In other words it is where every element in a population has a known non-zero probability of selection. There are five main cases which can be used to choose a probability sample. The five cases are simple random, systematic, stratified random, cluster, and multistage sampling. According to Saunders, Lewis, & Thornhill, (2009) his techniques is commonly associated with survey-based research where there is want to make statistical inferences from the sample about the population. In the case of probability sampling, researcher bias and subjectivity is minimised or eliminated through the random choice of elements. Although it offers the researcher with a dominant statistical analytical tool, probability sampling is expensive and takes a lot of time.

**Non-Probability Sampling** in disparity, non-probability sampling is non random, purposive, and subjective to facilitate the researcher to choose the sample using deliberate and intentionally controlled criteria other than the ones associated with randomness of selection. The probability of any meticulous member of the population being selected is unknown and the choice of sampling units is quite subjective, as the researcher will depend greatly on personal decision. While the probability of every element being chosen from the entire population is unknown, it is almost not possible to address objectives or questions that need statistical inferences on the characteristics of the population.

Time and cost variable might also influence the selection of non-probability sampling as probability sampling needs careful planning and complete effort in choosing the population and creating the sample frame. Non-probability sampling is also further flexible as it allows the researcher to capture a broader range of important facets than the probability sampling. In spite of its simplicity, the fact that it permits researcher bias and subjectivity to influence sampling procedures, the researcher results are subject to distortions. As with probability sampling, non-probability sampling is divided into five
categories, which are convenience, quota, purposive or judgment, maximum variation and snowball sampling.

3.4.3 Sampling Method Used

In view of the research objectives and the pros and cons of the probability and non-probability sampling techniques, the researcher resorted to the use of non-probability sampling due to its flexibility in selecting the sample. Purposive sampling or judgmental sampling is a non-probability sampling method that basically allows a researcher to select cases that seems to be best suited to answer the research questions. This form of sampling is often used when working with small samples, especially in a case study when a researcher is looking for cases that are particularly informative. This researcher’s sample selection was based on judgmental sampling, which is non-probability sampling. The company was selected as a case which completed its implementation in one or more years and it is experiencing a number of problems.

The criteria selected allow the researcher to focus on people they think would be most likely to experience, know about, or have insights into the research topic (Denzin & Lincoln, 2005). This method was considered to be suitable because samples/elements were chosen intentionally as they were considered to be representative of the population on the basis of the sample’s participation during the ERP implementation and they are the users of the ERP system.

3.4.4 Sample Size

According to Salkind, (2000) the size of the sample is almost always a compromise between the accuracy or confidence of the findings and the amount of time and money needed in the collection, checking and data analysis. Given these competing influences, the final sample size is almost a matter of judgment as well as of calculation (Saunders, Lewis, & Thornhill, 2009). Bell (1999) submitted that statistically, a minimum sample of 30 is held by many researchers to be acceptable. This is so by the fact that a sample that is too small is not likely to be representative of the
population, while one that is too large is likely to increase costs and time demands without producing significant benefits.

In the selection of the sample and respondents, the researcher adopted judgmental sampling. Management team was selected as these are responsible for the organisation’s strategic decisions. The sample is made up of 30 respondents of which 5 is the management team and 25 are Pecas Vision II system users of which some were involved during its implementation. These users are the ones who are bringing forward the problems they are encountering with the system. The researcher thought this sample will be the best sample to answer the research questions. The customers were not included since the system does not have a module which caters for customers.

3.5 Data Collection Method

There are two data collection methods in sourcing data, namely, primary and secondary data sources. Saunders, Lewis, & Thornhill, (2007) define secondary data as the data used for a research project originally collected for some other purpose other than the research at hand. According to Salant & Dillman, (1994) secondary data is data that is collected from records holding the primary data. Secondary data instruments involve the use of annual reports, journals, and websites which could not be relied upon in making conclusions about a research on their own. However, the researcher relied mostly on the use of primary data. Primary data refers to data collected specifically for the research project being undertaken (Parker, 1997). Primary data for the research was obtained through a self and interviewer administered questionnaire.

3.5.1 Primary Data

The primary data instruments used was self and interviewer administered questionnaire which are a survey based instruments of data collection. Self-administered questionnaires are those which are completed by the respondents without direct interference from the interviewer and interviewer administered questionnaire are those where responses are recorded by the interviewer on the basis of each respondent’s answers. The interviewer administered questionnaires include telephone
questionnaires and structured interviews. This was used as the main mode of primary data collection because of its flexibility to capture data from different sets of people since it is a new area of study in Zimbabwe. However, Zikmund, (2003) observed that primary data is expensive to collect, but it is important, as it is possible to formulate structured and unstructured questions that focus on the study topic. A self-administered questionnaire allowed respondents to go through the questionnaire at their own pace and any possible bias due to the presence of an interviewer was avoided. Furthermore, questionnaires provided uniform or standardized data, which was easy to process and present.

3.5.2 Questionnaire

According Kotler & Keller (2006), a questionnaire represents the simplest, flexible and most common research instrument for collecting primary data and it consists of a set of questions presented to respondents. Most researchers agree that questionnaires are expensive way to gather data from a potentially large number of respondents and there is anonymity and respondents are comfortable to answer any question without feeling any pressure or bias (Salant & Dillman, 1994). The shortcomings of questionnaire according to Salant & Dillman (1994) are that,

i) the respondent may misread or misunderstand a question and as a result the response given will not be the correct one,

ii) the response rate may be low if the respondent lacks and,

iii) the respondent may be interested in certain questions and thereby end up partially completing the questionnaire.

A well-designed questionnaire that is used effectively can be used to gather information on both the overall performance of the test system as well as information on specific components of the system (Miller & Sakind, 2001). Another advantage of using questionnaires is that the validity of the results is more reliant on the honesty of the respondents since the researcher has limited control over the environment (Miller & Sakind, 2001). The self-administered questionnaire was sent to respondents via email or hand delivered where necessary. It is important to remember that a questionnaire
should be viewed as a multi-stage process beginning with definition of the aspects to be examined and ending with interpretation of the results (Wallis, 2002).

One questionnaire was distributed to each respondent and a response rate of at least 90% is expected. Exhaustive attempts will be made within one week to contact respondents via email and subsequent follow-ups with telephone calls, outlining the research agenda. It is hoped that a face to face reminder will speed up the data gathering exercise and have a positive bearing on the expected response rate. However, respondents are expected to return completed questionnaires as hard copies.

The researcher also provided an ethical commitment to treat all responses with the required confidentiality and also to be used solely for these purposes for which they are sought. Every step needs to be designed carefully because the final results are only as good as the weakest link in the questionnaire process.

3.5.3 Questionnaire Design

Questionnaires may have different number of sections and headings. However, it is now common in most instruments of this nature to contain three major sections, namely, administrative section which accommodates the cover letter, instructions to respondents and questionnaire number. The other section is the demographic section which houses the basic information describing the respondent. The last section is the body of the questionnaire which is the crux of the matter as it contains the research questions. In carrying out this research, some of these outlined sections will be adopted in the crafting of the questionnaire. In this regard, a structured questionnaire was drafted to capture responses during the survey study for Printflow (Pvt) Ltd management and employees who use the ERP system. The analysis takes two forms, namely, literature review and data from the research survey. To increase reliability and relevance of adequate primary data collected, the researcher used self and interviewer administered questionnaires. The questionnaire used is shown on appendix A.
3.6 Data Analysis and Presentation

3.6.1 Data Preparation

To improve the reliability and validity of the data, the researcher carried out a data preparation process by checking for accuracy and completeness of the questionnaires. In the cases where respondents for any other reasons happen to have skipped some key questions, the researcher had to kindly get in touch seeking for such information. The editing process ensures accuracy, consistency, uniformity and completeness to allow for easy coding and tabulation of research findings (Parker, 1997).

3.6.2 Data Analysis

Research findings are only of value to users if they can be effectively communicated (Wegner, 2000). Excel and Statistical Package for Social Sciences (SPSS) Version 11 were used to analyse data. This is because these Statistical Packages can express deeper relationships in the data. The data was cleaned by Cronbach’s Alpha Item Delete to remove inconsistencies in the responses. One way of communicating these is through graphical presentations, which are a better way of conveying information vividly and quickly. The research findings were analysed, compared and presented using tables and histograms. All the information gathered was analysed against theory cited in the literature review and the appropriate inferences were made. Yin (1989) states that data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial hypothesis/propositions of a study.

According to Wegner (2000), descriptive statistics condenses large volumes of data into few summary measures. The summary measures include mean, mode, frequencies among other measures but for this research they were not used. Inferential statistics generalizes sample findings to the broader population (Wegner, 2000). This gives users a broader picture of the characteristics and behaviours of a random variable in the population from which the sample was drawn. Statistical inferences allow users to establish bounds of reliability of their limited data when generalizations are sought.
3.7 Validity and Reliability

Validity and reliability have to be considered to reduce the risk of obtaining incorrect answers to research questions (Chisnall, 1997). In developing the research questionnaires, the validity, reliability and objectivity of the information to be obtained from the instrument was considered.

3.7.1 Validity

According to Fraenkel & Wallen, (1996) defined validity as the defensibility of the inferences the researchers make from the data collected through the use of research instrument. They argue that validity of the instruments must always be considered within the context of inferences the researcher makes regarding particular areas or topics. Validity refers to the extent to which an account accurately represents the social phenomena to which it refers (Hammersley, 1990). Validity is concerned with whether the findings are really about what they appear to be about (Saunders, Lewis & Thornhill, 2000). It refers to how well a specific research method measures what it claims to measure (Chisnall, 1997). Yin (1980) states that judgments of validity measure how valid the collected data is, and whether or not the methods used to gather data measure or explain the things that the researcher states to measure or explain.

According to Yin (2003) there are three tests for the researcher to test the validity and these are construct, internal, and external validity. According to Yin (2003) internal validity is only used for explanatory or causal studies. Because this study is mainly descriptive the test will not be dealt with. Yin (2003) also states that external validity deals with the problem of making generalisation of the case study. This study is not aiming to make generalization, thus this will not be taken into consideration.

3.7.2 Reliability

The objective with this final test is to be sure that another researcher will acquire the same results if he would repeat the study. However, the condition is that the other researcher follows the exact same procedures as the earlier investigator, and studies the same case, not a similar one by replicating results. According to Yin (2003), the goal
of reliability is to minimize the errors and biases in a study. Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions (Hammersley, 1992).

Reliability can be assessed by posing the following two questions (Easterby-Smith, Thorpe, & Lowe, 1991)

1. Will the measure yield the same results on different occasion? (Deductive approach).

2. Will similar observations be made by different researchers on different occasions? (Inductive approach).

Before the survey, the researcher pre-tested questionnaires using a small sample to increase their validity. The supervisor also reviewed the questionnaire and made his input. The pre-testing checked improper elements such as question wording, question sequencing and length of questionnaire.

3.8 Ethical Issues

Ethics relate to moral choices affecting decisions and standards and behavior. So it is hard to lay down a set of clear rules, which cover all possible moral choices (Greener, 2008). The University of Zimbabwe's guidelines on research on ethics will be observed throughout the implementation of various aspects of the study. Particular attention will be paid to the principle of voluntary participation of research subjects and confidentiality of information obtained. The researcher shall endeavor to protect the anonymity of the research participant and the confidentiality of their disclosures unless they consent to the release of personal information.

3.9 Limitations of the Study

It would be preferable to ask far more questions which would enable the researcher to do detailed analysis on the various answers given. This is impossible because respondents do not have the time or the interest to answer a lot of questions. A balance between enough information for solving the research problem and the time
which respondents are able to spend on answering the questionnaire is a crucial factor. There is also not much research pertaining to critical success factors for ERP implementation that has been carried out for an entire organisation. This means that recommendations made in this study are limited to the outcome of this study. However, notwithstanding the limitations, the outcome of the research was solid and can only be further qualified or disproved by further research work.

3.10 Chapter Summary

Chapter 3 has highlighted the methods that the researcher used to collect data from the intended respondents and how the data collected was analyzed and presented. The chapter outlined the research process, strategy, approach, scope, the target population as well as the sampling techniques. Data collection methods and analysis was also outlined in this chapter. It also provided some justifications for the methods chosen for the collection of data from the identified respondents. The chapter has also presented validity, reliability, and ethical considerations and some research limitations related to data collection. In the next chapter the researcher discusses and analyses the findings of the research.
4 CHAPTER 4 - DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction
The aim of the research was to investigate the critical success factors for an effective ERP implementation. This chapter presents findings on the investigation of critical success factors for effective ERP implementation. It also analyses the data as captured in the questionnaire in line with other findings from several studies as highlighted in Literature Review as well as linking them to the research objectives stated in the Introductory chapter. The findings were presented together with a descriptive analysis and in the form of bar graphs and statistical analysis tools.

4.2 Research Experience and Response Rate
The researcher used the self-administered and interviewer administered questionnaire as the primary sources of data during data collection. The sample was made up of thirty respondents which included Printflow management team and the users of the ERP system. A total of five (5) questionnaires were interviewer-administered, and twenty-five (25) were self-administered. An overall response rate of 100% was obtained. The high response rate is due to the fact that the researcher is an employee at the case study organisation and the sample size was very small such that the researcher had to go in person to collect the questionnaire from the respondents. This research response rate is tabulated in Table 4.1 on the next page.
Table 4.1: Summary of Research Response Rate

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Target Sample</th>
<th>Response</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>IT</td>
<td>3</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Warehouse</td>
<td>5</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Planning</td>
<td>3</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Costing</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>Engineering</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>Marketing</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.3 Demographic Characteristics of Respondents

The demographic characteristics of the respondents would assist in coming up with a conclusive decision. The characteristics of the respondents are as follows.

4.3.1 Respondent’s Department

Figure 4.1: Respondent’s Department
As depicted on Figure 4.1 on the previous page, most of the respondents were from the Finance, Marketing and Costing departments. This is so as they are the departments who use the ERP most as compared to the other departments with 20% of the respondents. The Warehouse department follows with about 17%. IT and Planning departments have the same percentage of 10% then lastly Engineering department which has the lowest number of people using the ERP system at about 3% of the total respondents.

4.3.2 Respondent’s number of years using Pecas Vision II

![Graph showing Respondent’s Number of years using Pecas Vision II.](image)

**Figure 4.2: Respondent’s Number of Years using Pecas Vision II**

As depicted on Figure 4.2 above, it shows that most of the respondents have been using Pecas Vision II for a period of 1 year to 2 years with about 37%, followed by those who have used the system for more than 4 years with 30%. The respondents who have used the system for 3 years to 4 years and 2 years to 3 years have 17% and 10% of the total respondents, respectively. The least of them have used the system for less than a year with 3% of the respondents.
4.4 Reliability Test

Table 4.2: Cronbach’s Alpha Variable Reliability Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of Items Before Item Delete</th>
<th>No. of Deleted Items</th>
<th>No. of Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Management Support</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0.69</td>
</tr>
<tr>
<td>Project Management</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>0.64</td>
</tr>
<tr>
<td>User Training</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>0.55</td>
</tr>
<tr>
<td>Change Management</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0.82</td>
</tr>
<tr>
<td>Consultants</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>0.66</td>
</tr>
<tr>
<td>Business Process Reengineering</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0.72</td>
</tr>
<tr>
<td>Adequate Testing</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>0.73</td>
</tr>
<tr>
<td>Budgeting</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>0.78</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>14</td>
<td>34</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Table 4.2 above shows the Cronbach’s Reliability Analyses Test for the research carried out for Printflow (Pvt) Limited. The table is showing that the Cronbach’s Alpha for all the variables is 0.78 (78%) after item delete has been carried out. The only variable which was below the acceptable value was the User Training variable with 0.55 (55%), which is below the acceptable value for exploratory studies, but the figure is not bad since if we round it to the nearest one decimal place it comes to 0.6 which is the minimum acceptable value.

Therefore, we can conclude that the questionnaire is reliable as the Cronbach’s Alpha test is 0.78, which is above 0.7 (70%), the acceptable minimum value and also above the 0.6 (60%) minimum acceptable for exploratory studies since this research was also an exploratory study.
4.5 Test of Normality

Table 4.3 below shows the Kolmogorov-Smirnov Normality Test and Shapiro-Wilk Normality Test for the research variables.

<table>
<thead>
<tr>
<th>Table 4.3: Tests of Normality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Demograph</td>
</tr>
<tr>
<td>TopMGT</td>
</tr>
<tr>
<td>ProjectMGT</td>
</tr>
<tr>
<td>User_Training</td>
</tr>
<tr>
<td>ChangeMGT</td>
</tr>
<tr>
<td>Consultant</td>
</tr>
<tr>
<td>BPR</td>
</tr>
<tr>
<td>Adequate_Testing</td>
</tr>
<tr>
<td>Budgeting</td>
</tr>
</tbody>
</table>

a. Lilliefors Significance Correction

* This is a lower bound of the true significance.

Table 4.3 above is showing results from two well-known tests for normality, which are Kolmogorov-Smirnov Test and the Shapiro-Wilk Test. According to literature the Shapiro-Wilk Test is more appropriate for small sample sizes (<50 samples), but it can also handle sample sizes above 2000. Therefore, for this reason the researcher used the Shapiro-Wilk Test for normality. For a normally distributed data the significant value should be above 0.05. From Table 4.3 above the Shapiro-Wilk Test is showing that all significant values are less than 0.05 except for consultant which has a significant value of 0.06 which is slightly greater than 0.05. Therefore, we can conclude that the variables are statistically significant and are not normally distributed.

4.6 Correlation Tests

From the conceptual framework it is clearly stated that all the variables (factors) depend on Top Management Support. In this section the researcher will explain the
correlation between Top management Support and the other variables. Since the variables are not normally distributed Spearman Correlation Coefficient was used for this research. According to literature, Spearman’s Correlation Coefficient is a statistical measure of the strength of a monotonic relationship between paired data. The coefficient is denoted by \( r_s \) where,

\[-1 < r_s < +1\]

If the coefficient is +1, it means that there is a very strong positive relationship and if it is -1, it means there is a very strong negative relationship between the variables.

For hypothesis testing, the significance level value \( \alpha = 0.05 \). For critical values and rejection regions, you reject the null hypothesis when p-value \( \leq 0.05 \) and it therefore means that the relationship is not statistically significant. If the p-value \( \geq 0.05 \) it means that the relationship is statistically significant therefore, accept the null hypothesis.

### 4.6.1 Top Management Support and Project Management

**Table 4.4: Top Management Support and Project Management**

<table>
<thead>
<tr>
<th></th>
<th>ProjectMGT</th>
<th>TopMGT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>ProjectMGT Correlation Coefficient</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
</tr>
<tr>
<td>TopMGT</td>
<td>Correlation Coefficient</td>
<td>.275</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.142</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
</tr>
</tbody>
</table>

Spearman’s rho between Top Management Support and Project Management from **Table 4.4** is 0.28. This value of \( r \) shows a positive correlation between the two variables since the value is positive and a weak relationship since the value of \( r \) is close to zero. The p-value is 0.142 and therefore, we reject the null hypothesis, **H1**: Project Management has a positive impact on effective ERP implementation. At the \( \alpha = 0.05 \) level of significance, there exists enough evidence to conclude that the slope of the regression line is not zero.
This does not necessarily confirm acceptance of alternative hypothesis. Studies carried by Holland & Light (1999), Umble, Haft, & Umble, (2003); Stratman & Roth (2002); Ngai, Law, & Wat, (2008); Al-Mashari, Al-Mudimigh, & Ziri, (2003); Alaskari, Ahmad, Dhafr, & Pinedo-Cuenca (2012), Somers & Nelson (2001), Shanks et al., (2000), and Nah et al. (2001), concluded that project management is critical for ERP implementation success.

During the ERP implementation, Printflow did not have a project team in place according to the data gathered for this study, hence no project leader or manager to monitor the progress of the implementation process. The then IT Manager was just steering the implementation since the system is by default under IT department and the department is the custodian of all IT systems. The IT Manager did not have enough knowledge with project management as literature says that there should be someone in the project team who has extensive knowledge of project management. Project planning was not even there prior to system implementation; this resulted in some modules not being implemented, inadequate time for training and testing due to poor planning.

This was in contrast with literature as Somers & Nelson (2001); Holland and Light (1999); Aladwani (2001); Mabert, Soni & Venkataramanan (2003); Stratman & Roth (2002); and Gargeya & Brady (2005) concur that project planning is critical for the success of an ERP implementation. Therefore, project management facilitates the effectiveness of ERP implementation. Management should know that ERP implementation needs to be management prior to implementation.

### 4.6.2 Top Management Support and User Training

#### Table 4.5: Top Management Support and User Training

<table>
<thead>
<tr>
<th></th>
<th>User_Training</th>
<th>TopMGT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>1.000</td>
<td>.465</td>
</tr>
<tr>
<td>User_Training</td>
<td>.</td>
<td>.010</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>TopMGT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.010</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**
Spearman’s rho between Top Management Support and User Training in Table 4.5 above is 0.47. This value of $r$ shows a positive correlation between the two variables and the relationship is moderate since the value of $r$ is in between 0 and 1. The p-value is 0.010 and, therefore, we accept the null hypothesis, **H2**: User Training has a positive impact on effective ERP implementation. **Table 4.5** is also confirming from SPSS that the correlation is significant at the 0.01 level. At the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that the slope of the regression line is zero, hence User Training has a positive impact on effective ERP implementation.

This concedes with literature that user training has got a positive impact on the success of ERP implementation. Umble, Haft, & Umble, (2003); Mabert, Soni & Venkataramanan (2003), Stratman & Roth (2002), Gargeya & Brady (2005), Ngai, Law, & Wat (2008); Al-Mashari, Al-Mudimigh, & Ziri, (2003); Somers & Nelson (2001); Bradford & Frorin (2003); Gupta (2000), Alaskari, Ahmad, Dhafr, & Pinedo-Cuenca (2012); Nah et al. (2001), Shanks et al., (2000); Parr & Shanks, (2000), Markus, Axline, Petrie, & Tanis, (2000), Aladwani (2001), and Holland & Light (1999) agree that user training is one of the critical success factors for ERP implementation. Users of the system should know how the system operates so that they will be able to work with it without any errors due to lack of knowledge on how the system works.

When Printflow was implementing the ERP system, it took them two weeks for them to install, train and test the system. The consultant was working with the time frame which Printflow had paid for. From the data collected during the study, almost two thirds of the users complained that the time allocated for training was too little. This brings up the problem Printflow is currently experiencing of a number of wrong posting by users which results in wrong or incomplete financial reports from the system.

Therefore, user training facilitates the effectiveness of ERP implementation. Management should know that users need to be adequately trained prior to ERP implementation.
Spearman’s rho between Top Management Support and Change Management from Table 4.6 above is 0.09. This value of $r$ shows a positive correlation between the two variables and the relationship is very weak since the value of $r$ is closest to 0. The $p$-value is 0.635 and, therefore we reject the null hypothesis, $H_3$: Change Management has a positive impact on effective ERP implementation. At the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that the slope of the regression line is not zero. This does not necessarily confirm acceptance of alternative hypothesis.

Fulla (2007) defines change management as the act of managing modifications to an organisation’s culture, hierarchy, and/or business processes in order to achieve a desired outcome. According to the data collected from the users of the system at Printflow it showed that users/employees were not involved during the selection process or told about the change in the then current business process. This brings a lot of resistance to change if employees are not involved from project inception. Umble Haft, & Umble, (2003), Somers & Nelson (2001); Parr & Shanks, (2000); Markus, Axline, Petrie, & Tanis, (2000); and Mabert, Soni & Venkataramanan, (2003), concur that change management is critical to a successful ERP implementation.

Management should know that change need to be managed prior to ERP implementation. Change management facilitates the effectiveness of ERP implementation.
4.6.4 Top Management Support and Consultant

Table 4.7: Top Management Support and Consultants

<table>
<thead>
<tr>
<th>Spearman's rho</th>
<th>TopMGT Correlation Coefficient</th>
<th>Consultant Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.000</td>
<td>.309</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.097</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Consultant</td>
<td>.309</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.097</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Spearman’s rho between Top Management Support and Consultant from Table 4.7 above is 0.31. The value of $r$ shows a positive correlation between the two variables and the relationship is weak since $r$ value is closer to 0. The p-value is 0.097 and, therefore, we reject the null hypothesis, $H_4$: Consultants has a positive impact on effective ERP implementation. At the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that the slope of the regression line is not zero. The researcher cannot confirm that the alternative hypothesis should be accepted.

The ERP implementer-vendor partnership is a key success factor influencing ERP implementation success (Nah & Lau, 2001), (Ranzehe & Xun, 2007), (Zhang, Mathew, Zhang, & Banerjee, 2003) and (Somers & Nelson, 2001). The implementer was not the vendor in the case of Printflow. The vendor is in the United States and the implementer is in South Africa and he is the current supporter/consultant of the ERP. From the findings of the research the consultant did not have extensive knowledge of the system such that he was not able to answer all questions from the users and to correct all errors which were encountered during implementation.

The South African company had to send one consultant for the implementation and if they had sent more than one consultant they could have helped each other on answering user’s questions, correcting errors encountered, installing all modules and even training users in separate groups during implementation. Gargeya & Brady (2005), Ngai, Law, & Wat, (2008), and Somers & Nelson (2001), came up with their conclusion
that consultants have got a huge bearing on the success of the ERP implementation if they are not managed properly since they are the owners of the system.

Therefore, consultants facilitate effectiveness of ERP implementation. Management should take into consideration the issue of consultant seriously prior to implementation.

### 4.6.5 Top Management Support and Business Process Reengineering

#### Table 4.8: Top Management Support and BPR

<table>
<thead>
<tr>
<th></th>
<th>TopMGT</th>
<th>BPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td>1.000</td>
<td>.050</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.794</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>BPR Correlation Coefficient</td>
<td>.050</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.794</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Spearman’s rho between Top Management Support and BPR from Table 4.8 above is 0.05. The value of $r$ shows a positive correlation between the two variables and the relationship is very weak since the value of $r$ is closest to 0. The p-value is 0.794 and, therefore, we reject the null hypothesis, $H_5$: Business Process Reengineering has a positive impact on effective ERP implementation. At the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that the slope of the regression line is not zero. The finding does not necessarily confirm acceptance of alternative hypothesis.

Customisation and adoption is needed to change the business processes implemented in the ERP software (Esteves, Pastor, & Casanovas, 2002) and (Van Stijn & Wensley, 2005). The ERP system at Printflow could not be customized since it was an over the shelf/ vanilla ERP system. Actually, Printflow had to change its processes to conform to the system. ERP systems are built on best practices for the specific industry, and to successfully install ERP, all the processes in a company have to conform to the ERP model (Bosilj-Vuksic & Spremic, 2005) and (Jarrar, Al-Mudimigh, & Zairi, 2000).
According to the data collected during the research, it showed that prior to ERP implementation, Printflow did not carry out BPR so that the processes conform to the ERP model. This caused some challenges as some modules are not being used because users just want to conform to the old processes and not the new processes offered by the new system. Holland & Light (1999); Huang & Palvia (2001); Mabert, Soni & Venkataramanan (2003); Stratman & Roth (2002); Parr & Shanks, (2000); Alaskari, Ahmad, Dhafr, & Pinedo-Cuenca (2012); and Nah et al. (2001), concur that BPR is critical to the successful implementation of ERP.

Thus, BPR facilitates the effectiveness of an ERP implementation. Management should carry out a proper BPR prior to ERP implementation.

4.6.6 Top Management Support and Adequate Testing

Table 4.9: Top Management Support and Adequate Testing

<table>
<thead>
<tr>
<th></th>
<th>TopMGT</th>
<th>Adequate_Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho TopMGT</td>
<td>1.000</td>
<td>.434</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.016</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Adequate_Testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td>.434</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.016</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

*: Correlation is significant at the 0.05 level (2-tailed).

Spearman’s rho between Top Management Support and Adequate Testing from Table 4.9 above is 0.43. The value of r shows a positive correlation between the two variables and the relationship is moderate since the value of r is in between 0 and 1. The p-value is 0.016 and, therefore, we accept the null hypothesis, H6: Adequate Testing has a positive impact on effective ERP implementation. Table 4.9 is also confirming from SPSS that the correlation is significant at the 0.05 level. At the α = 0.05 level of significance, there exists enough evidence to conclude that the slope of the regression line is zero, hence adequate testing have a positive impact on ERP implementation success. This finding concedes with studies carried by Ngai, Law, &
Wat, (2008), and Gargeya & Brady (2005), that adequate testing is critical for ERP implementation success.

System testing has proven to be the key element of success for some companies and a direct cause of failure for others (Gargeya & Brandy, 2005). During the ERP implementation at Printflow, the time which was allocated for system testing was less than a month according to the data collected and the consultant was only available for two weeks. It took less than a month for Printflow to test the system according to the data collected during the research work. This is because the consultant was working with the time which had been paid for to do the implementation. According to Rosario, (2000), proper tools and techniques and skill to use those tools will aid in ERP success. Therefore, adequate testing facilitates the effectiveness of ERP implementation. Management should budget for adequate testing prior to ERP implementation.

4.6.7 Top Management Support and Budgeting

Table 4.10: Top Management Support and Budgeting

<table>
<thead>
<tr>
<th></th>
<th>TopMGT</th>
<th>Budgeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spearman's rho</td>
<td>.274</td>
<td>.143</td>
</tr>
<tr>
<td>Correlation Coefficient</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.143</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Spearman’s rho between Top Management Support and Budgeting from Table 4.10 above is 0.27. The value of $r$ shows a positive correlation between the two variables and the relationship is weak since $r$ value is close to 0 than 1. The $p$-value is 0.143 and, therefore we reject the null hypothesis, $H_7$: Budgeting has a positive impact on effective ERP implementation. At the $\alpha = 0.05$ level of significance, there exists enough evidence to conclude that the slope of the regression line is not zero. This finding does not necessarily confirm the alternative hypothesis.
Gargeya & Brady (2005) carried out their study and found out that proper budgeting has got a positive impact on the success of ERP implementation. For the company under study they had budgeted only $10,000 for implementation which is very far way below the average amount budgeted for ERP implementation. Lack of funds resulted in some modules not being implemented since the consultant was working with the time which was budgeted for and it also resulted in inadequate testing and training. Literature states that in large organisations, the cost of full-scale ERP implementation can easily exceed $100 million and the implementation usually takes not less than two years. The poor budgeting we cannot only blame Printflow since during that period of implementing ERP Zimbabwean economy was under a severe recession. There was a shortage of foreign currency in the country to an extent that even the Reserve Bank of Zimbabwe could not get the foreign currency since the ERP system was being purchased from a foreign company which required foreign currency.

Therefore, proper budgeting facilitates effectiveness ERP implementation. Management should budget properly prior to ERP implementation.

4.7 Regression Analysis
A regression analysis was run for all the variables under study with Top Management being the dependent variable. The variables which had their null hypothesis accepted are Adequate Testing and User Training from the findings. For the other remaining variables, the research could not conclude that the opposite null hypothesis is true since the correlation tests showed that there is a correlation relationship between those variables and the dependent variable.
Table 4.11: Regression Analysis Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df1, df2, Sig. F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Durbin-Watson</td>
</tr>
<tr>
<td>1</td>
<td>.490a</td>
<td>.240</td>
<td>.002</td>
<td>2.62537</td>
<td>.240</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.992</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7, 22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.462, 1.822</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Budgeting, Consultant, ChangeMGT, User_Training, BPR, ProjectMGT, Adequate_Testing
b. Dependent Variable: TopMGT

The R Square value is a statistic which tells us how much of the variation in the dependent variable is explained by the regression model. From Table 4.11 on the previous page, the R Square value is 0.24. This value indicates that 24% of the variation in Top Management Support can be explained by variability in Adequate Testing, Budgeting, Change Management, Project Management, BPR, Consultant, and User Training.

Table 4.12: ANOVA Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>47.863</td>
<td>7</td>
<td>6.838</td>
<td>.992</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>151.637</td>
<td>22</td>
<td>6.893</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>199.500</td>
<td>29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Budgeting, Consultant, ChangeMGT, User_Training, BPR, ProjectMGT, Adequate_Testing
b. Dependent Variable: TopMGT

Analysis of Variance (ANOVA) determines the linear relationship among the variables in the regression. If the value of the F is statistically significant at a level of 0.05 or less, this suggests a linear relationship among the variables. Statistical significant at a 0.05 level means there is a 95% chance that the relationship among the variables is not due to chance. From Table 4.12 above the F value is 0.992 and at
0.462 significant level. This suggests that there is a positive, linear relationship among the variables.

**Table 4.13: Coefficients Table**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>6.433</td>
<td>4.856</td>
</tr>
<tr>
<td>User_Training</td>
<td>.396</td>
<td>.244</td>
</tr>
<tr>
<td>Adequate_Testing</td>
<td>.064</td>
<td>.194</td>
</tr>
<tr>
<td>ProjectMGT</td>
<td>.239</td>
<td>.322</td>
</tr>
<tr>
<td>ChangeMGT</td>
<td>-.056</td>
<td>.236</td>
</tr>
<tr>
<td>Consultant</td>
<td>-.032</td>
<td>.254</td>
</tr>
<tr>
<td>BPR</td>
<td>.009</td>
<td>.444</td>
</tr>
<tr>
<td>Budgeting</td>
<td>-.072</td>
<td>.113</td>
</tr>
</tbody>
</table>

a. Dependent Variable: TopMGT

The Coefficients in **Table 4.13** summarises the results of the regression equation. Column B gives the values of the regression coefficient and the constant, which is the expected value of the dependent variable when the values of the independent variable are zero. **Table 4.13** is showing that User Training represent the strongest effect on Top Management Support with standard beta value of 0.378. Statistical results have proven that there is a positive and strong linear relationship between Top Management Support (TMS) and the other variables which are Adequate Testing (AT), Budgeting (B), Change Management (CM), Project Management (PM), BPR, Consultant (C), and User Training (UT).

The linear regression that predicts Top Management Support from the other variables by minimizing the sum of squares of the vertical distances of the points from the regression line, \( R = 0.24 \) measure goodness of the regression given as:

\[
TMS = 6.433 + 0.396(UT) + 0.064(AT) + 0.239(PM) + 0.009(BPR) - 0.056(CM) - 0.032(C) - 0.072(B).
\]
The equation shows that for every 1 unit increase in User Training there is 0.396 increase in Top Management Support, for every 1 unit increase in Adequate Testing there is 0.064 increase in Top Management Support, for every 1 unit increase in Adequate Testing there is 0.064 increase in Top Management Support, for every 1 unit increase in Project Management there is 0.239 increase in Top Management Support, for every 1 unit increase in BPR there is 0.009 increase in Top Management Support. The other three remaining variables which are Change Management, Consultants and Budgeting have got a decreasing effect on Top Management Support for a unit increase in each variable. The researcher cannot say the three variables have got a negative impact on the successful implementation as a number of studies carried show that the three variables have a positive impact on the success of ERP implementation.

4.8 Chapter Summary
This chapter was mainly concerned with reporting the research main findings and discussing these findings, their implications and the link to literature. The following chapter covers the inferences and conclusion made through the research, recommendations, and areas for further study.
5 CHAPTER 5 – CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
In this chapter the researcher makes inferences and conclusions based on findings in the previous chapter in answering the major research question. Recommendations and areas of further study will also be highlighted in this chapter.

5.2 Summary of Research Findings
Top management remains the primary critical success factor. The following is a summary of findings on the critical success factors of effective implementation of ERP:

- User Training
- Adequate Testing

These factors had their null hypothesis rejected but the researcher does not necessarily confirm the alternative hypothesis:

- Project management
- Change Management
- Consultants
- Business Process Engineering
5.2.1 Modified Conceptual Model

The following Figure 5.1 shows the Modified Conceptual Model for this research based on the research findings. The dashed arrows show the factors which had their null hypothesis rejected and those with straight arrows are the ones which have their null hypothesis accepted by the statistical analysis tool SPSS which was used for this research.

Figure 5.1: Modified Conceptual Model
5.3 Conclusions

Top management is the most critical factor as all other factors depend on it. There is a strong relationship between top management and effective implementation of ERP. Top management is also the primary critical factor as most of the other factors depend on it to have overall influence on successful implementation of ERP. Based on the findings it appears there is indirect transmission mechanism via top management support variable between other factors and their impact on effective implementation of ERP as summarised below:

- **User Training** - there is a moderate positive correlation between user training and top management support. For top management support to be effective in ERP implementation there is need for adequate knowledge for the use hence justification for user training.

- **Adequate Testing** – proper adequate testing is critical for effective ERP implementation as this reduces challenges when the system is fully operational.

Despite being rejected on statistically insignificant the following have some positive correlation on top management support:

- **Change management** - change management does have a bearing on the successful implementation of an ERP. Therefore, it is one of the important factors which have to be considered when implementing an ERP system.

- **Consultants** - consultants do not have a positive impact on the successful implementation of an ERP system. However, consultants are the owners of the system and in most cases they are the developers of the system, so there is a great need for them to be actively involved in the implementation of the system. Consultants have got in-depth knowledge of how the system works, and therefore, they have to be involved in the implementation process.

- **Business Process Reengineering** - proper business process reengineering is a precondition to streamline the processes in the implementation of an ERP system.

- **Project Management** - Projects need proper management for them to be successful.
Budgeting - budgeting is an important factor to consider when carrying out projects even though the control of them is very difficult. Poor budgets and budgetary plans results in a lot of projects being abandoned. Proper budgeting and budgetary plans are critical in an ERP implementation.

5.4 Research Hypothesis
The research hypothesis has been accepted in this study that Top Management Support, Project management, User Training, Change Management, Consultants, Business Process Reengineering, Adequate Testing and Budgeting have a positive impact on ERP implementation success.

5.5 Recommendations
The following are recommendations based on the researcher’s findings:

- Top management should be actively involved from the project inception up to its completion.
- The project must be clearly and explicitly designated as top priority by top management and they should legitimize new goals and objectives.
- Business process reengineering should be carried out and minimize customization of the system since most of the ERP systems are over the counter systems.
- A broad reengineering should be done before choosing the system and even before configuring the system.
- A large amount of reengineering should be done iteratively to take advantage of improvements from the new system.
- There should be an extensive training of the users of the system. The users to undergo training should be relieved of their daily duties to concentrate on the raining of the new system and the training should be away from the work place.
- The people element and training aspect of the ERP implementation is very important and organisations should avoid assigning a fixed cost to the training.
There should be adequate time for testing the system and the consultant should be available during the testing period.

Parallel run of the old system and new system should be carried out until everyone involved has confirmed that the old system should be dropped off.

The ERP team should consist of the best people in the organisation and they should have extensive knowledge of project management information technology systems.

Consultants should have an in-depth knowledge of the system and the organisation should be able to manage these consultants effectively.

Troubleshooting of errors should continue even after months or years of ERP implementation.

Users should be retrained if they did not get the concepts on how the system operates. Successive retraining sessions are important as well for users to recap.

Consultants should be negotiated with to fix any challenges incurred during the implementation process onsite to minimize unnecessary delays in problem solving.

Management should have a proper budget and budgetary plans for resourcing the effective implementation of ERP system.

Employees/users should be involved from the project inception to avoid unnecessary resistance.

Proper, effective, knowledgeable project team should be in place prior to implementation.

5.6 Areas of Future Study

Because of time limit the researcher could not discuss cultural issues surrounding ERP implementation. It is recommended that future research in the field of ERP must cover behavioural and ethical issues surrounding operationisation of ERP systems.
Bibliography


Hancock, B. (2002). *An Introduction to Qualitative Research.* Nottingham: Trent Focus Group.


Appendix A
My name is Tendai Joana Tazvivinga, a student from University of Zimbabwe conducting a research study an Investigation into the Critical Success Factors for Effective ERP Implementation in Printing Industry Case of Printflow (Pvt) Ltd. This is in partial fulfillment of the requirements of the MBA programme.

I have a few questions to ask and it will last about 30 minutes. The research is purely for academic purposes.

Your responses will remain private and completely anonymous, so please, speak your mind.

Please tick one of the boxes to provide your best answer from the options given on each question.

Questionnaire on “An Investigation into the Critical Success Factors for Effective ERP Implementation in the Printing Industry: Case of Printflow (Pvt) Ltd Zimbabwe (2009-2013)”

SECTION A: Demographics & General Information

A1. Which department do you belong to?

<table>
<thead>
<tr>
<th>Department</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
</tr>
<tr>
<td>Warehouse</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
</tr>
<tr>
<td>Costing</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
</tr>
</tbody>
</table>
A2. For how long have you been with the organisation?

<table>
<thead>
<tr>
<th>Number of Years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 3</td>
<td></td>
</tr>
<tr>
<td>3 – 6</td>
<td></td>
</tr>
<tr>
<td>6 – 9</td>
<td></td>
</tr>
<tr>
<td>9 – 12</td>
<td></td>
</tr>
<tr>
<td>12 +</td>
<td></td>
</tr>
</tbody>
</table>

A3. For how long have you been using Pecas Vision II?

<table>
<thead>
<tr>
<th>Number of Years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 1</td>
<td></td>
</tr>
<tr>
<td>1 – 2</td>
<td></td>
</tr>
<tr>
<td>2 – 3</td>
<td></td>
</tr>
<tr>
<td>3 – 4</td>
<td></td>
</tr>
<tr>
<td>4+</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION B: Top Management Support**

B1. How was management’s involvement/commitment during pre-implementation stage?

Very Poor [ ]   Poor [ ]   Not Bad [ ]   Good [ ]   Very Good [ ]

B2. How was management’s involvement/commitment during implementation stage?

Very Poor [ ]   Poor [ ]   Not Bad [ ]   Good [ ]   Very Good [ ]

B3. How was management’s involvement/commitment during training?

Very Poor [ ]   Poor [ ]   Not Bad [ ]   Good [ ]   Very Good [ ]
B4. Where there any new policies set for the established new system?
Yes  [ ]  No  [ ]  Not sure  [ ]

B5. Was there IT representation during the system selection process?
Yes  [ ]  No  [ ]  Not sure  [ ]

B6. Was management trained on how the system works?
Yes  [ ]  No  [ ]  Not sure  [ ]

SECTION C: Project Management

C1. Was there a project team in place during the ERP implementation?
Yes  [ ]  No  [ ]  Not sure  [ ]

C2. Was there a Project Leader/Coordinator/ Manager during the implementation of the ERP?
Yes  [ ]  No  [ ]  Not sure  [ ]

C3. How effective was the Project Leader/ Manager/ Coordinator?
Very Poor  [ ]  Poor  [ ]  Not Bad  [ ]  Good  [ ]  Very Good  [ ]

C4. Was a demo conducted onsite by the supplier/consultant before the system was purchased?
Yes  [ ]  No  [ ]  Not sure  [ ]

C5. Where you offered full time to the project implementation i.e. relieved of your daily duties to concentrate on the Pecas training?
Yes  [ ]  No  [ ]

C6. How knowledgeable was the project team in terms of IT systems and computers?
Very Poor  [ ]  Poor  [ ]  Not Bad  [ ]  Good  [ ]  Very Good  [ ]
C7. How knowledgeable was the project team in doing projects?
Very Poor ☐  Poor ☐  Not Bad ☐  Good ☐  Very Good ☐

**SECTION D: User Training**

D1. How effective was the training?
Very Bad ☐  Bad ☐  Moderate ☐  Good ☐  Very Good ☐

D2. How was the time for training?
Very little ☐  Little ☐  Enough ☐  More than enough ☐  Too much ☐

D3. Where the users offered with manuals during training?
Yes ☐  No ☐  Not sure ☐

D4. Were the users offered with manuals after training?
Yes ☐  No ☐  Not sure ☐

D5. How many IT personnel were involved in the training of the system?
0 ☐ 1 ☐  2 ☐  3 ☐  4 ☐  5 ☐

D6. Was the training conducted on site?
Yes ☐  No ☐  Not sure ☐

D7. How was the training being conducted?
1 on 1 ☐  Departmental ☐  Sub Departmental ☐  Everyone ☐  Not sure ☐

**SECTION E: Change Management**

E1. Was there a clear business model of how the organisation will operate after the implementation?
Yes ☐  No ☐  Not sure ☐
E2. Where the users aware of the company procuring a new system before implementation?
Yes [ ] No [ ] Not sure [ ]

E3. Was there a seminar carried out to alert all the employees why the organisation has decided to implement the ERP system?
Yes [ ] No [ ] Not sure [ ]

E4. Was there user involvement during the selection process of the ERP system to purchase?
Yes [ ] No [ ] Not sure [ ]

SECTION F: Consultants

F1. Was the consultant committed to his work?
Yes [ ] No [ ] Not sure [ ]

F2. Rate the consultant’s knowledge of the system on a scale of 1 to 5.
1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ]

F3. How was the consultant’s conduct with the users during the training?
Very poor [ ] Poor [ ] Not Bad [ ] Good [ ] Very Good [ ]

F4. How was the consultant’s conduct during the testing period?
Very Poor [ ] Poor [ ] Not Bad [ ] Good [ ] Very Good [ ]

F5. On a scale of 1 – 5 rank the consultant’s ability to answer questions posed by the users during the implementation?
1 [ ] 2 [ ] 3 [ ] 4 [ ] 5 [ ]
SECTION G: Business Process Reengineering

G1. Was the Business Process Reengineering carried out?
Yes               No               Not sure

G2. Were the users trained on how the system will change the business process?
Yes               No               Not sure

G3. Were the users told about the advantages of having the ERP system?
Yes               No

SECTION H: Adequate Testing

H1. How long was the testing period for ERP system?

<table>
<thead>
<tr>
<th>Month(s)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 month</td>
<td></td>
</tr>
<tr>
<td>1 - 3</td>
<td></td>
</tr>
<tr>
<td>3 - 5</td>
<td></td>
</tr>
<tr>
<td>5 - 7</td>
<td></td>
</tr>
<tr>
<td>7 - 9</td>
<td></td>
</tr>
<tr>
<td>9 - 12</td>
<td></td>
</tr>
<tr>
<td>&gt;12</td>
<td></td>
</tr>
</tbody>
</table>

H2. How was the quality of testing?

Very Poor       Poor       Not Bad       Good       Very Good

H3. Was the system tested in parallel with the old system?
Yes               No               Not sure
H4. Was the integration test conducted i.e. testing if all the modules have been linked together properly?
Yes ☐  No ☐  Not sure ☐

H5. Where all installed modules tested one by one?
Yes ☐  No ☐  Not sure ☐

H6. Where there any errors encountered during the testing period?
Yes ☐  No ☐  Not sure ☐

H7. Where the issues/errors encountered during the testing period resolved?
Yes ☐  No ☐  Not sure ☐

H8. Was the consultant onsite during the testing period?
Yes ☐  No ☐  Not sure ☐

SECTION I: Budgeting

I1. Was there a business plan and vision for the ERP implementation?
Yes ☐  No ☐  Not sure ☐

I2. Were all modules installed for the ERP system?
Yes ☐  No ☐  Not sure ☐
I3. How much was budgeted for the ERP system?

<table>
<thead>
<tr>
<th>$(000)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 50</td>
<td></td>
</tr>
<tr>
<td>50 – 100</td>
<td></td>
</tr>
<tr>
<td>101 - 200</td>
<td></td>
</tr>
<tr>
<td>201 - 300</td>
<td></td>
</tr>
<tr>
<td>301 - 400</td>
<td></td>
</tr>
<tr>
<td>Above 400</td>
<td></td>
</tr>
</tbody>
</table>

I4. Was the issue of not implementing other modules due to budget constraints?

Yes [ ] No [ ] Not sure [ ]

I5. Was the issue of not implementing other modules due to time constraints?

Yes [ ] No [ ] Not sure [ ]

*Thank You for Taking Time to Complete This Questionnaire!*

---The End---