



## **ERP value determination in South African companies**

Daniel Christiaan de Jager

29603073

A research project submitted to the Gordon Institute of Business Science,  
University of Pretoria, in partial fulfilment of the requirements for the degree of  
Master of Business Administration

## **Abstract**

The theme of this research is to establish how South African companies evaluate the benefits of a capital investment, in terms of ERP implementations, to the organisation. The question of whether determinable value can be quantified and the methods used to calculate such value is explored. A search is conducted for critical success factors for successful ERP implementations, key metrics used for monitoring results, and the approach of South African companies to determining benefits.

The research is designed to establish what post purchase analyses of completed projects are conducted and what percentage of completed implementations are considered successful in the South African environment, as well as the possible reasons for those successes and failures.

The research consists of firstly a qualitative study of the *goals of value creation* of ERP decisions, which included a couple of interviews with IT and Process Engineering consultants to form a basis of knowledge for why companies implement ERP systems in the first place, followed by a quantitative descriptive study of the implementation success factors and post implementation analysis, by means of a survey of South African companies.

The outcome of the research shows that ERP in South Africa has matured to a level where the majority of projects are judged by the key decision makers to be successful, in contrast to expectations created by the literature review performed. It also highlights that, in the capital budgeting decision making processes followed by companies of different sizes, qualitative factors play a

slightly bigger role than quantitative factors in the motivation of an ERP implementation. In addition, this research concludes that companies who identify a clear business value goal with the proposed ERP implementation, ensures buy-in from top management, perform proper planning before embarking on the project, as well as follow some kind of rigorous measurement framework, experience higher levels of ERP success than those who do not.

### **Keywords**

ERP implementation, Business value, Critical success factors, Post purchase analysis, Key metrics.

## Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Masters of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Name: Daniel Christiaan (Tiaan) de Jager

Signature: \_\_\_\_\_

Date: 10 November 2010

## Acknowledgements

The author wishes to express his sincere gratitude to the following people for their support and assistance in making this research possible.

- Roy Page-Shipp for his advice, assistance and supervision of this project.
- Dr James Robertson of James Robertson and associates, for his invaluable guidance, insights, time and support.
- Professor Alastair Walker of Software Process Improvement Laboratory for his time and insights.
- To my family and friends who have supported me through this entire process.

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## **1. Definition of Problem and Purpose**

### **1.1. Introduction**

This chapter will introduce the background against which the research was conducted and then clarify the motivation for the research.

### **1.2. Background to the research**

Enterprise resource planning (ERP) systems are configurable information software systems packages that enable organisations to manage effective and efficient use of all of their resources (materials, human resources, finance, etc.) within and across functional areas in the organisation, by providing a total, integrated solution for their information-processing needs. An ERP system supports a process-oriented view of an enterprise and standardises business processes across the enterprise.

Many South African companies are faced with the daunting decision of whether or not to convert their legacy systems to an international standard of ERP systems such as SAP or Oracle. They are increasing their expenditure on information and communication technology (ICT) to obtain or even sustain a competitive advantage in their respective marketplaces. Such a decision of capital investment cannot be taken lightly as the amount of investment required usually exceeds the authority limits of general management of the company

and needs formal approval from the board of directors. Secondly and more importantly, organisations need to know in advance whether the intended investment will produce the required return as planned and provide long lasting benefits and value to the company's strategy, objectives and goals.

What makes this decision more daunting for South African companies specifically, is that they are at the mercy of large international software providers with regard to pricing, as licence and application costs for the majority of ERP system providers are based on US dollars, which increases the running costs of these systems significantly compared to companies in Europe for example, where the exchange rate is much stronger. Such decisions can thus have a major impact on the sustainability of a company, as the success or failure of large capital investments can seriously impact on the long term profitability of South African companies. It is therefore imperative that decision makers make an educated decision when it comes to any ICT related expenditure, especially where it concerns large investments in ERP systems.

Once approval for an ERP system is obtained, decision makers are then left with the quandary of how to evaluate their investments in these technologies. Although it is relatively easy to establish the projected costs of a planned project (through quotations received from outsourced service providers and internal resource cost projections), it is far more difficult to establish the possible benefits

and efficiency gains, post implementation reduced costs, as well as other non quantifiable factors of project success.

Many providers of ERP solutions can calculate an estimated payback period or return on investment (ROI) for the client, but few companies can do this by themselves, from an objective point of view and without a profit incentive. Few South African organisations have the ability to perform a well defined *pre*-implementation cost benefit analysis, in order to quantify the benefits of a planned implementation and support the acceptance of a requested project. In addition, not much *post* purchase analysis is performed by companies and the benefits of such projects are usually never quantified and reported on to the initial decision makers.

Even though a company may be able to perform such a calculation, there are currently no benchmark market ratios that can be used to establish whether an implementation was successful or not.

Projects are also not designed to build in performance measurement as this is seldom the main reason for the implementation. Only where it is the company's specific intention to, for example, reduce headcount as a direct result of implementing an ERP system, would this specific metric be measured and monitored throughout the life of the project.

Finally, due to the diversity of companies and the industries in which they operate in the South African environment, the myriad of different solutions available, as well as the amount of customisation required for every institution, each and every ERP implementation is different from another. This further complicates setting industry benchmarks.

### **1.3 Research Problem Definition**

Zikmund (2003, p. 93) defines a research problem as “The indication of a specific business decision area that will be clarified by answering some research questions.” The business decision area to be clarified by this research report centres on the capital budgeting decisions that need to be made on the implementation of enterprise resource planning systems. It further focuses on the methodology used by many enterprises in evaluating the success of such implementations, as well as the search for South Africa specific success factors, benchmarks or key performance indicators that will guide South African organisations in making the right decisions when taking on the ERP beast. Finally there will be an attempt at establishing standardised key metrics for businesses to calculate whether their implementations were successful.

## 1.4 Research Motivation

*Why was this problem selected?*

As an accountant by profession it is the author's responsibility to measure all projects and initiatives that his employer pursues. Whether it being a cost benefit analysis or return on assets calculation, there is an expectation to always connect a number to any task, whether it is financial figures or key performance indicators.

The success of any company initiative is evaluated by means of a profitability or cost benefit analysis. This is based on the understanding that, "If you can't measure it, you can't manage it" (Drucker, 1993), which is believed to originate from a remark attributed to Galileo, who said "Count what is countable, measure what is measurable. What is not measurable, make measurable". It is the author's endeavour to establish a set of key performance measures for assessing the true value of a currently immeasurable concept.

*What evidence verifies the existence of a problem?*

There remain a large number of ERP system implementation failures across the world. Internationally there have been countless amounts of failures recorded, including large write-offs of capital expenditure by big conglomerates (Robertson, 2008). In South Africa alone one of

the biggest capital expenditures on ERP implementations is still ongoing as Standard Bank has spent over R1billion on a SAP conversion (Engelbrecht, 2008). The problem is that most companies either do not know how to track or follow the key success factors applicable to their industry, or they simply do not know what those factors are, even though it may be in their interest to quantify the benefits.

*What is the relevance of this topic to business in SA?*

For every business decision made there is always a financial aspect that needs to be considered. Financial Managers and Chief Financial Officers are tasked with this responsibility and are seldom able to provide a quantifiable answer to this question. The role of the accountant as a key player in ERP has been confirmed by many authors, including Mische (2000), as cited by Jean-Baptiste in 2009.

Firstly, accountants are required to perform a cost benefit analysis of the planned implementation. Secondly, they are required to monitor the progress of the projects and report on the success of the project during and after the implementation.

This topic is more relevant today than in the past as all businesses that want to compete in the information age of today need to make informed decisions that are measurable and which can be evaluated.

## **1.5 Research Scope**

The scope of the research is limited to exploring the value that South African companies have obtained from recent ERP implementations and whether they have been able to monitor and quantify those values.

## **1.6 Structure of the report**

- Chapter 2 presents a summary of referenced literature that forms the base for the identification of the research problem;
- Chapter 3 highlights the research problems identified to address the aim of this research;
- Chapter 4 identifies the preferred research methodology that was used to conduct this research;
- Chapter 5 consists of the qualitative and quantitative data obtained during the initial interviews and subsequent survey;
- Chapter 6 analyses the data presented in Chapter 5;
- Chapter 7, the final chapter, presents recommendations and identifies areas for future research.

## 2 Theory and Literature Review

ERP from its traditional base in manufacturing and logistics has expanded into all types of industries traditionally relying on in-house development (Kumar & Van Hillegersberg, 2000a). These systems are continuously evolving in terms of technology and functionality and have improved significantly over the last decade to include integration with countless available applications and more recently became compatible with Web-based multimedia tools (Kumar & Van Hillegersberg, 2000a).

Initially, companies worldwide were lured by software vendors to implement ERP systems into their existing business environments on guarantees of improved business productivity, streamlined business operations, and increased cost savings (Beatty & Williams, 2006). These days, however, the implementation of an ERP system is no longer considered a *nice to have* or the key to an organisation's competitive advantage, but rather considered by many to be the price of entry for running a business (Kumar & Van Hillegersberg, 2000b). Nearly every organisation regardless of its size or industry sector in which it is competing, is operating an ERP system supporting its core business functions (García-Sánchez & Pérez-Bernal, 2007).



## 2.1 ICT Costs

The terms Enterprise Resource Planning (ERP) and Information and Communication Technology (ICT), although used in general amongst IT practitioners, do not provide a true explanation of the essence of these systems. A more meaningful abbreviation would be *Integrated Business Information Systems / Software*, or IBIS (Robertson, 2010). However, for the purposes of this research paper, the more commonly known terms will be used.

There is a general understanding amongst IT practitioners that all ICT costs can be split between direct and indirect costs. Direct costs are relatively easy to quantify as they are calculated up front, based on market related prices and can readily be presented to decision makers without much difficulty and margin for error. Indirect costs on the other hand are more difficult to quantify.

Some normative literature has suggested reasons for this difficulty as centring on the socio-technical (human, organisational and technical) dimensions associated with the adoption of ICTs, which includes the inability of managers to determine the true costs of deploying ICT due to a lack of knowledge and understanding of ICT-related costs (Love, Irani, Ghoneim & Themistocleous, 2006).

A number of specific indirect costs have been identified including reduced productivity, indirect human cost of management time spent

on revising, approving and amending IT-related strategies, system support and trouble-shooting costs (Love et al, 2006).

The Gartner Group developed a model for including all related IT costs (including direct and indirect costs) needed for owning and using hardware and software, which is called Total Cost of Ownership or TCO (Emigh, 1999). Bill Kirwin of Gartner defines TCO as “a holistic view of costs related to IT acquisition and usage at an enterprise level” (Smith David, Schuff and St. Louis, 2002). Throughout this research all references to “costs” will be based on TCO. Similarly, James A Robertson and associates have created an economic model for illustrating the total cost of ownership and compared that to the total value obtained from a fully effective system investment (refer *Appendix A*). From these two categories a real payback period can be calculated (refer 2.1.3 for a discussion on key metrics).

On top of direct and indirect costs of ERP implementation there are also the *hidden* financial costs of ERP software, as the adoption creates major distortions in the corporate decision-making process (Lindley, Topping and Lindley, 2008). If there is a lack of flexibility in the existing setup, even marginal changes to production, sales, human resources, or accounting would require alteration of ERP software, which requires additional costs. This ultimately means that the cost of innovation is increased by the limitations of the IT

capabilities (Lindley et al, 2008). These costs will be excluded from the research and will be deemed a limitation of the research outcome.

The costs associated with each project vary further due to the amount of customisation required. However, if the system is properly configured, a lot of the customisation falls away; conversely, if properly configured, it will create opportunities to configure more effectively (Robertson, 2010). Philip Hamm conducted a study of IT Cost components in 2007 and identified a list of 14 different components falling into direct and indirect costs, from a study of six different sources, as tabled below (Hamm, 2007).

**Table 2. 1: IT Cost Components identified by various authors**

Cost components identified	Weil and Broadbent (1998)	Chanopas et al (2006)	WITSA (2006)	Love et al (2004)	Smith David et al (2002)	Prasad and Tata (2006)
Hardware	X	X	X	X	X	
Network	X	X	X	X	X	
Telecommunications	X	X	X	X		
Software	X	X	X	X	X	
Local Applications	X	X		X		
Services			X	X	X	
Consumables				X		
Training		X		X	X	
Operating costs				X		
Indirect Human Costs		X		X		
Indirect Organisational Costs				X		
Centralisation					X	
Standardisation						
Complexity					X	X

What Hamm however omitted from his study was the opportunity cost of not implementing an ERP solution, which remains the most difficult component to quantify, as the calculation can only be performed after the implementation and there are no facts available on which to base the comparison. One could argue that the reason this was omitted is because this “cost” is actually a benefit.

## **2.2 Project Implementation Models**

Parr and Shanks in 2000 identified a myriad of different tools, techniques or models used for the actual implementation of an ERP system, including the five stage models of Bancroft et al. (1998) and Ross (1998) and the four stage model of Markus and Tanis (1999). Their study however notes the importance of proper planning of the implementation as well as setting critical success factors for each phase of the implementation. Other success factors included the appointment of an experienced 'champion' as well as partitioning large projects into smaller parts or projects. Refer Critical Success Factors in section 2.4.1 below.

This research will not focus on the different implementation models used by South African organisations but rather on the critical factors for a successful implementation, of which a specific implementation model could be one identified factor.

## **2.3 Critical Success Factors**

As cited by Finney and Corbett (2007), there are an increasing amount reports on ERP implementation failures (Ribbers and Schoo, 2002; Soh et. al., 2000; Willis and Willis-Brown, 2002) or complete abandonment of systems (Jesitus, 1997). Failures have even led to organisational bankruptcy from reports of Bulkeley, 1996; Davenport, 1998 and Markus and Tanis, 2000 (Markus, Axline, Petri and Tanis,

2000). As cited by Woo, Appleton (1997) reported that more than 50% of ERP projects fail to achieve the anticipated benefits and Scot and Vessey (2002) reported that 90% of SAP R/3 projects run late (Woo, 2007).

The successful implementation of an ERP system depends on whether the implementation was performed in a correct and complete form at minimal cost, time and human resources and will soon start to produce the expected and planned benefits for the organisation (García-Sánchez & Pérez-Bernal, 2007).

Dr James Robertson believes that companies should rather aim to complete projects at optimum cost, time and human resources, as a rush to complete projects may result in significant shortcomings in the end result (Robertson, 2010). This view complements the findings by Ryan and Harrison (2000), as cited by Pavlicko (2007), where they found that more than 50% of IT projects exceeded original cost estimates by more than double the initial projected amounts.

The literature review shows that various studies have been conducted to establish the key success factors that contribute towards a successful implementation, as well as the conditions for failure. García-Sánchez, Holland and Light (1999) define the critical success factors (“CSF”) in an ERP context as “the factors needed to ensure a successful ERP project”. Their research in 2007 of nine previous studies identified fourteen CSFs to be the largest, clearest and most

significant subset of all the factors analysed in the prior studies. The results of their study were compared to a previous study by Somers and Nelson in 2001.

In a separate study by Fui-Hoon Nah, Zuckweiler and Lee-Shang in 2003, they identified eleven CSFs, with underlying sub factors, for successful ERP implementation. Of these eleven factors, the five most critical factors were identified based on a survey questionnaire administered by Chief Information Officers (CIOs) of Fortune 1000 companies. Refer Table 2.2 below for a comparison of the identified CSFs of these studies.

It is clear from their findings that the three most important factors for successful implementation of ERP solutions, that ranked the highest in all three studies, include the buy-in and support from top management, effective project management and the composition and competence of the project team.

Two other factors which are repeated in all three surveys are the competence and leadership of the project champion, as well as the existence of proper communication between all parties involved in the project.

**Table 2. 2: Critical Success Factors (CSFs) for successful ERP implementation**

	<b>Somers and Nelson (2001)</b>	<b>Fui-Hoon Nah (2003)</b>	<b>García-Sánchez (2007)</b>	<b>Robertson (2004)</b>	<b>Standish Group (1995)</b>
1	Top Management Support	Top Management Support	Top Management Support	Executive Custody (Top Management Support)	User Involvement
2	Project Team Competence	Project Champion	Project Management	Strategic Solution Architect	Top Management Support
3	Interdepartmental Cooperation	Teamwork and Composition	Teamwork and Composition	Clear Strategic Perspective & Alignment	Clear Statement of Requirements
4	Clear Goals and Objectives	Project Management	Communication	Business Integration and Optimization	Proper Planning
5	Project Management	Change Management Culture & Program	Business Process Reengineering	Project Management	Realistic Expectations
6	Interdepartmental Communication	Communication	ERP System Selection	Data Engineering	Smaller Project Milestones
7	Management of Expectations	Business Plan and Vision	Having External Consultants	Technology Components	Competent Staff
8	Project Champion	Business Process Reengineering	Training and Support for Users	-	Ownership
9	Vendor Support	Development, Testing, Troubleshoot	Project Champion	-	Clear Vision and Objectives
10	Careful Package Selection	Monitoring & Evaluation of Performance	End Users Involvement	-	Hard-working, Focused Team
11	-	Appropriate Legacy Systems	Change Management Plan	-	-
12	-	-	Test and Problem Solution	-	-
13	-	-	To Facilitate Changes	-	-
14	-	-	Vision Statement & Business Plan	-	-

In discussion, Russel Swanborough, director at Sciam Solutions, highlighted the fact that that the majority of these critical success factors focused on the processes involved during an ERP implementation, but little on the planning stages prior to the actual implementation, especially with regards to establishing the informational requirements. The importance of what he calls the *knowledge of information*, which is clearly identifying what the required output of the planned project should be and what the company wants to achieve with the information, was completely omitted from these surveys (Swanborough, 2010). In summary, too much is said about 'people' but very little is said about the 'data'. Data configuration based on the desired outcome is of critical importance.

This statement is more closely aligned to the findings of the *CHAOS* study results back in 1995, where user involvement, executive management support and a clear statement of requirement were the three top factors for essential IT project success (The Standish Group, 1995).

Lastly, as with the critical factors that lead to the success of implementations, similar factors are applicable for the failure of many implementations. Issues of information technology mythology, lack of executive custody, policies, lack of strategic alignment, lack of an engineering approach, lack of data engineering, people and soft issues and technology issues all contribute to projects being



unsuccessful (Robertson, 2004). The project methodology should therefore not only aim to achieve success, but also be specifically engineered against failure.

## 2.4 Post Purchase and Performance Evaluation

A survey of 63 companies with ERP systems by Meta Group Inc. found an average negative value of US\$ 1.5 million, comparing quantifiable cost savings and revenue gains to hardware, software, consulting and support costs (Stedman 1999). The survey concluded that executives that are looking only for quantifiable returns may therefore be disappointed with the outcome of such an exercise and choose not to proceed with such investments. However, the intangible benefits, such as better customer service and improved supply chain planning could be of immeasurable value to the organisation (Stedman, 1999).

These tangible and intangible benefits or project metrics is divided by Pavlicko (2007) into *financial* and *quality* metrics. For the purpose of this research the tangible or financial metrics will be referred to as *quantitative* metrics and the intangible or quality metrics will be referred to as *qualitative* metrics.

### 2.4.1 Key Quantitative Metrics

The most common financial method of measuring the value of an ERP system implementation is Return on Investment (ROI) which is calculated as the net benefits divided by the costs (Pisello, 2003). Other preferential or popular capital budgeting methods include Net Present Value (NPV) and Payback period. Less popular methods also Accounting Rate of Return, Profitability Index, Modified Internal Rate of Return (MIRR) and Discounted Payback (Ryan & Ryan, 2002). Refer to the below definitions for each of these methods, as defined by Pavlicko, 2007.

*ARR – Accounting Rate of Return:* A quick estimate of a project's worth over its useful life, derived by finding profits before taxes and interest.

*DCF – Discounted Cash Flow:* The value of an investment measured in terms of the cash inflows and outflows adjusted for the time value of money.

*IRR – Internal Rate of Return:* The calculated interest rate that makes the net present value (NPV) of all cash flows equals zero.

*MIRR – Modified Internal Rate of Return:* The calculation of the net present value (NPV), which replaces the internal rate of return (IRR) with the firm's cost of capital, thus more accurately reflecting the profitability of a project.

*NPV – Net Present Value:* The difference between the present value of cash inflows and the present value of cash outflows. The present value takes into consideration the time value of money

in calculation the amount that a future sum of money is worth today given a specified rate of return.

*PP - Payback Period:* The length of time required for the accumulated net cash flow from an investment to equal the original cost of the investment; the length of time required to recover the cost of an investment.

*ROI: Return on Investment:* The collective use of one or more financial metrics considered as a whole in making the investment decision. The individual metrics applied may include Payback Period, Discounted Cash flow, Net Present Value, Internal Rate of Return, etc.

#### **2.4.2 Key Qualitative Metrics**

In 1992, Delone and Mclean introduced the D&M IS Success Model which included technical, semantic, user satisfaction and effectiveness tests as part of quality metrics for the measurement of Information systems implementation success (Delone and Mclean, 2003).

However, these success factors vary from company to company and true qualitative metrics depends on the organisation and the 'baseline' they are trying to improve (Walker, 2010). The most common quality metrics identified are improved customer service, reduction of manual errors or standardisation of processes.

This research will aim to identify which of the popular quantitative and qualitative metrics key individuals use at South African companies to measure the value and success of their ERP systems. Justifying the value-added contribution of a company's ERP system can become a real challenge without a proper performance-measurement framework that can provide feedback between the desired objectives of adoption and resultant effects of execution of ERP implementation (Wei, 2008).

Most companies spend significant amounts of money and time on analysing and justifying the investment purchase decision and fail to take a good look at how well the application actually performs once it is installed (Soares, Coutinho & Martins, 2007). After-the-fact audits should include specific metrics and should include measures of productivity gains and should be measured at regular intervals (Arif, Kulonda, Proctor, & Williams, 2004).

In a recent study by AMR Research into Enterprise Application Strategies and a survey of 186 companies, it was found that only 37% of companies actually measure the business value from their ERP projects and that those companies typically only implemented 16 of 47 best practices studied (Swanton & Draper, 2010).

Of the 47 best practices identified, ten of these predicted that companies attained more than half of the projected benefits of the business case and another eight practices assisted companies in realising the project completion on or before the target date. See Table 2.3 below for a summary of these best practices, ranked in order of significance.

**Table 2. 3: Best Practices used by companies to measure success**

	<b>Best practices of companies attaining over 50% of business case</b>	<b>Best Practices of companies attaining benefits on or before plan</b>
1	Detailed quantitative business case and financial ROI analysis for major implementations	Executive sponsor actively participating in business case development
2	Defined project-approval requirements based on investment level	IT and business jointly driving the business case
3	Regular IT and business planning meetings and methodology	Program scope is managed, with the impact to the realization of the business case considered
4	Defined prioritization criteria	Project success criteria a combination of KPIs, new capability, on time, on budget, and financial metrics
5	Multi-year planning	Solution design attributes are linked to business case and value
6	Program scope is managed, with the impact to the realization of the business case considered	Adoption of new processes/systems and benefit attainment in business unit leader's goals and incentives
7	Project portfolio management guided by business strategy, IT strategy, resource availability, and value	Performance baselines for project KPI prior to implementation
8	Sensitivity analysis on financial risk versus benefits	Strong link between business case and business process change qualitative/quantitative targets
9	Post go-live responsibility/ accountability for new or changed business processes very well defined	-
10	Well-defined risk identification and management process over implementation cycle	-

It is clear from the table that both quantitative and qualitative measurements are applicable in ensuring the on-time and on-budget delivery of an ERP solution. The quantitative business case, its development, its documentation and management involvement, plays

the single biggest role in assisting companies to achieve their ERP targets.

In Project Management circles this is defined as the project's Measurable Organisational Value (MOV). The MOV must be measurable, provide value to the organisation, be agreed upon from the start and must be verifiable. Therefore, at the end of the project the MOV must be verified to determine if the project was a success (Marchewka, 2003, p.35).

In summary, a project that is finished on time and within budget but does not provide business value to the organisation does not constitute a success.

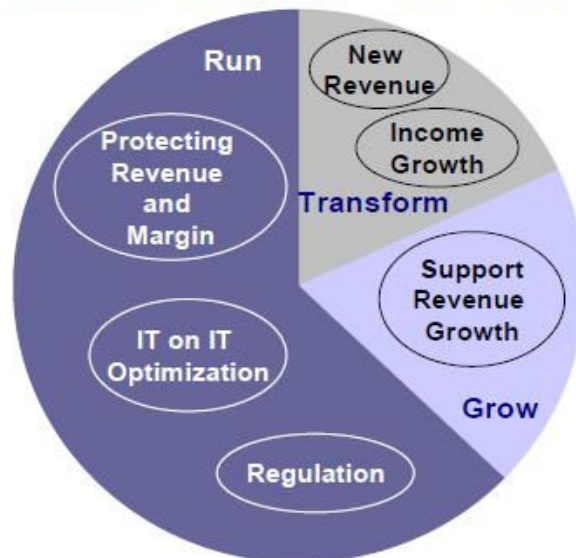
## **2.5 Business Value**

TheFreeDictionary.com defines *Value* as an amount, as of goods, services, or money, considered being a fair and suitable equivalent for something else; a fair price or return. *Business Value* in terms of IT spending should therefore translate into either increased profits, increased Return on Investment or improved cash flows (Agile Business Coach, 2003).

The research company Gartner has created a framework for explaining *Business Value* in terms of IT spending (Gartner, 2006). It identifies three basic categories in which IT assets and investments

can provide value to the business (refer Figure 2.1 below). The first category is *Business Transformation*, where IT supports new lines of business, new products or services and business models. The second category is *Growing the Business*, where IT spending supports organic growth, typically fuelled by increased customer demand. The last category is *Running the Business*, where IT spending supports the day-to-day operations, which is seen as necessary to keep the core functions of the business operating.

### Spending Categories & Business Value



**Figure 2. 1: Framework for explaining IT Business Value**

However, as cited by Ragowsky, Brynjolfsson (1993) identified the conflict of the strategic nature of IT and the inability to find rewarding payoffs by using traditional measures of economic productivity. He called this the *productivity paradox* and stated that it occurs particularly with ERP systems (Ragowsky and Somers, 2005).

## 2.6 Capital Budgeting

Management Accounting is a diverse and detailed discipline, which covers numerous topics from financial analysis to planning and reporting, from variable costing to activity based costing, and from flexible budgets to capital budgeting, to name but a few. This literature review is a high level overview of the capital budgeting fundamentals.

Capital budgeting or investment appraisal is the planning process used to determine whether a firm's long term investments such as new machinery, replacement machinery, new plants, new products, and research development projects are worth pursuing. It is budget for major capital, or investment expenditures (Sullivan and Sheffrin, 2003).

Formal techniques based on the incremental cash flows from potential investments include Accounting Rate of Return, Net Present Value and Internal Rate of Return. A number of models have been developed to calculate or measure the systematic risk of a planned investment, such as the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT), which can influence the acceptance or rejection of investment projects as one is allowed to incorporate a premium in the discount rate (Soares et al, 2007). Other accounting or more simplified methods or techniques include the Return on



Investment and Payback Period calculations which are less open to manipulation by decision makers.

Apart from the classical capital budgeting process where the objective is to maximise return on investment, alternative models have been presented, such as the knapsack model (McGeary and Hartman, 2006). Here the objective is to maximise “usage” and monitor “change in usage” due to a specific investment made.

Studies by Block (2005) have shown that capital budgeting procedures between industries can differ with regard to goal setting, determining the required rate of return and utilising portfolio effect considerations. However, the corporate goals and policies of a specific corporation need to be considered as large corporations do not necessarily opt for more sophisticated capital budgeting methods.

This research will aim to understand what capital budgeting tools were used by South African companies in supporting the decision to implement ERP systems. It will then aim to establish whether these tools were effectively and efficiently used by the companies or not. It will also aim to establish whether quantifiable capital budgeting tools and the expected results carry as much weight as the qualitative reasons for choosing to implement an ERP system.

### **3 The Research Problem**

#### **3.1. Introduction**

Based on core themes and constructs identified through the Literature Review, this research project explores how ERP solutions create value in the South African environment and whether this value is measured by South African organisations.

A proposition is defined (Zikmund, 2003, p. 43) as a, “statement concerned with the relationships amongst concepts. A proposition explains the *logical* linkage amongst certain concepts by asserting a universal connection between the concepts.”

#### **3.2. Research Questions**

This research will test the following propositions as the basis for establishing the key processes followed by making recommendations for an industry benchmark with regards to successful ERP implementations.

3.2.1 Firstly, to what extent are the pre-implementation decision, of an ERP system at South African organisations, based on both quantitative and qualitative measures?

- 3.2.2 Secondly, what are the critical success factors for ERP implementations in South Africa?
- 3.2.3 Thirdly, what *post purchase analysis* takes place (quantitative and qualitative) in terms of key metrics used?
- 3.3.4 Fourthly, are ERP implementations in South Africa successful or unsuccessful?
- 3.2.5 Lastly, do the above experiences differ across different industries?

### **3.3. Research Propositions**

- 3.3.1 The qualitative reasons outweigh the quantitative reasons in the capital budgeting decision-making process of an ERP system investment.
- 3.3.2 The critical success factors for ERP implementations in South Africa are similar to those experienced elsewhere.
- 3.3.3 By understanding the full costs and benefits of an ERP implementation, South African companies would be able to better track the success or failure of their ERP implementations by making use of basic key performance indicators.

3.3.4 The majority of South African ERP implementations are not successful.

3.3.5 The larger the company, the more difficult it will be to have a successful ERP implementation.

### **3.4. Research Hypothesis**

From the literature review it is clear that key decision makers need to rely on the quantifiable as well as qualitative benefits of ERP implementations. In most cases it seems that the qualitative benefits outweigh the quantitative benefits.

3.4.1 In the pre-implementation procedures followed by South African companies in making an ERP investment decision, the decision is based on qualitative factors, more so than on quantitative factors.

3.4.2 The three most frequent reasons for successful ERP implementations in South Africa is the same as the three most frequent reasons for successful implementations as per the literature review.

3.4.3 The ERP implementations of South African companies that perform post purchase analysis by using key performance

indicators were more successful in their ERP projects than those companies that did not perform similar analysis.

3.4.4 ERP implementations are only considered to be successful, when all three factors of success have been experienced by the company, i.e. within time, within budget and realised benefits.

3.4.5 There is no differentiation between industries when it comes to successful ERP implementations.

### **3.5. Summary**

This research may give evidence of best practises that exist in the South African ERP environment. It may prove that well aligned businesses have a total grasp on the levels of success achieved and the value created through the implementation of ERP systems. On the other hand this research may also give evidence that companies do not know what the realised benefits of completed implementations are, what the return on their investments are or which factors led to the success or failure.

## 4. Research Methodology

### 4.1. Introduction

Documentary research and literature reviews were performed of the academic publications and journals expanding on the topics as detailed in this proposal. The aim of the research was to follow an integrated approach to this study between the realms of Management Accounting and Information Technology.

Two separate interviews were held with consultants in the information technology spectrum, especially with regards to ERP implementations, with regards to formulating my questionnaire. These individuals included Dr James Robertson of James A. Robertson and Associates, an IT Project consultancy firm, and Professor Alastair Walker from the Software Process Improvement Laboratory, a software engineering and process improvement company.

After obtaining a better understanding of the industry and the typical reasons for companies to implement or update their ERP systems, the research then proceeded to follow a quantitative, descriptive research to support the hypothesis. The research method chosen was through submission of a survey to a sample of ERP customers.

The survey was sent to the key IT decision makers of a random list of 184 companies, including the Chief Executive Officers, Chief

Financial Officers, Chief Information Officers, Directors, I.T. Managers, Specialists and other individuals involved in the implementation. Forty responses were received within the first week. A follow up e-mail was sent a week later and in total 68 responses were received. Although a few responses were incomplete, none were discarded and statistical analysis was performed on all the responses.

The survey included additional qualitative questions relating to the nature of the company or the industry the company finds itself in as well as the size of the company.

#### **4.2. Population and Sampling**

The total target population included all South African listed and unlisted companies who have implemented recognised ERP solutions over the last ten years from 2000 to 2010. These include small corporations which are defined as having an annual turnover of less than R 5million, medium corporates (< R500 million), large corporates (> R500 million), as well as mega corporates that have greater than R1billion turnover per year. Further segmentation by industry sector was done by way of the questionnaire and subsequent analysis.

#### **4.3. Unit of Analysis**

The unit of analysis was completed ERP implementations at South African organisations over the last ten years, between 2000 and 2010.

#### **4.4. Unit of Influence**

The unit of influence was the key decision makers of the organisations at which ERP implementations have been completed. The survey was sent to those individuals and where possible the responses were obtained from them. There was no way to establish whether these individuals or their subordinates answered the questionnaire.

#### **4.5. Research Method**

Primary data was sourced through the literature review and further data was sourced through the initial interviews held. In order to ensure construct validity, a questionnaire was developed based on previous research done. Additional questions were added to support my research proposals.



#### 4.6. Questionnaire Development

The questionnaire, attached as *Appendix B* was developed in order to investigate the research questions. The questionnaire was designed to test the research hypothesis. The questionnaire also sought to establish to what extent South African companies differ in their approaches to ERP implementations from previous studies performed outside of South Africa, as detailed in the literature review.

Respondents were firstly requested to indicate what type of ERP implementation they had undergone during the last ten years, what their experience with ERP implementations were and what the intended business value was that they were seeking from the system.

The next section of the questionnaire was made up by three questions designed to identify the Pre- and Post implementation analysis undertaken by companies, as well as the key quantitative and qualitative metrics used. This was followed by a few questions on the companies' perceived understanding of whether their projects were deemed as successful or not.

The last section of the survey was designed to segment the respondents for statistical purposes, specifically by the job title of the respondent, the type of industry and the overall size of the company represented in the survey. The questions were structured in

recognisable categories defined by terminology to which the key decision makers are accustomed.

The questionnaire was designed to collect data using a 5 point Likert scale ranging from:

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

The questionnaire was placed on the internet using a recognisable platform in Google Documents. This allowed for convenience and also re-emphasised confidentiality. An introduction to the questionnaire including the internet link to the survey was e-mailed to a database of contacts, requesting them to forward it to the key decision maker at their company with regards to Information Technology and ERP systems. Refer to Appendix B for the complete survey.

#### **4.7. Timeline**

The research was conducted over a period of six months, between May and October 2010.

## 4.8. Limitations of the Research

4.8.1 This research project was conducted on a database of Information Technology customers available through a network of contacts. A large number of companies will therefore be excluded. However, the list of 184 contacts is considered a large enough sample size.

4.8.2 The questionnaire was sent to all key decision makers at the various companies, which will inevitably exclude certain users of the systems.

4.8.3 The research was deductive, taking general IT and Accounting theory specifically related to ERP solutions and more specifically relating to the structures, systems and processes required to support these constructs.

4.8.4 The sample cannot be assumed to represent the entire ERP population in South Africa, and factors such as privacy, specific company culture, different service providers, etc, would distort any inferences that this research would make about the ERP environment or the IT industry as a whole.

#### **4.9. Reliability**

Low reliability can be caused by respondents misunderstanding the question or the context in which the question is framed (Zikmund, 2003, p. 301). In order to establish the context, an introduction to the research explaining the rationale for the survey was included in an e-mail to each candidate respondent.

The objective was to reduce or eliminate the possibility of respondents misunderstanding the questions and thus answering contrary to their views. This was intended to improve the reliability of the research results.

#### **4.10. Validity**

By identifying the respondents in terms of their managerial position within the company, the aim was to validate the findings against their various roles and functions and to give greater depth to the research than surveying exclusively IT Managers or Chief Information Officers.

##### **4.10.1 Internal Validity**

By using proven scales and inserting questions that were to be reverse scored, the aim is to ensure a high degree of internal validity.

#### 4.10.2 External Validity

The intention was to survey as many respondents as possible within this contained population with the most recent experience. By classifying respondents by their managerial position or industry sector, the aim is to generate insight into possible differences in responses from one company, but also to establish if there were trends across various differing categories of industries.

#### 4.11. Summary

A detailed description of the methodology applied to this research has been provided, including a discussion on the rationale used for conducting both quantitative and qualitative research, how the questionnaire for the quantitative research component was devised, and on the data collection process and method.

The research topic has also been discussed in light of the research methodology theory of reliability, validity and limitations. The objective has been to validate the credibility of the elected format and process that has informed this research project within the context of the research objectives.

## 5. Results

### 5.1. Introduction

This chapter presents the results of the data gathered during the fieldwork phase of the research, both through the initial qualitative data obtained via interviews, as well as the quantitative data obtained via the submission of a survey.

### 5.2. Qualitative data

Two separate and independent interviews were held with experts in the ERP implementation field, being Dr James Robertson of James Robertson and Associates and Professor Alastair Walker of Software Process Improvement Laboratory. These meetings were held to discuss and confirm the validity of the research questions and to support the formulation of the research survey questionnaire.

From the interview with Dr James Robertson a number of constructs were identified. In response to the question of how companies should go about quantifying the benefits of an ERP implementation, Dr Robertson commented that *“the gains, the wins, the benefits of an ERP system should be so obvious to the business and to the people outside the company that you do not have to go through some arduous and complex exercise to quantify whether the project was a success”*. Using an example of building a bridge, one does not need to employ expensive consultants to determine whether the project

was a success or not. Either the cars can cross the bridge without falling off the cliff or they don't. One does not need to measure whether it was successful or not, it would be blatantly obvious. However, the question still remains, was the bridge built within a defined time frame and at optimum costs? Refer to the next section where specific research questions in the survey were based on this construct. Question seven in the survey was particularly aimed to address this construct. Refer to Appendix B for the full survey questionnaire.

The second construct identified through discussion with Dr Robertson was the question around what a company can do better through the implementation of an ERP system? Is it merely to automate processes or does it actually support better decision making? Although difficult to quantify, the ideal ERP system provides answers to the questions that the company has not even thought of yet. Question three in the survey was particularly aimed to address this construct.

From the interview with Professor Alastair Walker the same constructs were explored as per discussion with Dr Robertson, although from a different angle. In response to the question of whether companies can quantify or measure the benefits of an ERP implementation, the response was that only companies that had a *baseline* to measure from could perform such an exercise. In other words, a baseline assessment of the capabilities of the processes of

a company is necessary before an ERP implementation should be undertaken. Therefore, if management of a company understands the capabilities of a company, they would be able to accurately estimate their expectations. Question four in the survey was particularly aimed to address this construct.

On the construct of measuring the return or the benefits of an ERP implementation, Professor Walker also commented that it is more difficult to measure the level of *waste* in a company, as this cannot be captured and is included in all expenses. Therefore, a company may be able to reduce costs through the implementation of an ERP system, but in essence the company would be removing the level of waste that existed there. Question six in the survey was particularly aimed to address this construct.

### **5.3. Quantitative data**

The quantitative data was obtained by way of a survey submitted. Refer to Appendix C for a summary of the results as obtained from the online survey tool Google Documents. The following descriptive statistics provide information relating to the respondents, their role in the firm, the type of industry and the size of the company. It further details the type of ERP implementation undertaken, as well as the company's prior ERP experience.



### 5.3.1 Respondents

All the part time students of the Masters of Business Administration class of 2009/2010, totalling 163, were asked to forward the survey to their company's chief decision maker in terms of Information Technology. A number of these individuals originated from the same organisation and therefore a few duplicate requests may have been received by one company. However, the assumption is that only one response was received from each company contacted.

An additional number of 220 respondents from two IT service companies were contacted. Thus a total of 383 individual respondents were e-mailed. Respondents were given three weeks to complete the survey and one reminder was sent with one week remaining. Out of office notifications, undelivered e-mails as well as e-mail responses from companies who had not implemented any ERP solutions were received, which is recorded as set out in Table 5.1.

**Table 5. 1: Net Respondents Contacted**

	<b>e-Mails sent</b>	<b>Out of office</b>	<b>Un-delivered</b>	<b>No ERP response</b>	<b>Net Contacted</b>
MBA students	163	5	2	4	152
IT company clients	220	18	72	25	105
<b>Total</b>	<b>383</b>	<b>23</b>	<b>74</b>	<b>29</b>	<b>257</b>

Within the three weeks 68 surveys were completed. Table 5.2 details the number and percentage respondents by job

title. Although the collective of key decision makers such as the Chief Executive Officer, Chief Information Officer, Chief Financial Officer or Company Director made up 46% of the total respondents, the single largest contribution was received from IT Managers at 28%.

**Table 5. 2: Surveys Completed by Job Description**

Job Description	Number of responses	Percentage of Total	Groupings
CEO	9	13%	46%
CFO	6	9%	
CIO	8	12%	
Director	8	12%	
IT Manager	19	28%	38%
Specialist	10	10%	16%
Other	7	15%	
BLANK	1	1%	
<b>Grand Total</b>	<b>68</b>	<b>100%</b>	<b>100%</b>

Table 5.3 details the number and percentage respondents by type of industry where the primary sector relates to Agriculture and Mining, the secondary sector to Manufacturing, construction or Refining, the tertiary sector to Services or Distribution of Goods, the Quaternary Sector to Technological, Research, Design & Development and the Quinary Sector to Non-Profit activities. The majority of the respondents were either from the secondary or tertiary sector which equates to 75% of the respondents.

**Table 5. 3: Surveys Completed by Type of Industry**

Type of Industry	Number of responses	Percentage of Total
Primary Sector (Agriculture / Mining)	6	9%
Secondary Sector (Manufacturing)	29	43%
Tertiary Sector (Services)	22	32%
Quaternary Sector (Technological)	8	12%
Quinary Sector (Non-Profit)	1	1%
BLANK	2	3%
<b>Grand Total</b>	<b>68</b>	<b>100%</b>

Table 5.4 details the number and percentage respondents by size of company. Over 40% of the respondents were from medium sized companies with annual turnover of less than R 500 million. The second largest number of respondents of 31% was from mega companies which has a turnover exceeding R 1 billion per year. Only 7% of the respondents were from companies that are viewed as small, which has an annual turnover of less than R 5 million.

**Table 5. 4: Surveys Completed by size of Company**

Size of company	Number of responses	Percentage of Total
Small (< R 5 million)	5	7%
Medium (< R 500 million)	28	41%
Large (> R 500 million)	13	19%
Mega (> R 1 billion)	21	31%
BLANK	1	1%
<b>Grand Total</b>	<b>68</b>	<b>100%</b>

The respondents were further segmented in the following ways. Questions were asked about the type of ERP project, the company's previous ERP project experience as well as

the desired Business Value the company wanted to obtain from the project.

Figure 5.1 presents the type of ERP project that the relevant companies undertook, whether it be a completely new system or 'Greenfields' implementation, an upgrade from a previous version of the same system or a modification or customisation of an existing system. The reasoning for this segmentation was to establish if different types of ERP projects yielded different results. More than half of the respondents were involved in Greenfield implementations, which usually add more complexity, more time and more costs to the project scope.

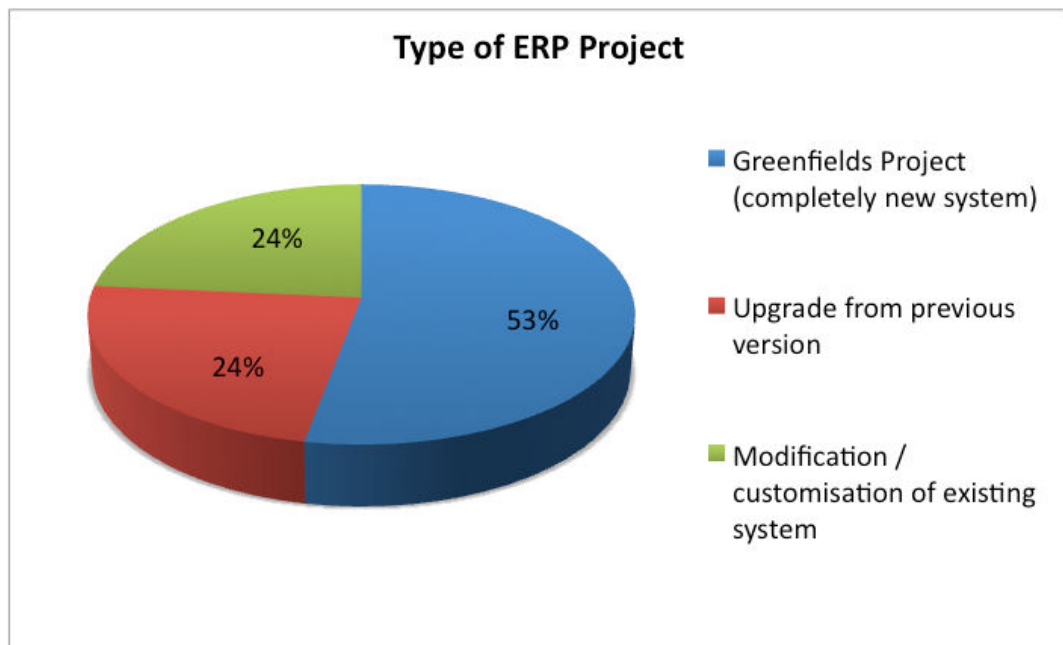


Figure 5. 1: Types of ERP Projects

Figure 5.2 presents the respondents' experience with regards to ERP implementations, as experience should logically add to the success of planned projects through the previous learning of team members. About half of the respondents had some previous experience in ERP projects and the other half were split in half between no previous experience and lots of experience.

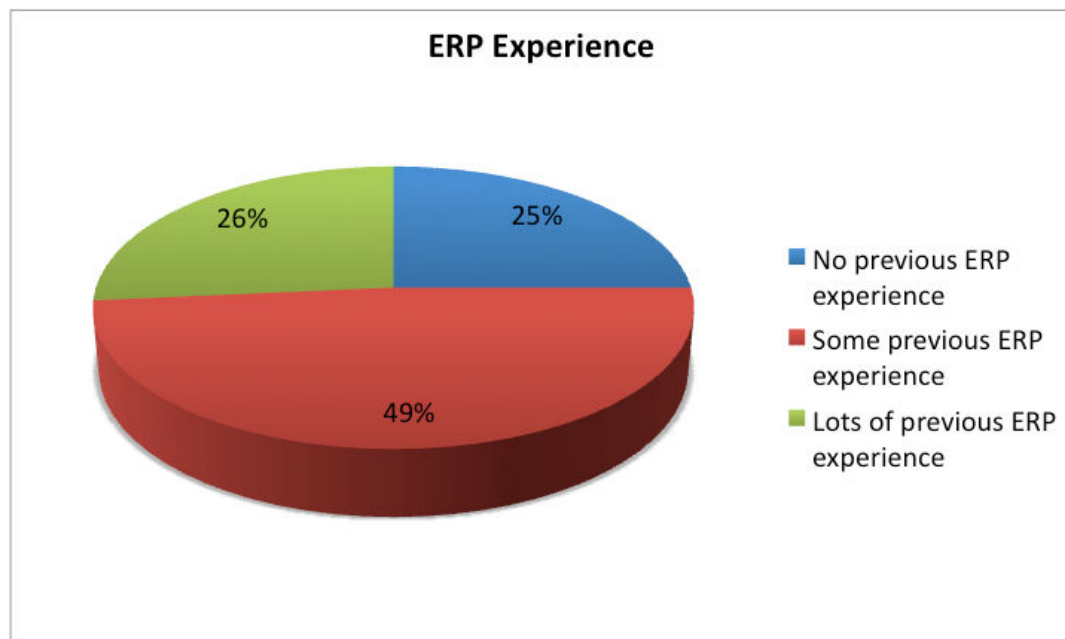


Figure 5. 2: ERP Implementation Experience

The data from Figure 5.1 and 5.2 show a good spread of respondents between types of ERP implementations and previous ERP experiences. Comparing the results of the two figures in a cross tabulation, as depicted in Table 5.5 below, there appears to be no apparent correlation between them.

**Table 5. 5: Type of ERP implementation and Experience**

ERP Implementations	No Experience	Some Experience	Lots of experience	Total
Greenfields Project	13	15	8	36
Upgrade to New Version	1	12	3	16
Modification/Customisation	3	6	7	16
<b>Total</b>	<b>17</b>	<b>33</b>	<b>18</b>	<b>68</b>

It does however seem that where companies upgraded or modified their ERP systems, some or more prior experience was present, although this was not the case where a Greenfield project was undertaken. The majority of companies who had no prior experience were involved in Greenfield projects.

Further segmentation was performed in terms of Business Value and Pre-implementation analysis performed.

**a) Business Value**

Question three of the survey was aimed at understanding what the main purpose for companies is when they approach an ERP implementation. Close to two-thirds of respondents felt that an ERP system was critical to running a business, 25% implemented their ERP for growing their business and only 10% saw ERP as an integral part in transforming their business to something greater. Refer to Figure 5.3 below.

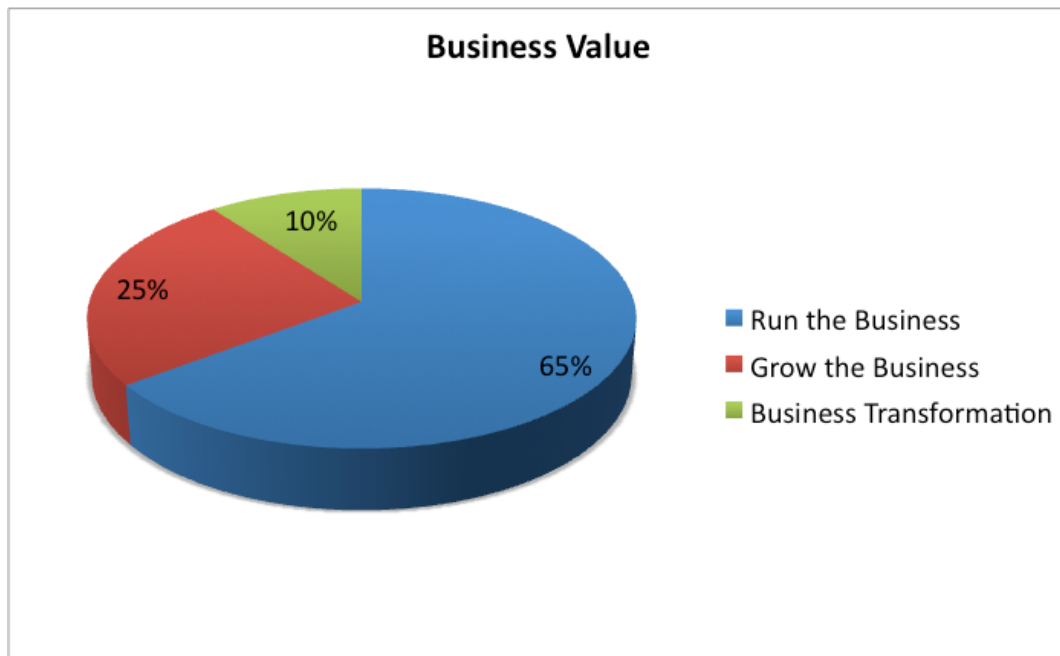
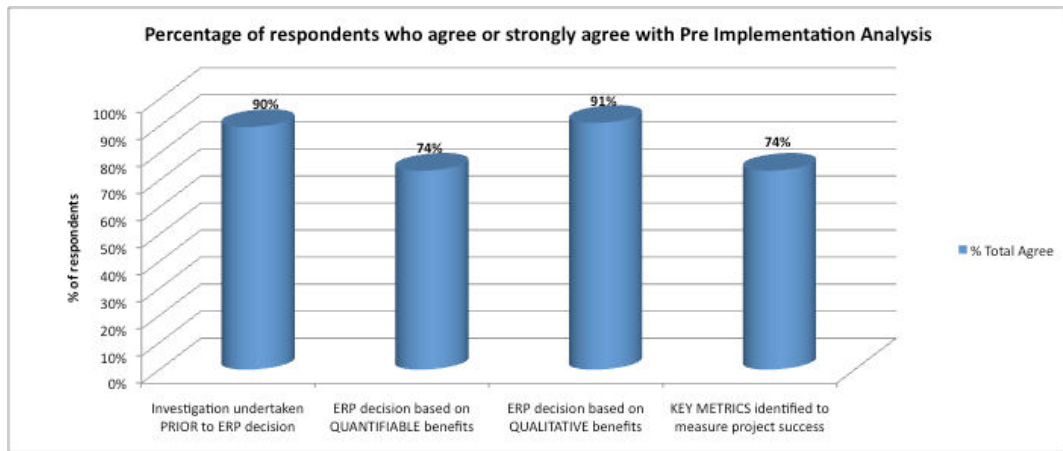


Figure 5. 3: Business Value obtained from ERP implementation

#### b) Pre-implementation Analysis

Question four of the survey was designed to establish which percentage of South African companies performed the 'baseline' assessment or rigorous investigation before embarking on the capital investment of an ERP project. It further aimed to explore to what level of detail such investigation went, in terms of quantifiable and qualitative cost benefit analysis, and whether key metrics were identified by the companies BEFORE the actual project initiation.

Figure 5.4 displays the feedback from the 68 respondents where a minimum of 74% of them performed all of the above pre-implementation procedures.



**Figure 5. 4: Respondents who performed Pre-Implementation Analysis**

## 5.4. Analysis and Results

### 5.4.1 Research Question One

To what extent is the pre-implementation decision to implement an ERP system at South African organisations based on both quantitative and qualitative measures?

The responses from the survey showed that both quantitative and qualitative benefits of a planned ERP implementation contributed to the motivation for a company to implement the system. A cross tabulation on the responses of the sixty eight respondents shows that there is a strong correlation between the number of respondents who agreed that using both quantitative and qualitative benefits were important to their decision making. No respondents strongly disagreed with either quantitative or qualitative benefits and only nine respondents disagreed with either of these two measures. Refer to Table 5.6 below.



**Table 5. 6: Qualitative versus Quantitative Benefits**

Quantifiable cost benefit analysis	Qualitative benefits				Row Totals
	Strongly Agree	Agree	Un-decided	Disagree	
Strongly Agree	15	9	0	0	24
Agree	6	15	4	1	26
Undecided	3	6	0	0	9
Disagree	2	6	0	1	9
<b>All Groups</b>	26	32	4	2	68

When combining undecided, disagree and strongly disagree responses and comparing with the total agree or strongly agree, forty-five respondents either agreed or strongly agreed on using both qualitative and quantitative benefits for choosing an ERP implementation, which constitutes 66% of all respondents. Refer to Table 5.7 below.

**Table 5. 7: Qualitative and Quantitative Benefits**

Quantifiable cost benefit analysis decision	Qualitative benefits Agree	Qualitative benefits Disagree	Row
Agree	45 (66%)	5	50
Disagree	17	1	18
<b>All Groups</b>	62	6	68

The above information was used in testing the hypothesis, that the decision to implement an ERP system as part of the pre-implementation processes followed by South African companies, is based more so on qualitative factors than on quantitative factors. The null hypothesis would therefore state that there is no difference between the weight of qualitative measures and quantitative measures when making an ERP investment decision.

The below measures were used:

P1: Qualitative measures

P2: Quantitative measures

Null Hypothesis  $H_0: P1 = P2 = 0.5 (50\%)$

Alternate Hypothesis  $H_a: P1 > P2$

A Chi-square test was performed on the above data and the result obtained was as follows:

$\chi^2 (1) = 2.189; p > 0.05$

In other words, the statistic obtained of 2.189, with one degree of freedom, was not significant. Therefore although it appeared as if more companies favoured qualitative benefits for choosing an ERP implementation than quantitative benefits, the difference between qualitative and quantitative was not statistically significant.

#### 5.4.2 Research Question Two

What are the critical success factors for an ERP implementation in South Africa?

Figure 5.5 shows a comparison of the respondents who either agreed or strongly agreed with the list of critical success factors as highlighted in the literature review. The results were then ranked from highest percentage to lowest percentage.

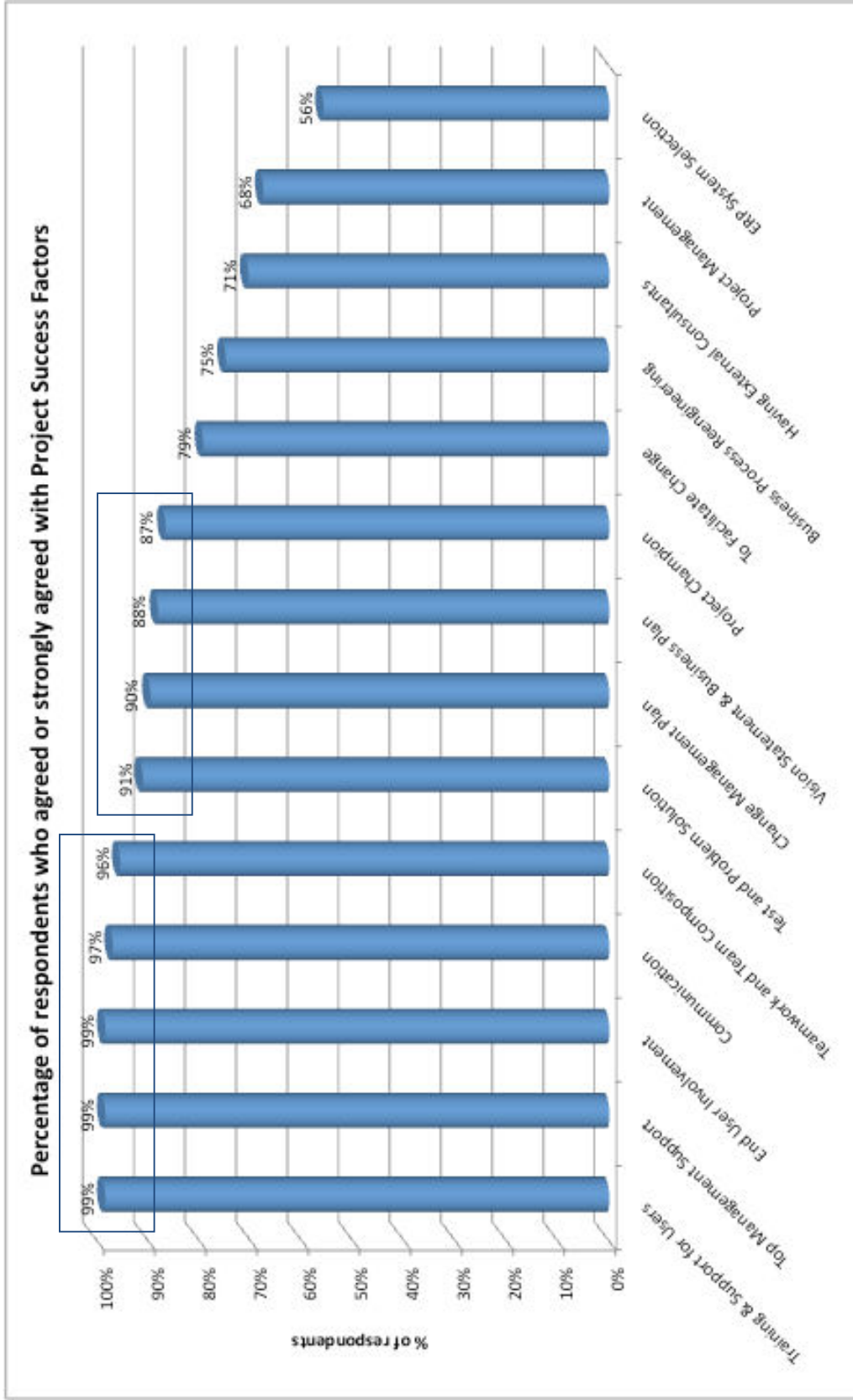


Figure 5.5: Respondents who agreed with stated Critical Success Factors

This Pareto chart provides a purely descriptive comparison and no statistical analysis were performed on these responses. There seems to be very little discrimination or variation between the importance of each of the top five success factors, with agreement of 96% to 99%, then the next four success factors attracting agreement of 91% to 87%, and then those factors with less than 80% of respondents agreeing.

Training and Support for Users, Top Management Support, End User Involvement, Communication and Teamwork are the top five or key critical success factors needed for a successful ERP implementation in South Africa, although not very much higher occurrence than the rest of the factors, as the next four factors attracted agreement of over 85% and the following four after that over 68%. The type of ERP system selected attracted the least amount of agreement, although still relatively high at 56%.

Although the above success factors or responses were all prompted, the survey in addition allowed for respondents to provide their own critical success factor for an ERP implementation. The top five general themes obtained from the responses were summarised and are displayed in Table 5.8 below:

**Table 5. 8: Unprompted Critical Success Factors**

Critical Factor	Number of responses
Proper Planning	20
Top Management Support / Executive Buy-in	8
Control Management (costs, scope, KPIs)	7
People ownership / end user involvement	6
Training	3

From this feedback it seems that in the minds of the respondents, *Proper Planning* far exceeds any other critical success factor with regards to an ERP system implementation. *Top Management Support* or *Executive Buy-in* was the second most noted factor, which agrees with the previous list of prompted responses. Where *Training* featured as most critical from the prompted list of success factors, it only featured fifth most critical from the unprompted responses.

The most interesting conclusion drawn from these responses is why *Proper Planning* did not feature in any of the literature reviews covered in Chapter 2. This will be explored further in Chapter 6.

### 5.4.3 Research Question Three

What post purchase analysis takes place (quantitative and qualitative) in terms of Key Metrics used by South African companies?

The questions around post implementation analysis in the survey were split between the quantitative and qualitative approached followed by companies. First respondents were asked whether they did in fact monitor the progress of the implementation, were able to track the costs and benefits, as well as identify key metrics as part of their post implementation analyses. Refer to Figure 5.6 below for an analysis of respondents who agree to having performed a post implementation analysis.

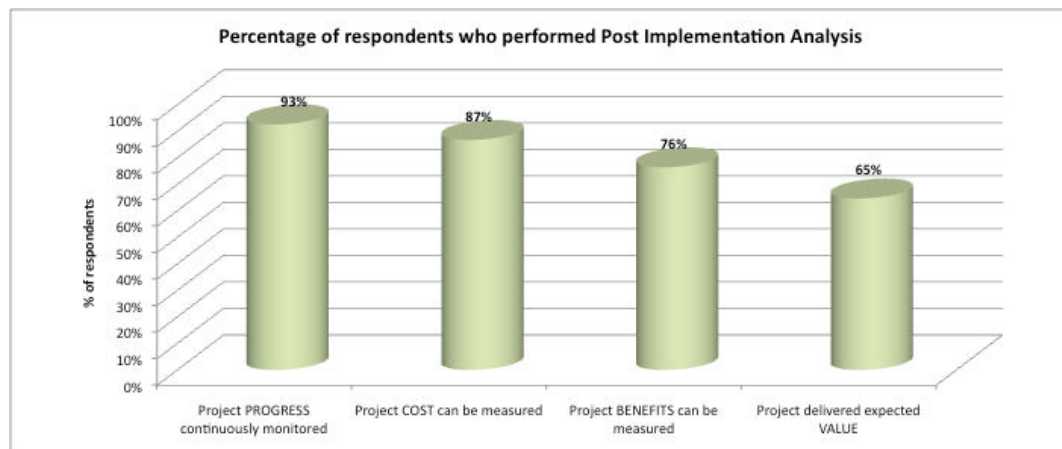
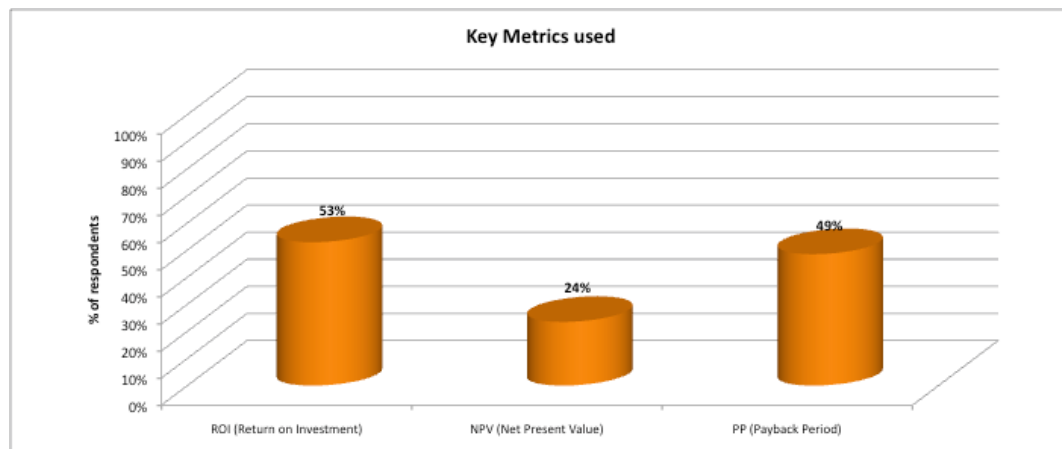


Figure 5. 6: Post Implementation Analysis performed

Although 93% of respondents did monitor the progress of the project on a continuous basis, only 87% were able to quantify the total costs of the project, only 76% were able to quantify the benefits form the

system and only 65% could prove that the implementation delivered the planned business value through the use of key metrics.

Further questions were asked with regards to exactly what type of key metrics the respondents used. The respondents were asked to confirm whether they used any of the standard metrics of Net Present Value (NPV), Return on Investment (ROI) or Payback Period (PP). Refer to Figure 5.7 below for a comparison of the standard key metrics used.



**Figure 5. 7: Key Metrics Used in Post Purchase Analysis**

The above figure shows that at least half of the respondents used either the ROI or PP metric, but it does not clearly state how many respondents did not use any of these metrics or how these metrics may have overlapped from the various respondents.

Figure 5.8 compares all the responses and shows that thirty-eight percent of the respondents did not use any of the three standard metrics. Twenty five percent did however use ROI and PP, fifteen

percent used all three metrics and no respondents used NPV as the only metric for measuring project success.

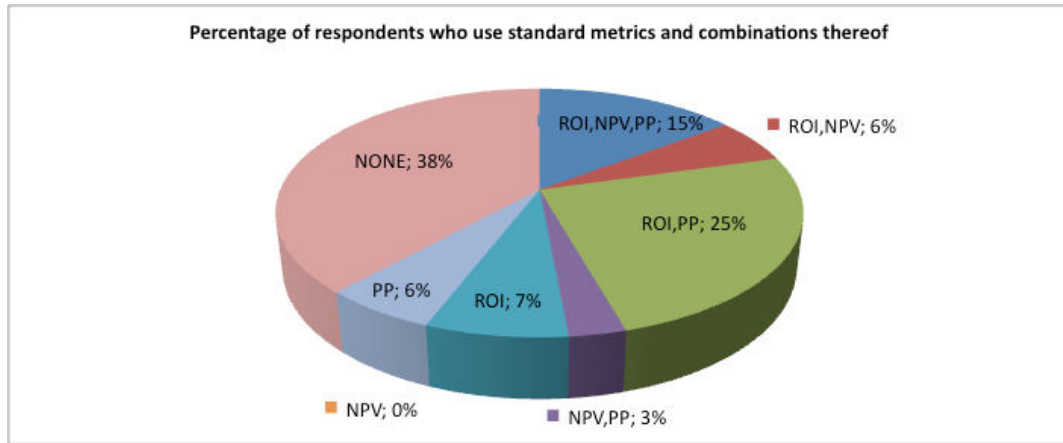


Figure 5. 8: Comparison of standard metrics used

From Figure 5.6 above, it was noted that the majority of respondents did manage to establish the total costs (87%) and total benefits (76%) of the ERP implementation. These results were then compared with how many respondents actually used the information available and performed standard key metrics, as per Figure 5.9 below.

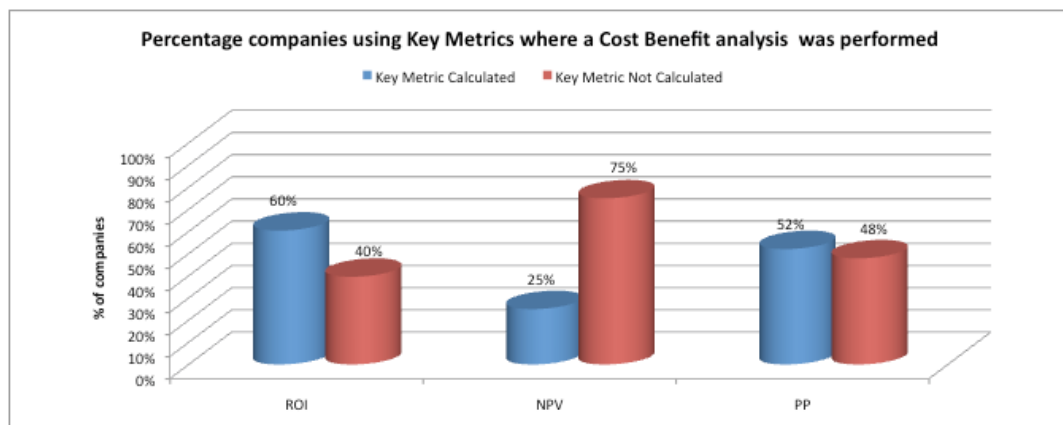


Figure 5. 9: Companies calculating standard quantitative key metrics

From the respondents who did perform a cost benefit calculation, sixty percent of them also performed an ROI calculation, fifty-two



percent also performed a PP calculation and only twenty-five percent performed an NPV calculation.

The survey also allowed for the respondents to provide any non-standard metric used by their respective companies in performing any type of post purchase analyses. The responses were collated and the majority of the responses related to either one of the following, as depicted in Table 5.9. The most popular reasons provided were more of a qualitative nature than quantitative, although a number of quantitative metrics were highlighted, of which reduced input costs appeared most frequently.

**Table 5. 9: Key Quantitative Metrics used**

Critical Factor	Number of responses
Reduced Input costs	14
Reduced Headcount	5
Reduced Inventory Holding	7
Increased Sales	5
Qualitative reasons provided (refer below)	17

The next question in the survey was aimed at assessing what the qualitative metrics were that companies use for post implementation analysis. The qualitative reasons provided in the quantitative question were discarded as most of them were repeated in the qualitative question. The overwhelming themes of the responses were aimed at providing increased or improved Customer Service.

Refer to Table 5.10 for a summary of the most regularly occurring qualitative metrics used by respondents in the performance of their post implementation analysis.

**Table 5. 10: Key Qualitative Metrics used**

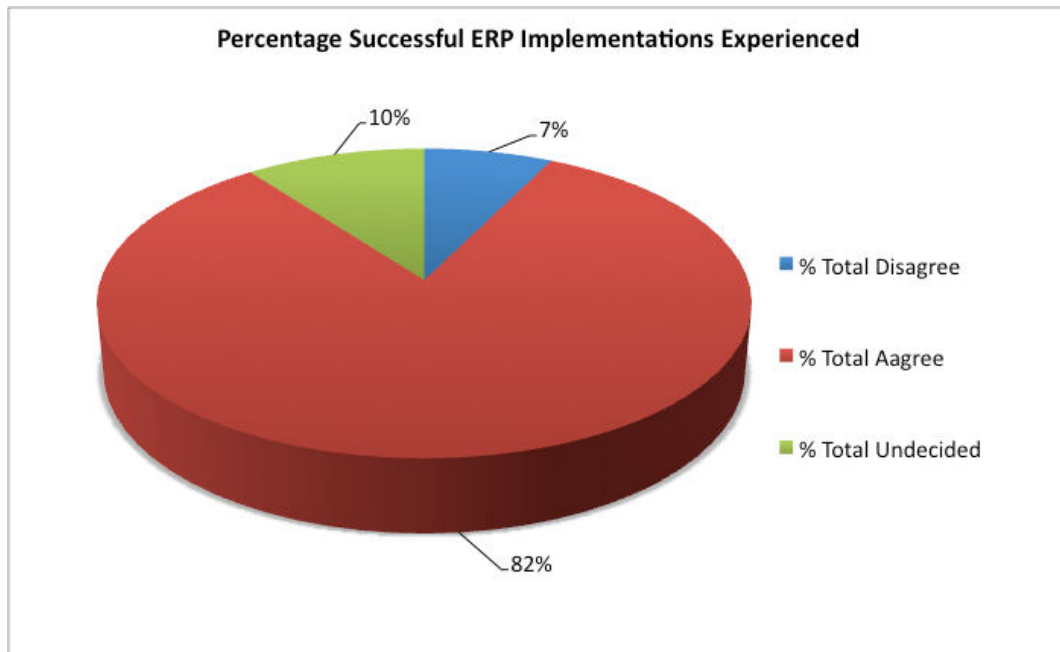
Critical Factor	Number of responses
Improved Customer Service	17
Improved Data Management	7
Reduced Time Spent	5
Reduced Errors	3
Standardisation of processes	4

Improved customer service was the main reason for the respondents as 25% of them stated this as the single biggest benefit of their ERP project.

#### 5.4.4 Research Question Four

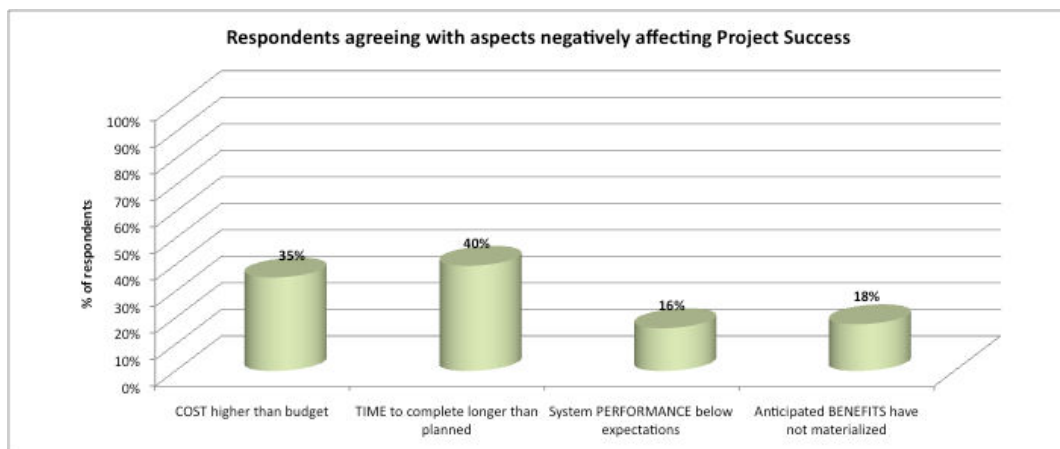
**What is the success rate of ERP implementations in South Africa?**

Of the sixty eight respondents only 6 (7%) believed that their ERP implementation was not a success, 10% were undecided and the majority of 83% believed they had experienced a successful implementation. Refer to Figure 5.10 below.



**Figure 5. 10: Percentage of successful ERP implementations**

In testing the factors of success or failure, questions were asked around the costs of the project, the time it took to completion, the performance of the system against expectations and the realisation of the anticipated benefits. Figure 5.11 below shows the relatively low occurrence of factors causing unsuccessful ERP implementations at South African companies.



**Figure 5. 11: Factors leading to unsuccessful ERP implementations**

In summary, 93% of respondents believe they had experienced a successful ERP implementation. Of that 93%, the tables below shows what percentage of the respondents judged their projects to have been completed within budget (Table 5.11), within time (Table 5.12), delivered the expected performance (Table 5.13) and delivered the anticipated benefits (Table 5.14).

**Table 5. 11: Cost of ERP Project**

Cost of ERP project significantly higher than budget	Project Unsuccessful	Project Successful
Agree	40%	35%
Disagree	60%	65%
All Groups	100%	100%

**Table 5. 12: Time of ERP Project**

ERP project took significantly longer than expected	Project Unsuccessful	Project Successful
Agree	60%	39%
Disagree	40%	61%
All Groups	100%	100%

**Table 5. 13: Performance of ERP Project**

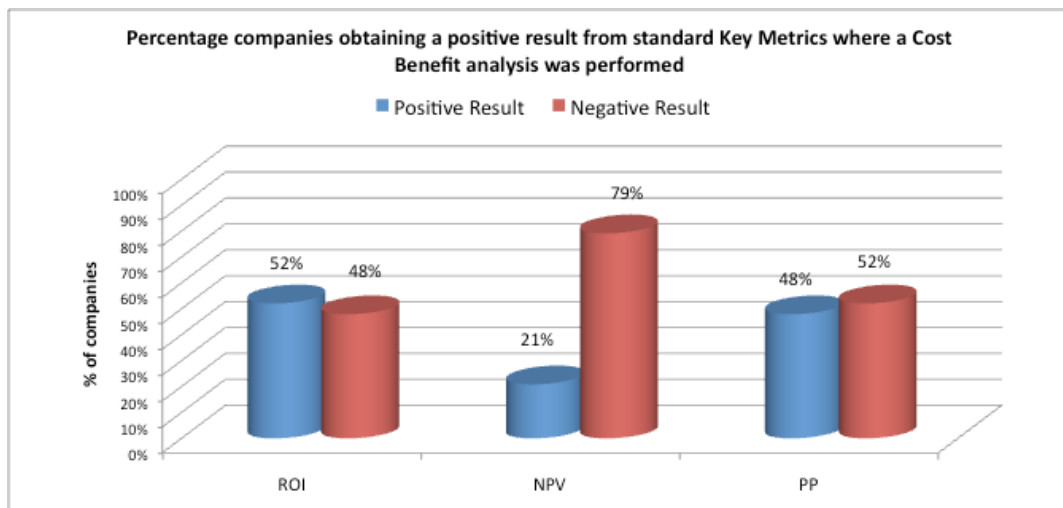
Performance of ERP system significantly below expected level	Project Unsuccessful	Project Successful
Agree	40%	15%
Disagree	60%	85%
All Groups	100%	100%

**Table 5. 14: Benefits of ERP Project**

Anticipated benefits of ERP have not been materialized	Project Unsuccessful	Project Successful
Agree	40%	16%
Disagree	60%	84%
All Groups	100%	100%

The above percentages show that very few respondents experienced any of the factors that lead to unsuccessful ERP implementations. However, those that did experience failure attributed it to one of these factors.

In contrast to the above statistics, the respondents who performed key metrics testing as part of their post purchase analysis, experienced mixed results. Only half of the respondents experienced a positive ROI and PP and only twenty-one percent of respondents experienced a positive NPV calculation. Refer to Figure 5.12 for a comparison of these numbers.



**Figure 5. 12: Positive Results from Post Purchase Analyses Performed**

The assumption can therefore be made that the success experienced by the majority of the respondents cannot only be attributed to the quantitative factors or positive results obtained from key quantitative metrics used in the post purchase analysis, but to a greater extend on the realisation of the key qualitative objectives for implementing the system. This is supported by the number of

respondents who agreed to having used qualitative metrics (91%) versus the number of respondents who agreed to having used quantitative metrics (74%).

#### 5.4.5 Research Question Five

**Do the above experiences differ across different industries?**

Refer back to Table 5.3 and Table 5.4 in the introduction to this chapter where the different types of industries and the different size of companies were discussed. These tables were used initially only to describe the sample.

The majority of the respondents were from the secondary and tertiary sectors, as per Table 5.3. As the rest of the industries did not deliver enough respondents, their results would not have statistical significance. If we look at the different respondents and their unique responses towards their experience towards successful ERP implementations, the following is derived from the data. Refer to Table 5.15 below.

**Table 5. 15: ERP Success experienced by Industry**

	Primary Sector	Secondary Sector	Tertiary Sector	Quaternary Sector	Quinary Sector	Row - Total
Cost Exceeded: Disagree	67%	69%	57%	63%	100%	65%
<b>Cost Exceeded: Agree</b>	33%	31%	43%	38%	0%	35%
Time Exceeded: Disagree	67%	72%	43%	38%	100%	58%
<b>Time Exceeded: Agree</b>	17%	28%	57%	63%	0%	40%
Weak System Performance: Disagree	83%	83%	86%	63%	100%	82%
<b>Weak System Performance: Agree</b>	17%	14%	14%	38%	0%	17%
Benefits Unrealised: Disagree	67%	79%	95%	63%	100%	82%
<b>Benefits Unrealised: Agree</b>	33%	21%	5%	38%	0%	18%
ERP Project Successful: Disagree	0%	7%	5%	25%	0%	8%
<b>ERP Project Successful: Agree</b>	100%	93%	95%	75%	100%	92%

Although only the Tertiary and Quaternary sector experienced a greater than 50% agreement in exceeding the expected project timeframe, a greater percentage of respondents of all industries agreed to having experienced project success.

Without performing any further statistical analysis, it is quite obvious from the above results that there cannot be any clear difference of statistical significance between the various industries.

## 5.5. Summary

In this chapter the results of the key themes identified from the initial qualitative interviews were discussed, which were used to formulate questions for the quantitative research survey. Descriptive statistics were provided on the respondents and a number of graphs and tables were derived from the results of the submitted survey to address the research questions.

## 6. Discussion of Results

### 6.1 Introduction

The objective of this chapter is to analyse the data gathered during the fieldwork phase of the research as presented in Chapter 5 and investigate each of the areas covered by the research in turn. In order to effectively analyse the research objectives, reference will be made to the research propositions that were presented in Chapter 3.

### 6.2 Analysis of Research Proposals

#### 6.2.1 Proposition 1

The qualitative reasons outweigh the quantitative reasons in the capital budgeting decision-making process of an ERP system investment.

The literature in Chapter 2 only mentions that either factors, being qualitative and quantitative measures, or quality and financial metrics, are important in the capital budgeting decisions of companies looking to implement information technology systems like ERP. What it fails to address is which of these two important factors weighs heavier in the decision-making process of the management of companies. My



proposition therefore implies that even if the quantitative factors show a less favourable outcome, the importance of achieving the qualitative factors will have a bigger influence on the motivation of the key decision makers of the company.

Although Stedman (1999) highlights the fact that executives should not only be looking for quantifiable returns and also consider the immeasurable value of the intangible benefits, he does not recognise that the intangible benefits of the proposed ERP system are a greater contributing factor to the initial capital budgeting decision.

Pavlicko (2007) researched the relationship between the rigour of IS development methodology and the outcome of the project's financial metrics as well as a relationship with the quality metrics. He found correlations between financial and quality metrics with regards to the justification and prioritisation process, but did not conclude that either of the two metrics carried a heavier weight. One possible explanation given was that information systems development methodologies are not likely to be geared towards the application of in-depth financial analysis, as only a limited number of financial techniques were being used by companies as part of the justification process.

The results of Chapter 5 show that qualitative metrics carry a bigger influence firstly, on the justification of the decision to

implement an ERP system, and secondly in assessing the success of a completed project.

- (i) Figure 5.4 shows that more respondents based their ERP decision on the qualitative benefits of the proposed project than on the quantifiable cost benefit analysis performed.
- (ii) Refer to research question four under Figure 5.11 where there were more negative results experienced by companies on the key financial metrics than positive results. However, these companies still proceeded with the ERP implementation due to the desire to obtain the qualitative results.

### **6.2.2 Proposition 2**

**The critical success factors for ERP implementations in South Africa are similar to those experienced elsewhere.**

The literature review from Chapter 2 highlighted three critical success factors as supported from a number of references. Top Management Support or Executive buy-in ranked first, with Effective Project Management and the Composition of the Project Team being the second and third most critical success factors.

The results of the local survey showed that Top Management Support once again featured in the top three CSFs, with Training & Support and End User Involvement replacing the second and third most important factors.

The respondents placed Teamwork and Team Composition in fifth position and Project Management outside the top ten in thirteenth position from fourteen available answers. Although this may seem like a major change from what is experienced elsewhere, 68% of respondents still agreed that it is a critical factor for an ERP project success.

The unprompted results of the survey showed that *Proper Planning* was the single most important factor for successful ERP implementations. Of the literature review, only the Standish Group's CHAOS study of 1995 listed this element as one the most important factors for ERP success and ranked it as fourth most critical.

All of the CSFs listed in the survey questionnaire were agreed to an extent of greater than 50% and the majority of factors had an agreement percentage of over 87%. From the results obtained it is clear to note that the same factors apply in South Africa as in any other country in the world.

Top Management Support and Proper Planning remains two factors of critical importance to the success of any ERP implementation project, although the priority of these and other factors may differ according to the type of industry, size of company or the role of the respondent.

### 6.2.3 Proposition 3

Companies who use key metrics in monitoring ERP systems implementations should experience a higher level of success than those that do not.

Figure 5.4 shows that 74% of respondents did identify key metrics for monitoring the success of their ERP projects prior to the start of the project. In turn, 65% of respondents agreed that the key metrics that were tracked proved that the project delivered the expected value to the company.

When cross tabulating the respondents who identified key metrics for monitoring the progress of the project pre implementation with the respondents who experienced successful ERP implementations, 63% of respondents agreed on both. Refer to Table 6.1 below. Similar results were experienced for those respondents that were able to measure the success of their ERP implementations post implementation through the use of qualitative (63%) and

quantitative metrics (53%). Refer Table 6.2 and Table 6.3 below.

**Table 6. 1: Cross tabulation between respondents who identified key metrics and experienced project success**

Pre-Implementation Metrics Identified	Successful ERP Implementations			
	Disagree	Agree	Undecided	Total
Disagree	3%	19%	4%	26%
Agree	4%	63%	6%	74%
Total	7%	82%	10%	100%

**Table 6. 2: Cross tabulation between qualitative metrics used and project success**

Successful ERP Implementation	Qualitative Metrics Used		
	No	Yes	Total
Disagree	4%	3%	7%
Agree	29%	53%	82%
Undecided	6%	4%	10%
Total	40%	60%	100%

**Table 6. 3: Cross tabulation between quantitative metrics used and project success**

Successful ERP Implementation	Quantitative Metrics Used		
	No	Yes	Total
Disagree	0%	7%	7%
Agree	32%	50%	82%
Undecided	4%	6%	10%
Total	37%	63%	100%

When referring back to the literature, the findings of Wei (2008) and Swanton (2010) support these findings. Wei concluded that a performance measurement framework was necessary to justify the value-added contribution of ERP systems, based on the objectives of the system. Swanton in turn also concluded that companies could only get the value from their ERP systems if they actually measured it.

This research proposal took a step back and highlighted the fact that any measurement framework is of vital importance to any company undertaking an ERP implementation. Whether achieving the targeted or planned key performance metrics or not, the mere practice of *measurement* should place the focus of the company on the successful implementation of the system. Companies that do not undertake any of these practices of setting and measuring identified metrics, whether qualitative or quantitative, would not have any warning lights alerting them that they may be on a collision course for failure.

#### 6.2.4 Proposition 4

The majority of South African ERP implementations are not successful.

The literature review leaned towards an overwhelming rate of failures in ERP implementations experienced worldwide, as cited by Finney and Corbett (2007), Markus, Axline, Petri and Tanis (2000) and Woo (2007).

However, the results of the research conducted show that the overwhelming majority of the respondents experienced successful implementations. This is further supported by the main identified factors that constitute a successful

project. Figure 5.10 and Tables 5.11 to 5.14 provides significant evidence that the majority of ERP implementations in South Africa are viewed as being successful.

There could however be a number of reasons for these findings, including response bias or a lack of understanding from the respondents about what constitutes a successful ERP implementation. These possibilities were not explored further and the results have thus proven the proposition invalid.

#### **6.2.5 Proposition 5**

**The larger the company, the more difficult it will be to have a successful ERP implementation.**

The literature suggests that although implementation techniques seem to be improving, the overall ERP success rate is not increasing. This has led researchers to suggest that perhaps contingency factors such as organizational culture, structure, management style, or company size could be the culprits (Ifenedo, 2007). Supporting this theory, Weil and Olsen found that the better the fit among the contingency variables of strategy, structure, size, environment, technology, task, and individual

characteristics, the better the performance of the ERP system (Kyung-Kwon, 2002).

This research has not delved into the myriad of different contingency factors, but focused on the company size only, as it was part of the descriptive analyses performed on the respondents.

Table 6.4 below shows that at least 76% of respondents from all sized companies judged their projects to have been successful and that an even greater percentage of respondents from medium sized companies experienced successful ERP implementations at 89% of the respondents.

**Table 6. 4: ERP Project Success by size of company**

ERP Project Judged	Size of Company				
	Unknown	Small	Medium	Large	Mega
Successful	100%	80%	89%	77%	76%
Unsuccessful	0%	20%	11%	23%	24%

No further statistical analysis was performed on these results as the amount of respondents in each category did not justify the results to be of statistical significance. Although one would expect that more ERP failures would occur with larger sized companies due to the scale and complexity of the project, these factors are all dependent on the company's ability to manage the critical success factors as mentioned under 6.2.2.



### 6.3 Summary

The findings of this research report suggest that the research propositions have highlighted the following five findings:

- a) Qualitative metrics carry a bigger influence than quantitative metrics, on the justification of the decision to implement an ERP system, as well as in assessing the successfulness of a completed project.
- b) The success factors for an ERP implementation in South Africa are similar to those in other parts of the world, of which *Top Management Support* and *Proper Planning* are of the most critical importance.
- c) Companies who have measurement practices in place to monitor the success of ERP implementations experience higher levels of success than those that do not.
- d) In contrast to expectations, ERP implementations in South Africa over the last ten years from 2000 to 2010 have been judged by the key decision makers of the companies surveyed to be largely successful.
- e) The size of the company does not play a significant part in the positive or negative outcome of an ERP implementation. However, the management of the critical success factors and measurement framework in place have significant influence on the success of these projects.

## **7. Conclusion**

### **7.1 Introduction**

This chapter revisits the research problem as outlined in Chapter 1 and presents a number of recommendations arising from the research and then indicates possible areas for further research identified.

### **7.2 Suggestions and Recommendations**

In order to derive further value from the findings of this research the author proposes that the following recommendations are considered.

#### **7.2.1 Capital Budgeting Decisions**

Key decision makers need to rely on a mixture of quantitative and qualitative benefit analyses for choosing to implement an expensive ERP system. Although a proposed system may show a calculated positive ROI but does not support the business value intended for the system to achieve, the company should not approve such a system.

Conversely, where a proposed system can enhance the qualitative aspects of the business such as improved customer satisfaction, but the investment does not make

financial or economic sense, it would be difficult to motivate such an implementation to the key decision makers of a company.

### 7.2.2 Measurement Framework

Although it was the aim of this research project to identify a number of key metrics for identifying the success of an ERP project, it has become clear from the results that “success” is not always quantifiable, although the process of measurement is vital to achieving success. The question that every decision maker needs to ask himself after the completion of such a project should rather be whether the system delivers the answers to the questions posed to it. In other words, does it provide the business value that the company wanted to achieve at the onset and does it support the business in doing the right things well.

If a company’s original business value goal was to have an inventory management system that can support Just-In-Time delivery of products and it is working, then the project was a success. If the company’s original business value goal was to improve its ability to compete and the system gave them a competitive advantage, then the project was a success.

### 7.2.3 Critical Success Factors

Although there are a number of CSFs listed from the literature review (refer Table 2) and from the results of the survey performed (refer Chapter 6.2.2), the same constructs repeat itself from every study performed to date. No project, whether ICT related or not, can be successful without the buy-in from the key decision makers or top management. These players need to lead from the front and drive the project to completion.

All other factors listed, including Proper Planning, Training and Support for Users, End User Involvement, Communication and Teamwork are also important but these factors all form part of the responsibilities of the Project Team and/or ERP service provider, where applicable.

## 7.3 Recommendations for Future Research

The results of the survey have highlighted a number of new avenues to explore as well as a few unanswered questions.

Future research should be conducted into management decision making procedures followed in terms of capital budgeting projects. This could include an in-depth study of the specific pre-approval

processes followed at specific companies embarking on an ERP implementation including the level of reliance placed on internally and externally provided cost benefit analyses.

In addition, a comparison of the pre-implementation estimated key quantitative metrics (ROI, NPV, and PP) to the post implementation key metrics results should be made to assess whether the company's understanding and motivation of the intended project was justified.

A more qualitative type research is encouraged where discussions with key decision makers are held to understand their motivation for making ERP related capital investment decisions. Ideally such a study would include multiple discussions with these individuals before, during and after the implementations, where time constraints are not present.

Further studies could investigate the success rates of ERP service providers in South Africa in comparison to those experienced internationally. Alternatively the success rates from off-the-shelf products versus in-house developed systems could be explored.

Lastly, an exploration into the strategic deployment of systems usage or systems based decision making practices would be of great interest to companies choosing the business value goal of transforming their business model. Such a study could shed light on

how companies use their systems to support thrive decision making, innovation and improved customer satisfaction.

#### 7.4 Conclusion

The results of this research shows that ERP in South Africa has matured over the last decade in that less companies experience unsuccessful ERP implementations than what the literature suggests.

Whether an integrated business information system is needed as the necessary cost for doing business or whether it is needed for obtaining a competitive advantage, key decision makers need to follow a three step approach to their planned implementation, as identified through this research:

- a) Identify the *Business Value* they want to obtain from the proposed system;
- b) Ensure the *Top Management* supports the project and that *Proper Planning* is performed prior to the initiation of the project.
- c) Identify the *Key Qualitative AND Qualitative Metrics* for measuring success throughout the life of the project.

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## Appendices

### APPENDIX A

**FIRST ESTIMATE ECONOMIC MODEL FOR AN I.T. INVESTMENT  
FOR ILLUSTRATIVE PURPOSES ONLY  
THESE NUMBERS HAVE NOT BEEN RESEARCHED  
AND THE MODEL HAS NOT BEEN AUDITED AND IS NOT GUARANTEED**

THIS IS AN EXTREME VALUE ANALYSIS FOR DEMONSTRATION ONLY  
REAL COSTS CAN BE EXPECTED TO BE SOMEWHERE BETWEEN THE EXTREMES DEPENDING ON MANAGEMENT ACTION

Based on fully integrated comprehensive E.R.P. system implementation for an organisation with about 500 staff and production of about US\$200 million per annum  
Project duration three to five years to full production

	UNITS OF COMPUTATION		COMPONENT AMOUNTS		TOTALS	
	LO	HI	LO	HI	LO	HI
<b>TOTAL COST</b>						
<b>1. Cost of Physical Components</b>					\$1,200,000	\$23,500,000
Servers			\$500,000	\$5,000,000		
Workstations			\$0	\$1,000,000		
Network equipment			\$250,000	\$2,000,000		
Network services			\$50,000	\$5,000,000		
Information warehouse			\$200,000	\$5,000,000		
Printers, scanners, etc			\$200,000	\$2,000,000		
Other computer hardware			\$0	\$1,000,000		
Office equipment and other physical costs			\$0	\$500,000		
Taxes, duties, import charges, shipping charges, etc			\$0	\$2,000,000		
<b>2. Cost of Software, Databases, etc</b>					\$1,500,000	\$30,000,000
E.R.P. Software			\$1,000,000	\$10,000,000		
Supporting Office Automation and similar software			\$0	\$2,000,000		
Databases			\$250,000	\$5,000,000		
Network, communication and related software			\$50,000	\$2,000,000		
Information warehouse database and analysis software			\$200,000	\$5,000,000		
Reporting and other specialist software			\$0	\$2,000,000		
Other computer software for the final solution			\$0	\$1,000,000		
Project office software, project management software, etc			\$0	\$1,000,000		
Taxes, duties, import charges, shipping charges, etc			\$0	\$2,000,000		
<b>3. Cost of Direct (External) Professional Services</b>					\$2,950,000	\$49,000,000
Strategic Solution Architect			\$200,000	\$8,000,000		
E.R.P. System consultants (may include some of the following)			\$1,000,000	\$10,000,000		
Business integration, management of change, communication			\$250,000	\$5,000,000		
Programme and project management specialists			\$500,000	\$3,000,000		
Information management specialists			\$0	\$3,000,000		
Information warehouse specialists			\$250,000	\$3,000,000		
Project specific specialists			\$0	\$5,000,000		
Translators			\$0	\$5,000,000		
Travel, accommodation, subsistence, etc			\$250,000	\$5,000,000		
Provision for other services			\$500,000	\$2,000,000		
<b>4. Direct (In-House) Personnel Costs</b>					\$107,200	\$2,400,050
Business Solution Executive			\$100,000	\$1,000,000		
Other In-House Staff on Project						
Number of In-House Staff on Project	10	50				
Percentage of time per month	20%	100%				
Number of months	12	60				
Monthly salary per person	\$200	\$5,000				
Overhead factor	1.5	3.0				
TOTAL			\$7,200	\$900,050		
Other Personnel Costs			\$0	\$500,000		
<b>5. Indirect (In-House) Personnel Costs</b>					\$11,640	\$20,200,000
Other In-House Staff NOT on Project but Affected by Project						
Number of In-House Staff NOT on Project	485	400				
Percentage of staff affected	20%	100%				
Average Number of hours per month expended on project or lost because of project	10	40				
Working hours per month	200	250				
Number of months	12	60				
Average monthly wage excluding managers	\$200	\$5,000				
TOTAL			\$11,640	\$19,200,000		
Other Personnel Costs			\$0	\$1,000,000		

**6. Cost of Executives and Managers** \$1,920 \$3,100,000

Manager and Executives Affected by Project			
Number of managers and executives	5	50	
Percentage of managers and executives affected	100%	70%	
Average Number of hours per month expended on project or lost because of project	8	20	
Working hours per month	250	200	
Number of months	12	60	
Average monthly salary	\$1,000	\$10,000	
TOTAL			\$1,920 \$2,100,000
Other Personnel Costs			\$0 \$1,000,000

**7. Lost Opportunity Cost and Lost Customer Cost** \$0 \$100,000,000

Estimate of value of opportunities that could have been

created and customers that may be lost through system problems that affect service levels or relationships -- this latter point can destroy a business

**8. Cost of Morale / Motivation / Loyalty / etc Loss** \$12,240 \$15,000,000

Percentage of total employee cost	1%	10%	
Total employee salaries and wages for project duration	\$1,224,000	\$150,000,000	

<b>TOTAL COST OF PROJECT</b>			\$5,783,000	\$243,200,050
MONTHLY COST OF PROJECT				
Over months	12	60	\$481,917	\$4,053,334
Hi estimate as ratio of Lo estimate				8.4

**TOTAL VALUE**

**VALUE PER YEAR ONCE FULLY EFFECTIVE -- ATTRIBUTABLE TO THE SYSTEM INVESTMENT**

These amounts can be estimated using STRATSNAP(c) and STRATSNAP(c) Resources or other techniques

**1. Direct Cost Reduction / Saving -- includes operating cost, financial savings (interest), etc** \$1 \$10

Specify in detail what is required to achieve this

**2. Increased Turnover Through Increased Sales Resulting from New System** \$1 \$10

(In addition to 1)

Specify in detail what is required to achieve this

**3. Increased Gross Profit through increased selling price resulting from new system** \$1 \$10

(In addition to 1 and 2)

Specify in detail what is required to achieve this

**4. Productivity Gain -- do more for same cost** \$1 \$10

(In addition to 1, 2 and 3)

Specify in detail what is required to achieve this

**5. Morale / Motivation / Loyalty / etc gain** \$0 \$1,500,000

Percentage of total employee cost	0%	5%	
Total employee salaries and wages per year	\$1,224,000	\$30,000,000	

Specify in detail what is required to achieve this

**6. Non-Financial Strategic Value (e.g. job creation)** \$1 \$10

Specify in detail what is required to achieve this

**7. Other?** \$1 \$10

Specify in detail what is required to achieve this

<b>TOTAL VALUE PER YEAR</b>			\$6	\$1,500,060
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**REAL PAYBACK PERIOD**

**Number of years before fully effective** 4 8

Years until the system is fully operational, all staff are fully trained and the BUSINESS is fully delivering the benefits postulated when the investment decision was made

**Number of years for which full value delivery is expected** 3 10

The number of years after the BUSINESS is fully delivering the postulated value

**Number of years before completion of capital cost** 1 5

The number of years before capital expenditure ceases, this SHOULD be the planned project duration

<b>Number of years of full value delivery to cover full cost</b>			963,833	162
Approximate number of years from start to fully recover cost and start delivering net benefit			963,837	170

Spreadsheet designed and issued by James A Robertson and Associates

P O Box 4206, Randburg, 2125, Johannesburg, South Africa

Telephone +27-11-791-2327 / +27-(0)83-251-6644

Email james@jar-a.com

Website www.jar-a.com

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## APPENDIX B: SURVEY QUESTIONNAIRE

### ERP VALUE DETERMINATION SURVEY (2010)

Dear Colleague I am conducting research on ERP Value Determination in South African organisations. The survey consists of 10 questions and is expected to take only a few minutes of your time. Your participation is voluntary and you can withdraw at any time without penalty. Of course, your input will remain anonymous and all data will be kept confidential. Following your participation, a summary of all the results to date will be displayed for your interest. If you have any concerns, please contact me or the research supervisor. Our details are provided below.

Researcher name: Tiaan de Jager  
Email: [titandejager@gmail.com](mailto:titandejager@gmail.com)  
Phone: 011 809 2786 / 082 562 9566

Supervisor Name: Roy Page-Shipp  
Email: [roy@pageshipp.co.za](mailto:roy@pageshipp.co.za)  
Phone: 012 804 5908 / 082 447 6289

#### **SECTION A: Your Company's most recent ERP system project**

Please answer the following questions with regards to any completed ERP system implementation, upgrade or customisation that occurred at your company during the last ten years (2000 - 2010).

##### 1. ERP project

Please indicate the type of project that you will be referring to in this questionnaire:

- a) This was a green fields project (completely new system)
- b) This was an upgrade from a previous version of the system
- c) This was a modification / customisation of an already existing system

##### 2. ERP experience

Please indicate your company's experience with regards to ERP projects:

- a) This was my company's first ever ERP related project
- b) My company has some experience with ERP related projects
- c) ERP related projects are second nature to my company

##### 3. Business Value

Please indicate the category that best describes the original purpose of the ERP project:

- a) Run the Business (to support day-to-day operations, necessity to keep core functions operating)
- b) Grow the Business (to support organic growth, fuelled by increased customer demand)
- c) Business Transformation (to support new lines, new products or services)

#### 4 ERP Project: PRE implementation procedures

These questions are designed to establish the motivation for the ERP decision.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
a) The company followed a rigorous investigation before making the decision to implement/upgrade the ERP system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) The ERP decision was based on a quantifiable cost benefit analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The ERP decision was based on qualitative benefits to the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Key Metrics for success were identified to measure the success of the project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 5 ERP Project: POST implementation analysis

These questions are designed to establish the procedures followed by the decision makers after the completion of the ERP project.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
a) The company monitored the progress of the project on a continuous basis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) The overall COST of the completed ERP project can be quantified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The overall BENEFITS of the completed ERP project can be quantified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) The key metrics that were tracked proved that the project delivered the expected value to the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## 6 Key Metrics Used

Please indicate if you have used any of the following metrics in your analysis of the project:

	YES	NO	N / A
ROI (Return on Investment)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If YES, was the result a positive ROI?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NPV (Net Present Value)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If YES, was the result a positive NPV?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Payback Period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If YES, was the result below 5 years?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please provide details of any other key QUANTITATIVE metrics monitored.

(i.e. reduction in staff, increased sales, reduced input costs, other)

Please provide details of key QUALITATIVE metrics monitored.

(i.e. quicker reply times, improved customer service, other)

## 7 PROJECT SUCCESS

These questions are designed to establish whether you deem your ERP project to have been a success or failure

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
a) The cost of ERP project was significantly higher than the expected budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) The ERP project took significantly longer than expected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) The system performance of ERP is significantly below the expected level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) The anticipated benefits of ERP have not been materialized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) The ERP project as a whole is considered by me to be unsuccessful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Please state the MAIN reason why you believe your project was either a success or failure

9. Please list the MOST CRITICAL factor that you would say leads to the success of any ERP project

10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects?

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Top Management Support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teamwork and Team Composition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business Process Reengineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ERP System Selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having External Consultants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Training & Support for Users	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project Champion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
End User Involvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change Management Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Test and Problem Solution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To Facilitate Change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vision Statement & Business Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## **SECTION B: Information for Statistical Purposes only**

Job Title

Please indicate your role in the company:

1. CEO
2. CFO
3. CIO
4. Director
5. IT Manager
6. Specialist
7. Other

Type of Industry

Please indicate into which category your company falls:

1. Primary Sector: Agriculture or Mining
2. Secondary Sector: Manufacturing or Construction or Refining
3. Tertiary Sector: Services or Distribution of Goods
4. Quaternary Sector: Technological Research, Design and Development

Size of Company

Please indicate into which category your company falls, relative to annual Turnover:

1. SMALL (< R 5 million)
2. MEDIUM (< R 500 million)
3. LARGE (> R 500 million)
4. MEGA (> R 1 billion)

## APPENDIX C

Edit form - [ ERP VALUE DETERMINATION SURVEY (2010) ] - Google Docs

2010/08/25 4:4

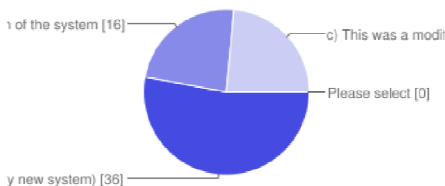
# 68 [responses](#)

### Summary [See complete responses](#)

#### SECTION A : Your Company's most recent ERP system project

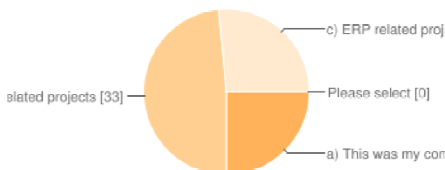
Please answer the following questions with regards to any completed ERP system implementation, upgrade or customisation that occurred at your company during the last ten years (2000 - 2010).

##### 1. ERP project



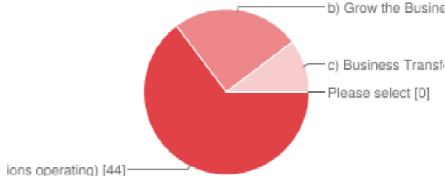
Please select	Count	Percentage
a) This was a greenfields project (completely new system)	36	53%
b) This was an upgrade from a previous version of the system	16	24%
c) This was a modification / customisation of an already existing system	16	24%

##### 2. ERP experience



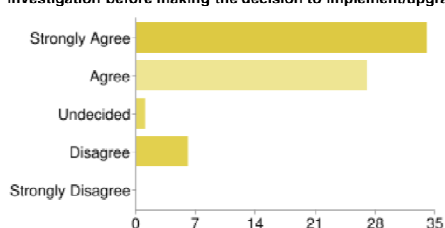
Please select	Count	Percentage
a) This was my company's first ever ERP related project	17	25%
b) My company has some experience with ERP related projects	33	49%
c) ERP related projects are second nature to my company	18	26%

##### 3. Business Value



Please select	Count	Percentage
a) Run the Business (to support day-to-day operations, necessity to keep core functions operating)	44	65%
b) Grow the Business (to support organic growth, fuelled by increased customer demand)	17	25%
c) Business Transformation (to support new lines, new products or services)	7	10%

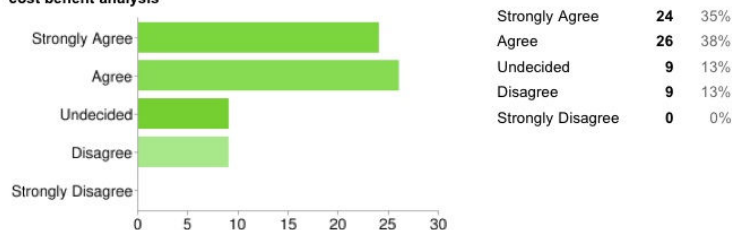
##### 4. ERP Project: PRE implementation procedures - a) The company followed a rigorous investigation before making the decision to implement/upgrade the ERP system



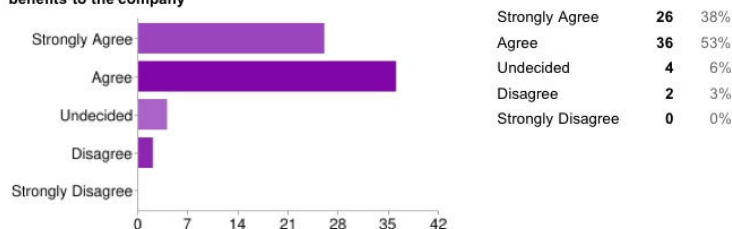
Response	Count	Percentage
Strongly Agree	34	50%
Agree	27	40%
Undecided	1	1%
Disagree	6	9%
Strongly Disagree	0	0%

##### 4. ERP Project: PRE implementation procedures - b) The ERP decision was based on a quantifiable

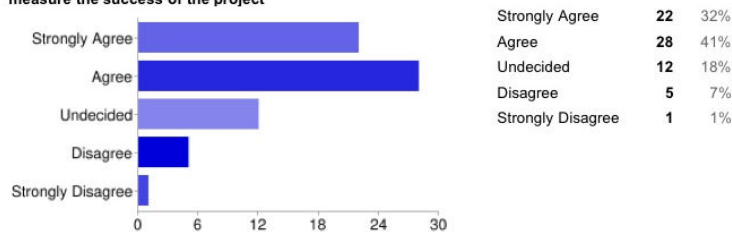
**cost benefit analysis**



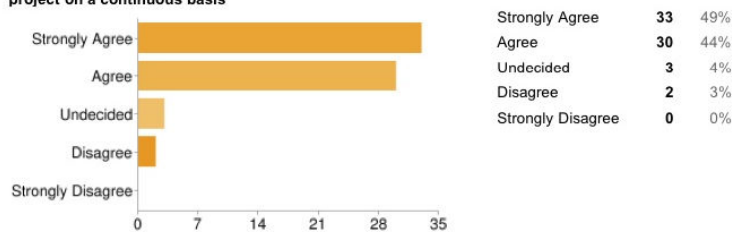
**4. ERP Project: PRE implementation procedures - c) The ERP decision was based on qualitative benefits to the company**



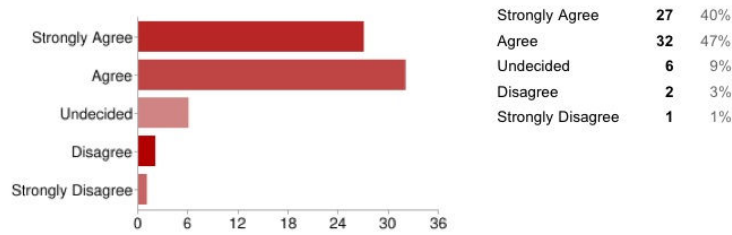
**4. ERP Project: PRE implementation procedures - d) Key Metrics for success were identified to measure the success of the project**



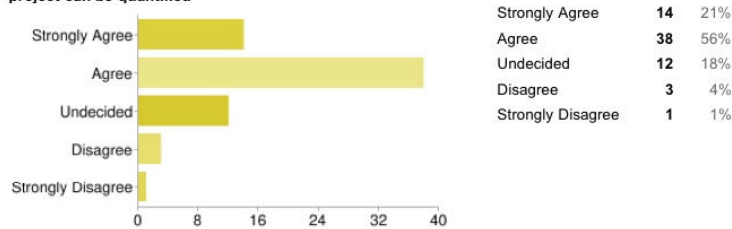
**5. ERP Project: POST implementation analysis - a) The company monitored the progress of the project on a continuous basis**



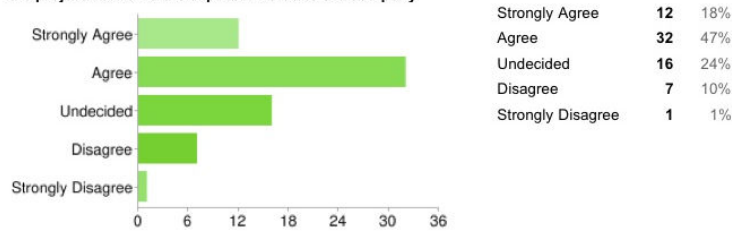
**5. ERP Project: POST implementation analysis - b) The overall COST of the completed ERP project can be quantified**



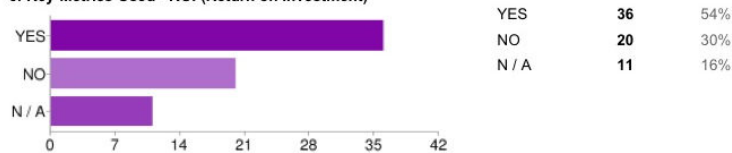
**5. ERP Project: POST implementation analysis - c) The overall BENEFITS of the completed ERP project can be quantified**



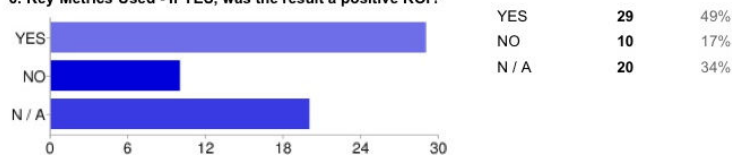
**5. ERP Project: POST implementation analysis - d) The key metrics that were tracked proved that the project delivered the expected value to the company**



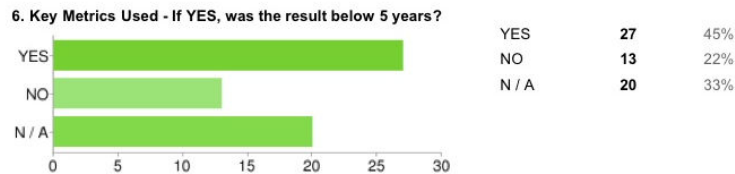
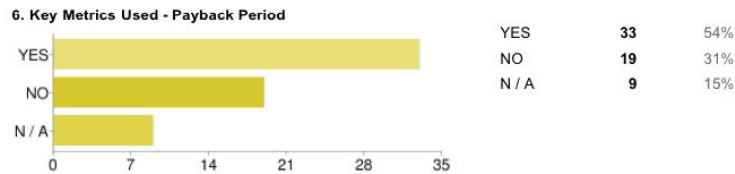
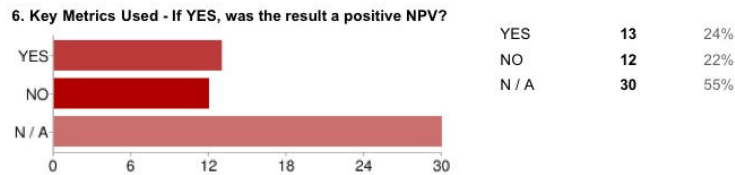
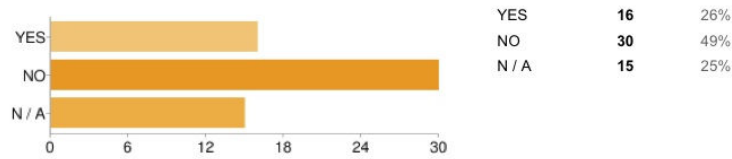
**6. Key Metrics Used - ROI (Return on Investment)**



**6. Key Metrics Used - If YES, was the result a positive ROI?**



**6. Key Metrics Used - NPV (Net Present Value)**



**Please provide details of any other key QUANTITATIVE metrics monitored.**

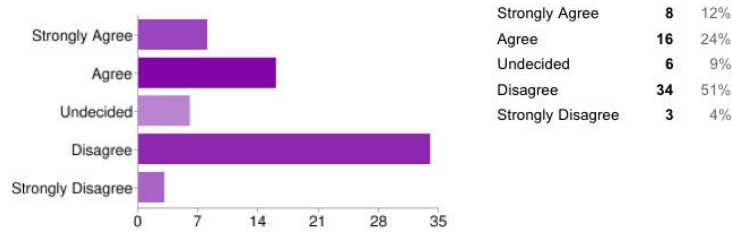
The cost of not having a stable transactional system, Reduced input cost. Improved system operation aligned to business process, and in the event, also improved some business processes. Reduce input in cost. Improved quality. Reduced risk greater volumes. Last installation of ERP system was done in 1987, twenty one years before I joined. I do believe exhaustive testing, planning etc.. was done prior to and during installation. Therefore above sections completed would not be inaccurately answered. System is still in use so I believe project was very successful, see your future questions. Improved ...

**Please provide details of key QUALITATIVE metrics monitored.**

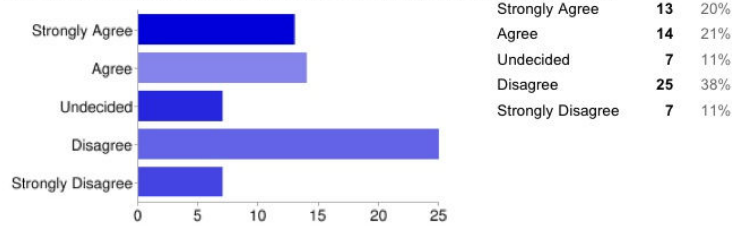
Competitive edge, System to support the Business strategy and growth plans. Improved data through put at an increased accuracy level which improves information flow and thus a management decision making and the ability to be pro-active. Improved customer service. Increased database scalability to deal with transaction volumes. Don't know. Improved customer service, swift production processes, improved warehouse management. Improved customer service. Improved Supply Chain Processes, Improved Reporting, Global Knowledge transfer, One system to service 65 locations, Global view. Standardised reports. Simpl ...

**7. PROJECT SUCCESS - a) The cost of ERP project was significantly higher than the expected budget**

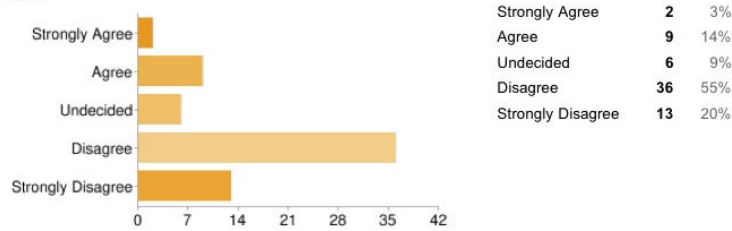




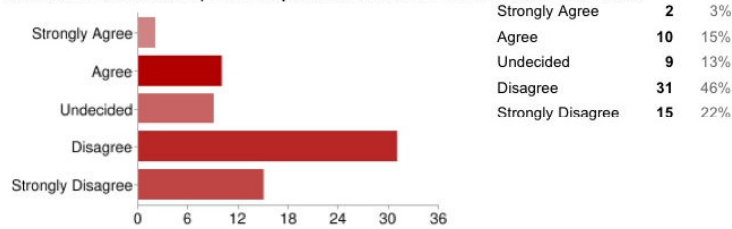
**7. PROJECT SUCCESS - b) The ERP project took significantly longer than expected**



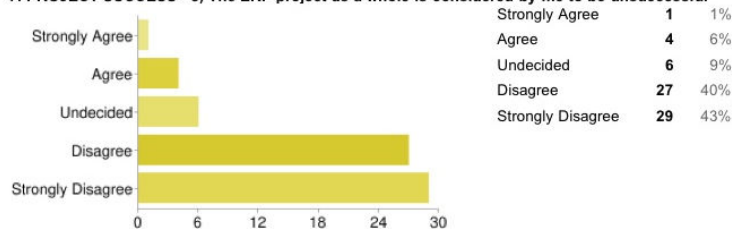
**7. PROJECT SUCCESS - c) The system performance of ERP is significantly below the expected level**



**7. PROJECT SUCCESS - d) The anticipated benefits of ERP have not been materialized**



**7. PROJECT SUCCESS - e) The ERP project as a whole is considered by me to be unsuccessful**



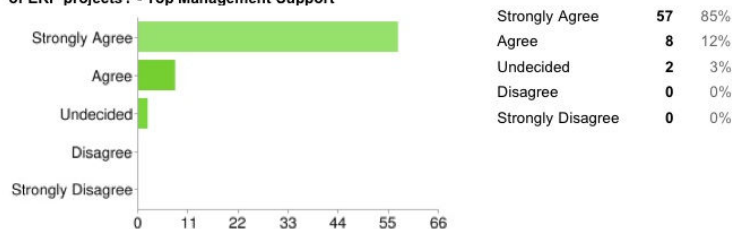
**8. Please state the MAIN reason why you believe your project was either a success or failure**

Good ROI    Technical upgrade without Business distrupction    Everyone's happy    Business continuity was maintained  
and the ERP package offered us additional functionality to improve business.    Staying with curr    ...

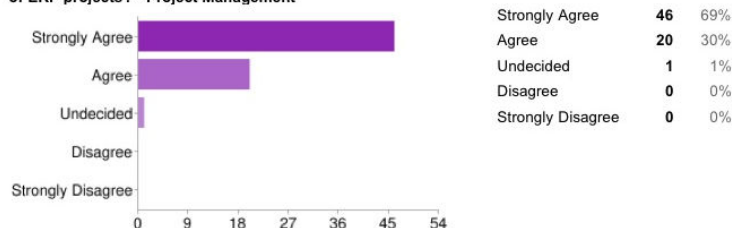
**9. Please list the MOST CRITICAL factor that you would say leads to the success of any ERP project**

Efficiency    Change Management    people ownership    Top Management Support    Smooth Implimentation from one  
ERP to another    Identification and an understanding of user requirements .This will result in scope chan    ...

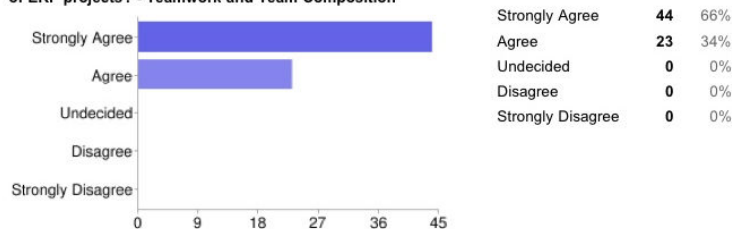
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Top Management Support**



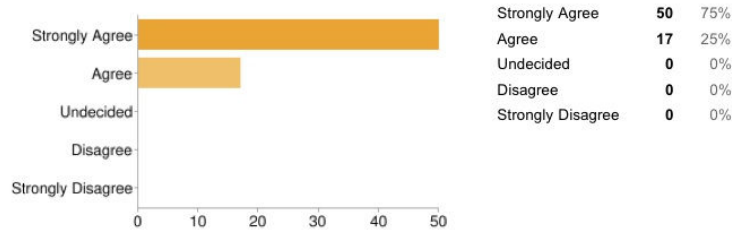
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Project Management**



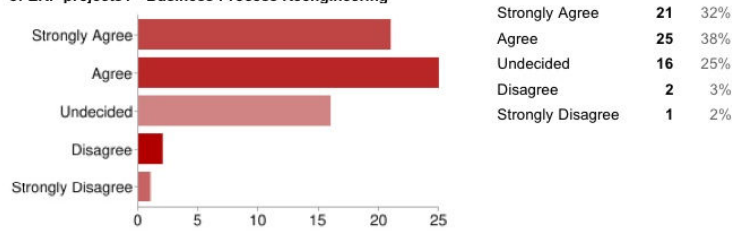
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Teamwork and Team Composition**



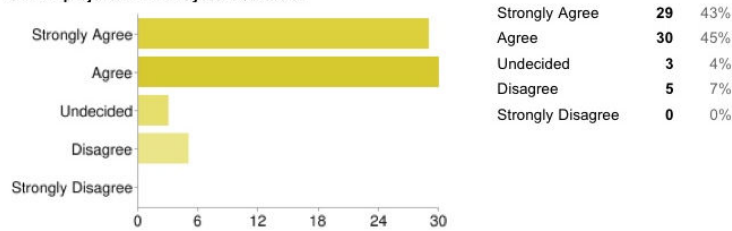
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Communication**



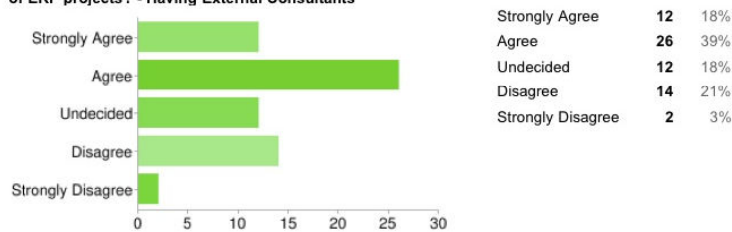
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Business Process Reengineering**



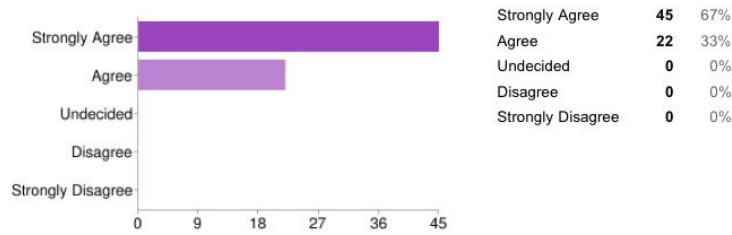
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - ERP System Selection**



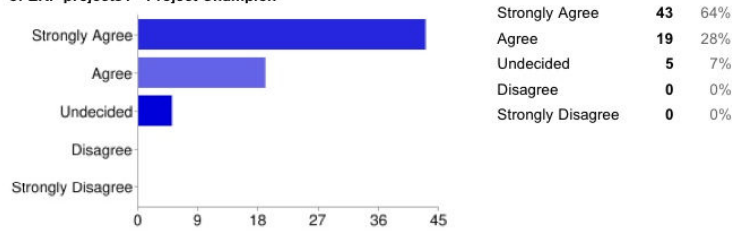
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Having External Consultants**



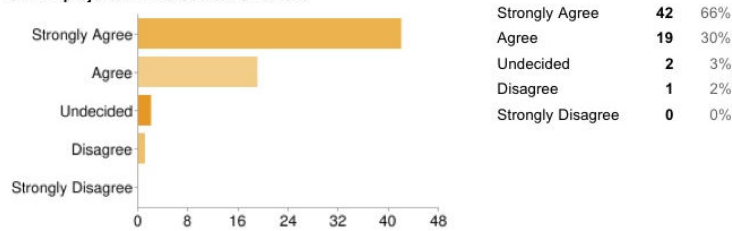
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Training & Support for Users**



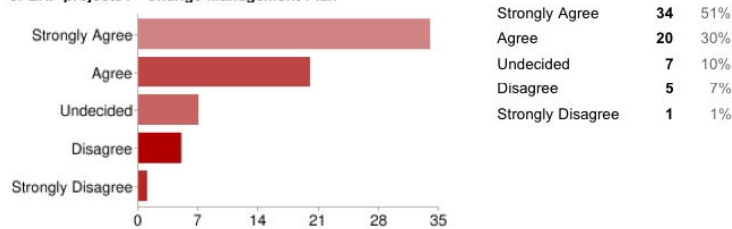
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Project Champion**



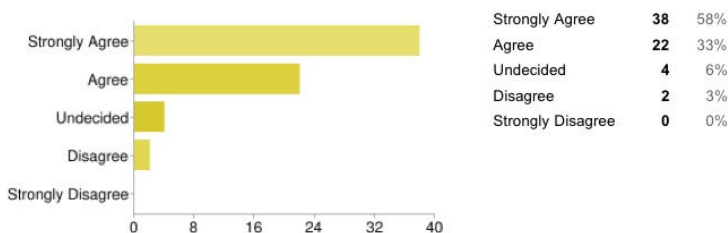
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - End User Involvement**



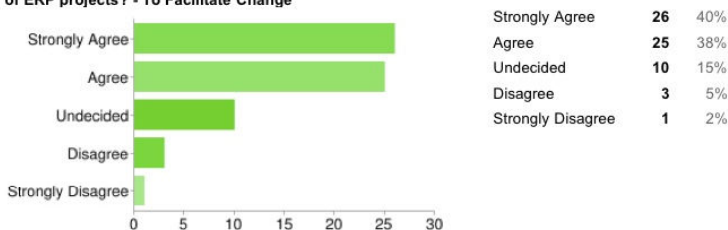
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Change Management Plan**



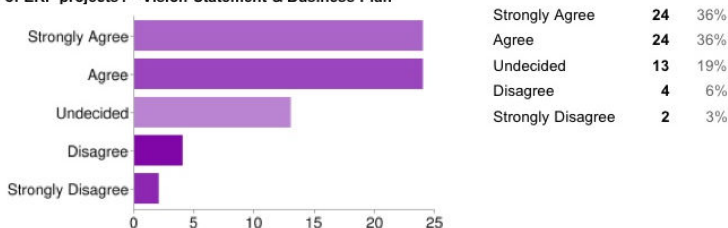
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Test and Problem Solution**



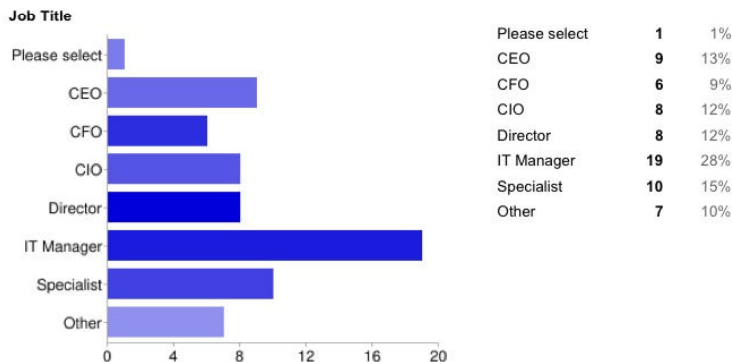
**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - To Facilitate Change**



**10. Are there any other factors from the below list that you also feel are CRITICAL to the success of ERP projects? - Vision Statement & Business Plan**

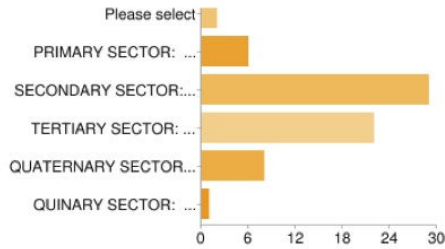


**SECTION B : Information for Statistical Purposes only**



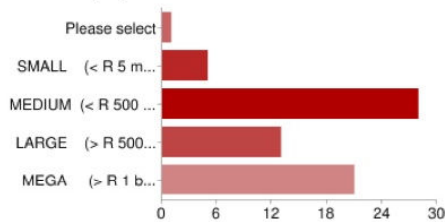
**Type of Industry**





PRIMARY SECTOR: Agriculture or Mining	6	9%
SECONDARY SECTOR: Manufacturing or Construction or Refining	29	43%
TERTIARY SECTOR: Services or Distribution of goods	22	32%
QUATERNARY SECTOR: Technological Research, Design and Development	8	12%
QUINARY SECTOR: Non-Profit Activities	1	1%

**Size of Company**



SMALL (< R 5 million)	5	7%
MEDIUM (< R 500 million)	28	41%
LARGE (> R 500 million)	13	19%
MEGA (> R 1 billion)	21	31%

**Number of daily responses**



## APPENDIX D: CONSISTENCY MATRIX

RESEARCH QUESTION	RESEARCH PROPOSITION	RESEARCH HYPOTHESIS	LITERATURE REVIEW	SURVEY QUESTION	ANALYSIS
1 To what extent are the pre-implementation decision, of an ERP system at South African organisations, based on both quantitative and qualitative measures?	The qualitative reasons outweigh the quantitative reasons in the capital budgeting decision-making process of an ERP system investment.	In the pre-implementation procedures followed by South African companies in making an ERP investment decision, the decision is based on qualitative factors, more so than on quantitative factors.	Pavlicko, 2007 Stedman, 1999	<u>Section A</u> Question <b>FOUR</b>	Frequency Analysis
2 What are the critical success factors for an ERP implementation in South Africa?	The critical success factors for ERP implementations in South Africa are similar to those experienced elsewhere.	The three most frequent reasons for successful ERP implementations in South Africa is the same as the three most frequent reasons for successful implementations as per the literature review.	Somers & Nelson, 2001 Fui-Hoon Nah, 2003 García-Sánchez, 2007 Robertson, 2004 Standish Group, 1995	<u>Section A</u> Question <b>NINE</b> Question <b>TEN</b>	Frequency Analysis
3 What post purchase analysis takes place (quantitative and qualitative) in terms of Key Metrics used?	Companies who use key metrics in monitoring ERP systems implementations should experience a higher level of success than those that do not.	The ERP implementations of South African companies that perform post purchase analysis by using key performance indicators, were more successful in their ERP projects than those companies that did not perform similar analysis.	Wei, 2008 Swanton, 2010	<u>Section A</u> Question <b>FIVE</b> Question <b>SIX</b>	Statistical Analysis
4 Are the majority of ERP implementations South Africa successful or unsuccessful?	The majority of South African ERP implementations are not successful.	ERP implementations are only considered to be successful, when all three factors of success have been experienced by the company, i.e. within time, within budget and realised benefits.	Robertson, 2008 Engelbrecht, 2008 Finney, 2007 Markus, 2000 Woo, 2007	<u>Section A</u> Question <b>SEVEN</b> Question <b>EIGHT</b>	Statistical Analysis
5 Do the above experiences differ across different industries?	The larger the company, the more difficult it will be to have a successful ERP implementation.	There is no differentiation between industries when it comes to successful ERP implementations.	Ifenedo, 2007 Kyung-Kwon, 2002	<u>Section B:</u> Question <b>TWO</b>	Frequency Analysis