

**AN ERP SYSTEM IMPLEMENTATION FRAMEWORK  
FOR MANAGEMENT ACCOUNTANTS IN THE  
WATER INDUSTRY**

**T.N. MUDAU**

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**AN ERP IMPLEMENTATION FRAMEWORK FOR MANAGEMENT  
ACCOUNTANTS IN THE WATER INDUSTRY**

**BY**

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In accordance with Rule G4.6.3, I hereby declare that the above-mentioned treatise is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

**SIGNATURE:**

A handwritten signature in black ink, appearing to read "Thanyani Norman Mudau", written over a horizontal line.

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A handwritten date "19/02/2013" in black ink, written over a horizontal line.

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## **ABSTRACT**

Organisations are seeking for an opportunity to reduce costs while they increase service delivery to their customers. In order to remain in business, companies must have proper strategies in place to reduce costs while they still deliver the same standard of service. In order to remain competitive, companies have implemented Information Communication Technology (ICT). The implementation of ICT was done to assist organisations to improve efficiency in their production processes. To achieve these objectives, companies implemented Enterprise Resource Planning (ERP) systems. Some companies that have implemented an ERP system, however, are faced with the challenge of not fully realising the full benefits of implementing the ERP system.

The Water Industry is faced with a challenge of ensuring that it manages the water value chain effectively through the use of an ERP system. The industry is also experiencing difficult times in ensuring that the business is run in a sustainable manner to manage the infrastructure assets. This has resulted in the importance of internal reporting within the Water Industry to assist management to monitor performance and take informed decisions. The implementation of an ERP system has affected all the roles in the Water Industry, especially the role of management accountants who are involved with internal reporting. Management accountants are experiencing challenges during and after the implementation of an ERP system, especially with the effective and efficient reporting of information.

This study investigated the challenges that management accountants encountered after the implementation of an ERP system in the Water Industry in South Africa. The research consists of a preliminary study to identify challenges that management accountants encounter during and after the implementation of ERP system in the Water Industry. A literature review on the role of management accountants combined with the ERP system applications and framework are investigated and an ERP system implementation framework for the Water Industry is proposed. The proposed framework is evaluated and recommendations are made to those involved with the water industry that are considering upgrading or implementing an ERP system.

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## LIST OF ABBREVIATIONS

ABB	Activity Based Budgeting
ABC	Activity Based Costing
ASAP	Accelerated System Application
AGSA	Auditor General South Africa
BO	Business Objects
BI	Business Intelligence
BPR	Business Process Re-engineering
CSFs	Critical Success Factors
DWA	Department of Water Affairs
ERP	Enterprise Resource Planning
FI/CO	Financial and Controlling
IT	Information Technology
ICT	Information Communication Technology
MM	Material Management
NWRS	National Water Resources Strategy
NWIB	National Water Infrastructure Branch
PFMA	Public Financial Management Act
PM	Plant Maintenance
SA	South Africa
SAP	System Application
SD	Sales and Distributions
TCTA	Trans-Caledon Tunnels Authority

WTE	Water Trading Entity
ZBB	Zero Based Budgeting

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# Chapter 1

## Introduction and Problem Statement

### 1.1 Introduction

In recent years companies are faced with challenges of increasing competition, market expansion and increasing customer expectations (Umble et al., 2003). This has been fuelled by the recent global crisis from which the world is still recovering. Companies are expected to save the cost of doing business but they must still provide quality products or services. In order to remain competitive companies have implemented Information Communication Technology (ICT). One reason for the implementation of ICT was to assist organisations to improve efficiency in their production process. To achieve these objectives, companies have moved towards the implementation of Enterprise Resource Planning (ERP) systems (Umble et al., 2003).

ERP systems are software packages that integrates a company business processes and all information that is relevant to manage the organisation (Fui-hoon Nah & Delgado, 2006). ERP systems assist managers by providing real-time financial and production information. Companies which implement ERP systems are able to manage their resources efficiently. This is because data is stored in a single database and managers are able to extract information that will aid them in decision making. There are several reasons why companies implement ERP systems. Some companies implement ERP systems to integrate systems throughout the organisation (Fui-hoon Nah & Delgado, 2006).

The benefits of ERP systems are sometimes affected by the challenges that companies are experiencing with implementation (Al-fawaz et al., 2008). Al-fawaz et al. (2008) indicated that ERP systems tend to be large, complicated and expensive. ERP systems require a large, time commitment from employees in the organisation, affect all the departments in the organisation and require changes to business processes. This requires additional training for all employees so that they can familiarise themselves with new business processes and the functioning of the system.



Ngai et al. (2008) found that there has been an increase in the high rate of failure in the implementation of ERP systems. The result is that companies do not realise the benefits of implementing ERP systems. The success of implementing an ERP system is affected by business readiness, involvement of end- users, availability of business processes, ownership of the project, methodology used, education and training and ERP system selections (Ngai et al., 2008). Many organisations are planning to upgrade to the latest version of ERP systems despite the unsuccessful implementation of ERP systems (Ngai et al., 2008). The upgrade is influenced by the fact that companies have not realised the benefits of system integration in return for their financial investment in these systems.

ERP systems are common applications used in the Water Industry and the successful implementation of ERP systems can assist the Water Industry to manage financial and non-financial information. The Water Industry is dependent on integrated information to manage the availability of water in South Africa. The integrated information is managed by management accountants within the Water Industry. The role of the management accountant becomes important as management accountants provide management with information for decision making. ERP systems like SAP have different modules to accumulate cost and information. This study will focus on the Financial and Controlling modules (FI/CO) in an ERP system. These modules provide management accountants with profit centre reporting, cost elements reporting, cost centre reporting, Activity Base Costing (ABC) and planning. The module provides management with the information required to make better business decisions (Yusuf et al., 2003).

This study will investigate the current challenges faced by the Water Industry in their implementation of ERP systems and will develop a framework for implementing an ERP system within the Water Industry. The framework developed will be used by management accountants in the Water Industry when they implement an ERP system.

## **1.2 Research problem**

In the Water Industry the complexity of business processes impact the implementation of ERP systems. The lack of understanding of the business

processes may result in implementation failure, which has an impact on the performance of the Water Industry.

Granlund and Malmi (2002) state that investment in ERP systems improves the organisation's efficiency and effectiveness which results in improvements in the financial performance and management decision making of the organisation. This is due to the fact that ERP systems integrate all databases into one database and management can easily access the information it wants on the performance of the organisation. The implementation of ERP systems has also resulted in production and quality improvements in key business areas like product reliability, customer service and knowledge management.

Companies which have implemented ERP systems are upgrading to add more functionality or to upgrade to the latest version of the software (Moon, 2007). Some companies implemented an ERP system even though the value lies in the extended system for reporting purposes. The upgrade of the system is as a result of benefits derived from the ERP system or because the current modules do not meet all the business requirements. The high cost of an investment in an ERP system forces companies to continue with the upgrade of the ERP system even if they have not realised the return on investment (Moon, 2007).

The successful implementation of ERP systems is dependent on proper understanding of business processes by the implementer, top management support, proper change management, communication, business involvement, the methodology used and training (Granlund & Malmi, 2002). The ERP system implementation is complex in large organisations and it is therefore important that the implementation be managed properly to ensure that the business derives value for money (Galani et al., 2010). In large organisations the software is often incompatible with business processes and these results in customising the system, which is expensive due to maintenance costs and to the restructuring of business processes to meet software requirements.

Management accountants represent management in the implementation of ERP systems (Galani et al., 2010). Their role is to ensure that business processes are correctly documented and understood by the implementer. In most organisations the role of the management accountant becomes the role of business analyst therefore it

is important for them to have knowledge of software and business processes (Galani et al., 2010).

According to Garrison et al. (2008) management accountants provide information to internal managers within the organisation. The information is used to measure the performance of the organisation and it is also used by managers to make strategic decisions. The data provided by management accountants is essential to run the organisation. Management accountants prepare reports, some of which measure how managers or business units have performed. The reports provide key indicators that are essential to the organisation. This includes preparation of budgets and a strategic plan that is essential to the future of the organisation. They provide a basis on which costs are allocated to products or services by using Activity Based Costing (ABC) and other management accounting tools. The role of management accountants is to represent management within the organisation (Garrison et al., 2008).

The reports generated by management accountants require the use of ERP systems, since ERP systems integrate information across the organisation (Galani et al., 2010). This information is obtained from modules within the ERP systems. ERP systems like Systems Applications and Products (SAP) have the following components used by management accountants: Plant maintenance (PM), Financial (FI), Controlling (CO), Sale and distribution (SD), Material management (MM) and Business objects (BO).

To deliver an ERP system that meets business requirements on time and within budget, various ERP system vendors have developed frameworks to be used by consultants and businesses for implementing on ERP system. The framework gives guidelines on what needs to be in place and what steps are to be followed when implementing an ERP system. An ERP system framework proposes the governance structure around the ERP system implementation (Fitz-Gerald & Carroll, 2003). This assists the organisation to ensure that ERP systems are implemented successfully and the desired results are achieved. Despite these generic frameworks by ERP system vendors, there has been an increase in the failure of ERP systems. Organisations are not achieving what they intended to achieve (Rashid et al., 2002). One of the groups affected by ERP system project failures are management

accountants. Despite the implementation of ERP systems, they are continuing to use stand-alone systems like Excel, Business Intelligence and Business Objects for reporting on ERP system information (Granlund, 2011).

The Water Industry has implemented ERP systems using the ERP systems implementation methodology. The Water Industry is faced with unique challenges related to the implementation of ERP systems. The ERP system has been implemented however; they have challenges with efficient and effective reporting of financial and non-financial information (DWA, 2011). The Water Industry must ensure that costs are kept down to ensure that they remain competitive in supplying water to all South Africans. This forces the Water Industry to review the challenges they have on their ERP systems implementation. This leads to the main research Problem:

An ERP systems implementation framework for management accountants in the Water Industry in South Africa has not been developed.

### **1.3 Objectives of the research**

The main research objective of this study is:

*ROM: To develop and evaluate a management accounting ERP systems implementation framework for the Water Industry in South Africa.*

The research objectives of this study are:

- RO1: To identify the importance of the Water Industry and the information technology (IT) solutions used by the industry;
- RO2: To review the literature in order to establish the role of management accountants within the Water Industry;
- RO3: To identify the current problems experienced by management accountants in the Water Industry in South Africa;
- RO4: To understand the importance of ERP systems and the impact they have on management accounting practices;
- RO5: To develop and implement an ERP systems implementation framework for the Water Industry;

- RO6: To evaluate an ERP systems implementation framework for the Water Industry.

#### **1.4 Research questions**

The main research question of this study is:

*RQm: Can an ERP system implementation framework be developed for management accountants in the Water Industry in South Africa (SA)?*

Based on the research objectives identified, the following related research questions need to be addressed:

- RQ1: What is the importance of the Water Industry and what IT solutions are used in this industry?
- RQ2: What is the role of management accountants in the Water Industry?
- RQ3: What are the problems experienced in the Water Industry regarding ERP systems implementation?
- RQ4: What is the importance of ERP systems and their impact on management accountants?
- RQ5: Can an ERP systems implementation framework for the Water Industry be developed?
- RQ6: Can an ERP systems implementation framework for the Water Industry be evaluated?

#### **1.5 Scope and delimitation of the research**

The research will be limited to the Water Industry in South Africa. The departments, namely Management Accounting, Financial Management, Information Technology (IT) and Project Management, are those within the company that have a direct influence on ERP system implementation. The research will only focus on the Financial and Controlling modules (FI/CO) of ERP systems. The scope of this study is limited to employees within the Water Industry. The ERP implementation framework to be developed for management accountants will only be tested within the Water Trading Entity (WTE).

## **1.6 Significance of the research**

This research aims to provide a management accounting ERP system framework which can improve ERP system implementation in the Water Industry.

This research will also be useful for:

- Water Entities that are beginning to implement a new ERP system.
- Water Entities that are upgrading their ERP systems to the latest version.
- Senior management, management accountants and project teams who affect the success of the ERP system implementation and that of new modules to be implemented.

## **1.7 Research methodology**

Leedy and Ormrod (2005) state that research methodology is the technique which the researcher uses in conducting research project. The approach taken indicates the types of strategies to employ when conducting the research.

### *1.7.1 Research paradigm*

This study will be a qualitative research study and will include a literature review and a case study. The qualitative approach seeks to understand a given research problem. It is used to give an answer from the complex phenomena; it understands and describes the phenomena from the local point of view (Collis & Hussey, 2009:55).

The focus in this case study is on an individual case because it is unique and it must be well understood to solve the problem. A case study approach analyses the individual programme in details and scenario in depth for a specified period. The case study is relevant for learning more about a situation that is not understood (Collis & Hussey, 2009).

A case study for this research will enable the researcher to collect data on the operations within the Water Industry and being an employee at one of the Water Entities, the researcher can spend an extended period of time on-site and interact regularly with the people and departments that are being studied. The empirical study consists of:

- Surveys (questionnaires) in the Water Industry;
- Make direct contact with the management team, ERP system consultants, management accountants and financial managers within the various water entities to establish their expectations of the ERP system;
- Observation of the activities that support the assessment of the ERP system framework.

A preliminary study will be conducted to identify the current challenges that management accountants face on the implementation of the ERP systems at the Water Industry. These main problems experienced in the Water Industry will be discussed in Chapter 4.

### *1.7.2 Data collection*

The primary data will be collected by means of questionnaires. The sample is representative of the population from which it is drawn. When a sample is selected, care needs to be exercised to ensure that the sample is unbiased in the way in which it represents the population under study (Collis & Hussey, 2009). Sampling plays an important role in providing information for making business decisions. It is impractical for the researcher to survey the whole population as it is not cost effective (Evans, 2010:143).

Qualitative research makes considerable use of inductive reasoning where many specific observations are made and then inferences are drawn about larger and more general phenomena (Evans, 2010). The data collected from the questionnaires will be analysed on an individual basis which means that each question will be handled separately, and conclusions and recommendations will be made individually. The data will be analysed with the assistance of the Nelson Mandela Metropolitan University (NMMU) statistician, Dr Jacque Pietersen.

## **1.8 Definitions of concepts**

In order to provide a better understanding of the key concepts contained within this study, the following definitions and their meanings are provided.

### *Activity Based Costing (ABC)*

ABC is a costing system used in both service and in manufacturing industries, and in both private and public sectors, which identifies overhead costs as closely as possible with the drivers of cost (Gowthorpe, 2008).

### *Budgeting*

Budgeting is the foundation of management accounting control process in an organisation. Budgets are used for planning and control and they play an important and vital part in planning (Mowen & Hansen, 2008).

### *ERP system*

An ERP system is a software package that enables companies to integrate their business processes and all information relevant to their organisations. ERP systems standardise business processes across the organisation and they also assist in ensuring that management receives real-time data in financial and production information (Fui-hoon Nah & Delgado, 2006).

### *ERP system framework*

An ERP framework describes the amount of preparative work to be done before the system is in use and the structure indicates what programs should be built and how these programs should relate to each other (Makipaa, 2003).

### *Management accounting*

Management accounting is concerned with the provision of information to people within the organisation to help them make better decisions and improve the efficiency and effectiveness of existing operations (Drury, 2001).

### *Management accounting information*

Management accounting information refers to financial and non-financial information used in an organisation for decision making (Atkinson et al., 2004).

### *National Water Resource Strategy (NWRS)*



NWRS is about putting into practice the policy and law about water resources. It is about making sure that everyone has fair, equitable access to water. It is also about making sure that it is used so that our people, our society and our economy can grow without compromising environmental sustainability (DWA, 2011).

### **1.9 Ethics clearance**

The completed pro-forma for Ethics Clearance was submitted to the NMMU Business School, however, as there were no vulnerable groups involved in this study, full ethics clearance was not applied for.

### **1.10 Key assumptions**

The literature study combined with the results of the case study, will provide insight into the challenges of ERP systems being used in the Water Industry and will identify potential areas for improvement.

### **1.11 Contents of the final report**

The study is arranged as follows:

Chapter 1 will outline the introduction of the research, scope of study, the problem statement, the research objectives, the key assumptions, the significance of research, the research methodology and the proposed chapter headings of the study.

Chapter 2 outlines the importance of the Water Industry and the IT solutions used. The chapter will provide a literature overview of the Water Industry internationally and the Water Industry in South Africa. The importance of water will be discussed and also the impact on climate change. This chapter will address research question RQ1 and research objective RO1.

Chapter 3 will provide a brief literature on the role of management accountants in the Water Industry. This chapter will also discuss the importance of budgets in management accounting. The use of cost accounting systems by management accountants will also be discussed. The importance of information technology in management accounting will also be investigated. This chapter will address research questions RQ2 and research objectives RO2.

Chapter 4 outlines the literature study on the importance of ERP systems and their impact on management accountants. The importance and benefits of ERP systems are also discussed. In this chapter the Critical Success Factors (CSFs) for ERP system implementation are identified. A preliminary study to identify problems experienced by management accountants during and after the implementation of ERP system will be also be conducted. The main problems experienced by management accountants will be explained. The chapter will outline a generic model for implementing an ERP system and how the proposed ERP system framework was developed for the Water Industry. This chapter will address research questions RQ3, RQ4 and RQ5 and research objectives RO3, RO4 and RO5.

Chapter 5 will outline the research methodology followed when identifying the main problems of ERP implementations and the design for evaluating the proposed ERP implementation framework within the Water Industry. The chapter identifies and describes the research paradigm and how the sample was selected and how the questions were addressed. The reliability and the validity of the measuring instrument will be discussed. The chapter also describes the research design of the study.

Chapter 6 will evaluate the proposed framework and discuss the results. This chapter will address research question RQ6 and research objective RO6.

Chapter 7 will outline the proposed recommendation and conclusion on the study. The research gap will also be identified and future research opportunities are identified.

In the following chapter the Water Industry will be discussed.

## Chapter 2

### The Water Industry

#### 2.1 Introduction

An outline of the research was provided in Chapter 1 where the research questions and research objectives which need to be investigated were introduced. In this chapter, the first research question RQ1 will be investigated;

*“What is the importance of the Water Industry and what IT solutions are used?”*

The research objective RO1 will also be addressed;

*“To identify from the literature the importance of the Water Industry and the IT solutions used in this industry”.*

Although water is the core of any economy, it is not properly reflected in macro and sector strategies (DWA, 2011). The national budgets allocated to water do not reflect the importance of water as a strategic and scarce resource. If countries do not increase investments in the development of water infrastructure and management, it will be difficult to ensure water security to achieve economic growth and social development targets. Placing water at the centre of integrated planning and decision making will be crucial for the achievement of social and economic goals such as job creation (DWA, 2011).

Global freshwater consumption has increased over the last 50 years. According to Ahmetovic and Grossman (2010), it is predicted that by the year 2050 a quarter of the world's population will be living with a water shortage. The increase in water pollution of both surface water and ground water is deepening the crisis and will have a negative impact on the environment. The changes in environment have affected the patterns of rainfall over the years. This has forced countries to look at better ways of water management and sustainability. This shows that water is indispensable to the sustainability of the economy and ecological systems (Ahmetovic & Grossman, 2010).

In this chapter the Water Industry, internationally, will be examined (Section 2.2). The Water Industry in South Africa will be covered (Section 2.3) and the value chain

of the Water Industry in South Africa will be covered (Section 2.4), the importance of IT solutions in the Water Industry will be identified (Section 2.5) and the specific case study in the Water Industry is described (Section 2.6).

## **2.2 The Water Industry internationally**

The increase in population growth has called for the global community to increase the production of food and energy by 50%, which in turn will require an increase in water consumption by 30%. This is a huge challenge as environmental changes will result in a shortage of water because of changes in rainfall patterns and the poor infrastructure of managing water. Technologies and skills that can assist in solving the issues have already been invented. The issue can only be addressed through proper implementation of governance, financing and regulation (Guthrie, 2010).

In order to ensure that enough resources are available to manage water scarcity, most of the countries in Europe have privatised the Water Industry into different public entities to manage water. This was aimed at making this industry efficient by opening them to competition and by changing them into having a profit making motive (Schaefer, 2009).

### *2.2.1 The need for water*

According to Cambedessus and Winpenny (2003), water has become an important asset today. Access to water is a human right and a basic need to all people. Water is a key element to achieving all the other human rights, since without water all the human rights cannot be achieved. The plan of any government should include water as part of the strategic agenda to achieve all the other government plans. If governments want to provide proper sanitation to the community, water is critical in achieving that. The population growth requires more food to be available in order for the agricultural sector to farm more products (Cambedessus & Winpenny, 2003).

The water use for agricultural purposes can be as high as 70% in some countries and in countries like India the agricultural sector uses 90% of available water (Cambedessus & Winpenny, 2003). The global price increases in 2008 has fuelled a debate on food security for the existing and future generations. In order to increase food production, the demand and availability of water to the agricultural sector has to be increased. The demand for water by the agricultural industry has to be recognised

by the policy makers so that they can increase investment in the Water Industry (Guthrie, 2010).

Cambedessus and Winpenny (2003) estimate that industry use 20% of fresh water for generating electricity and producing products. The increase in production has increased the demand of water. In some countries the development of technology has reduced the usage of water; however the production of products has increased so the effect is not felt. Industry contributes to water pollution due to waste they discharged in the rivers. This has threatened the availability of water as the quality of water is deteriorating. The shift to organic raw material by the agricultural sector contributes to the increase in water pollution. The agricultural industry is a huge polluter of water (Abbott & Cohen, 2009).

The world population has increased over the past decade and is expected to increase in 50 years to come (Cambedessus & Winpenny, 2003). The 40-50% increase in the population size results in an increase in consumption of food (Guthrie, 2010). This will put stress on the demand for water. There is a shift towards urbanisation by the communities. According to Abbott and Cohen (2009), 60% of the population will be living in the urban areas in 2030. This is due to the fact that majority of the people are striving to better their lives. The demand in urban areas has also affected the South African Water Industry. In some rural areas a shortage of water is inevitable because of the management of the current infrastructure (Cambedessus & Winpenny, 2003).

### *2.2.2 The water supply*

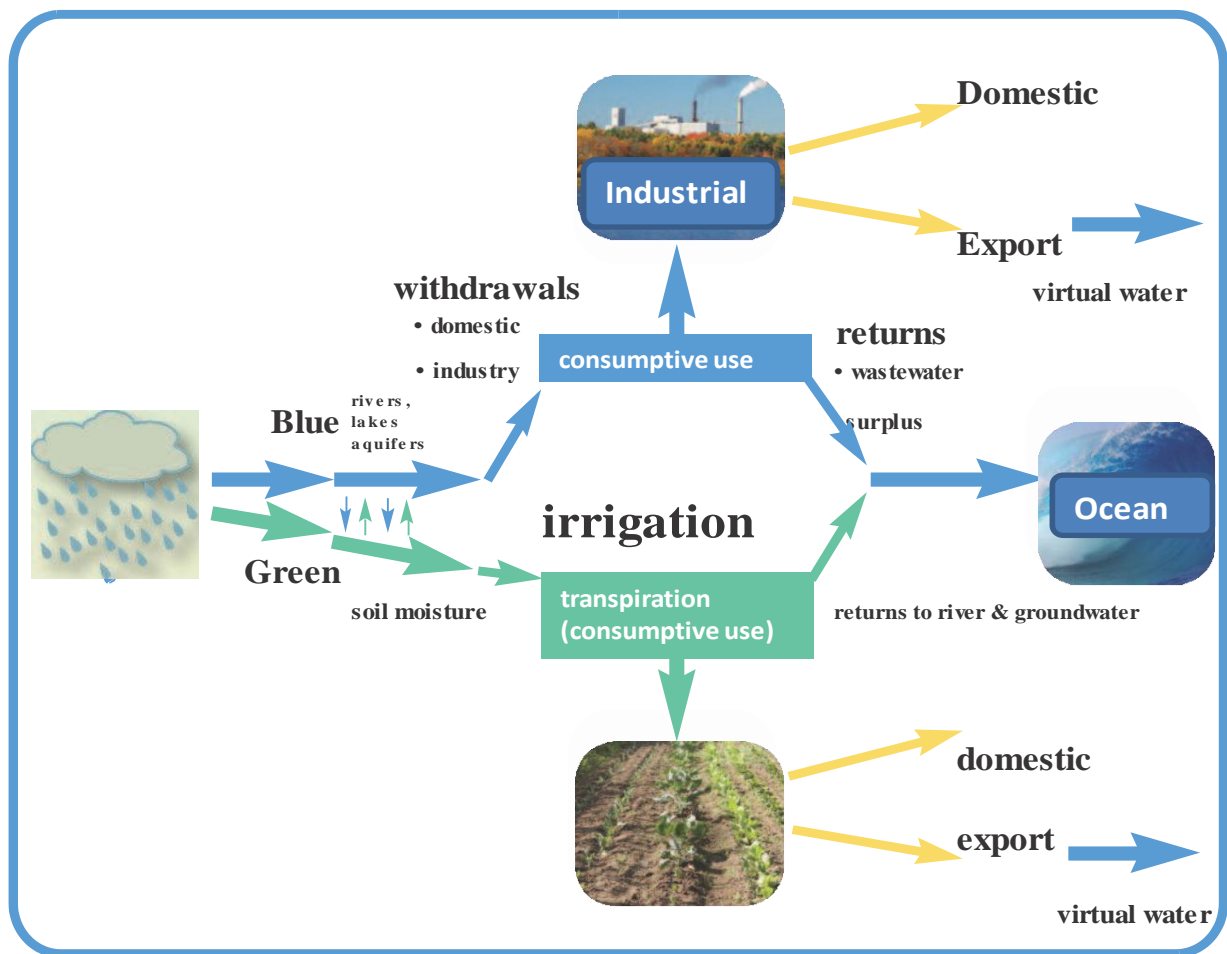
Water has contributed significantly to climate change in terms of change in weather patterns across the globe. The effects of change in the climate are evident through related water phenomena, namely; storms, flood, drought, hurricanes, glacial melt, snow melt, evaporation and the rise of sea levels. The effects of change in climate could contribute to water shortages in future. This will make it difficult for water resources to reach the communities, industries and agricultural sectors. The supply of water is being threatened by the change in weather patterns as in some of the western countries there is a decrease in rainfall due to climate changes. It is predicted that there will be an increase in shortage of water in the following countries China, East Africa and India (Ferguson & Maxwell, 2010).

Gruthrie (2010) states that one sixth of the world's population live in catchment areas fed by snowmelt or glacier melts that provide reliable water storage and supply. The increases in temperatures will make these glaciers melt and increase water supply in the short term. The flow of water will be affected in the long term as the storage of the glacier will be depleted. The melt will affect the supply of water in the future to agricultural sectors, individuals and industries. Most of the countries share the river basins which mean that the changes in catchment area of one country will affect the other countries in terms of water shortage and the quality of water. The water infrastructure becomes important to store and manage the flow of water (Ferguson & Maxwell, 2010).

Historically, most countries neglected to invest in water infrastructure. The condition of the water infrastructure has deteriorated over the years and is threatening the supply of water for irrigation and urban areas. The water network in urban areas is subject to high rate of failure due to water leaks. This problem is a result of unplanned expansion in the urban areas. It is estimated that by 2030, 60% of the world's population will be living in urban areas and investment in water infrastructure is far below the requirements, even in developed countries (Ferguson & Maxwell, 2010). The current investment in water infrastructure will contribute to future shortage of water in urban areas.

### *2.2.3 Managing water with the water cycle*

The management of water is done through the hydrological cycle which is a naturally occurring cycle where water moves from different physical states and undergoes a transformation. Human intervention in this cycle affects the whole value chain. In recent years environmental pollution by human beings has affected this cycle. The management of water resources must be done as a total system of the water cycle and it must address the human, economic and environmental systems (Figure 2.1). The issue of focusing on one component of the water cycle has a huge impact on the total value chain of the water system. The flow of water progresses from two sources into rivers, to soil moisture and to the ocean (Ferguson & Maxwell, 2010).



**Figure 2.1 Water Management Cycle**

**Source: Guthrie, 2010**

Blue water makes 40% of the total rainfall and this water flows to the rivers, lakes and aquifers. The remaining 60% of rainfall is called green water, which is the part of the water cycle that gets absorbed by the soil and it does not reach the required destination. Green water is important in maintaining the ecosystem and irrigation to plants. This is not regarded as part of water resource management due to the fact that this water gets absorbed by soil. If the green water had to be stored it would be an intervention to lessen water scarcity. A potential future source of water lies in the use of grey water. Grey water is water already used that needs to be recycled and reused for the same purpose or for different purposes. This can be used for drinking, irrigation and industrial purpose. The recycling of used water will assist the environment in terms of environmental pollution (Guthrie, 2010).

There are consumptive and non-consumptive uses of water. Consumptive water, once used, is lost from the water cycle as it does not go back to the water system. Non-consumptive water is returned to the surface and groundwater and used once for productive processes, it can be used again. This water, if not managed properly can pollute the water system as it is water already used. Proper technologies have to be in place to clean this water before it is discharged back into the system. The management of the water cycle is crucial in distributing water to global communities (Guthrie, 2010).

### **2.3 The Water Industry in South Africa**

The provision of water in South Africa is a key strategic drive for growth and development for the health and wellbeing of the people. It is important that the Water Industry in SA is properly regulated to ensure effective, efficient, sustainable use and management of the country's scarce resource water resources (DWA, 2011). The South African Water Industry is regulated through the National Water Act of 1998. The National Water act has being successful in ensuring that previously disadvantage people have access to water and sanitation. The number of people with access to water has increased from 54% in 1994 to 94% in 2011 (DWA, 2011). The regulatory function of the Water Industry is performed by the Department of Water Affairs (DWA). The DWA provides planning and also operates complex bulk water infrastructure which has allowed growth in places where growth would not have been possible (DWA, 2011).

South Africa experiences low rainfall and high evaporation (DWA, 2011). The rainfall does not spread across the catchment areas which leaves the northern and southern areas without sufficient water. The low rainfall and high evaporation make South Africa the 30<sup>th</sup> driest country in the world (Jonker, 2007). The uneven distribution of water across the country means that the availability of water resources differs from area to area. In order to manage drought and floods more than two thirds of available water is stored in dams (DWA, 2011).

Water plays a critical role in the socio-economic development of South Africa. The supply of water in the right quantity and quality is critical to economic growth, job creation and production of food by the farmers. The agricultural industry consumes more than 60% of available fresh water in South Africa (DWA, 2011). The climate



change has affected the Water Industry negatively. It is becoming impossible to meet the water demands of South Africa. New approaches are needed to balance the demand and supply, especially in the catchments areas that are stressed because of economic growth and shortage of rainfall (Jonker, 2007).

The Water Industry in South Africa has reached a point where urgent interventions are needed to avert the water deficit in the country. With the acid mine drainage spilling to the fresh water, the quality of water in South Africa is deteriorating (Jonker, 2007). The surface water has been utilised and there are few opportunities for building new dams. Ground water has not been developed to the same level as the surface water resources (DWA, 2011). There is an opportunity to treat water used by mining, irrigation and industry.

According to DWA (2011) the country has the following concerns regarding water resources:

- Growing concerns for future water security, access to water, floods, droughts, water availability, potential impacts of climate change;
- Deterioration of water quality and ecosystems due to water quality problem (eutrophication, salinization, acid mine drainage, microbiological contamination), impacts on water quality and other habitat threats;
- Deteriorating of water infrastructure; ageing water infrastructure, non-optimal operation, lack of maintenance over the past years; and
- Technology to manage the water management systems.

According to Jonker (2007) the above water concerns are caused by the following issues:

- Limited financial resources and rising costs of water;
- Weak governance, regulation, compliance monitoring and enforcement;
- Inadequate alignment with and support of national development and growth strategies;
- Skills shortage and limited institutional capacity;
- Inadequate information and knowledge to manage a complex water business and
- Lack of investment in technology.

It is clear that Government and the private sector should work together to assist each other in ensuring sustainability of water resources in South Africa. The management of the water value chain should involve all the stakeholders in the Water Industry value chain.

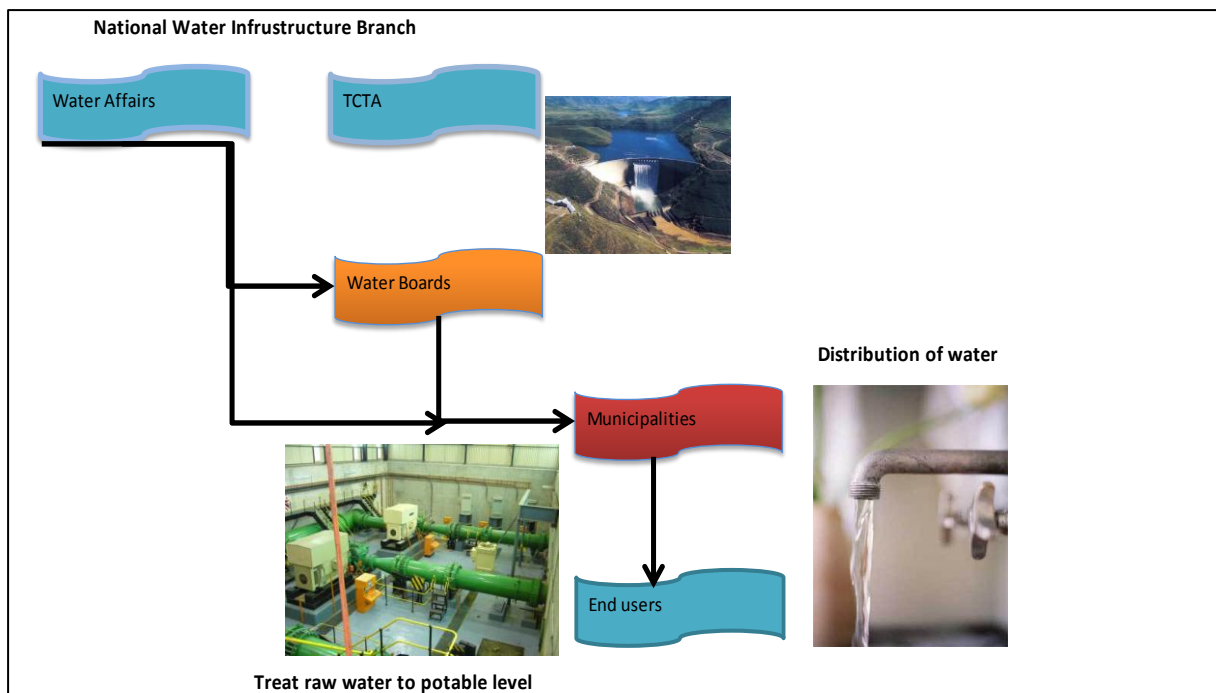
#### **2.4 The value chain of the Water Industry in South Africa**

The responsibility of the DWA is to regulate the Water Industry value chain by establishing various entities. The National Water Act of 1998 mandated the DWA to develop the National Water Resource Strategy (NWRS). According to DWA (2011) the NWRS is about to put the policy and law about water resources into practice. It is about making sure that everyone has equitable access to water. It is also about making sure that water is used so that our people, our society and our economy can grow without compromising environmental sustainability (DWA, 2011).

Through the NWRS the DWA serves the following purposes (DWA, 2011):

- Provides a national framework for managing water resources;
- Provides a framework for preparation of catchments management agencies;
- Provides information and identifies development opportunities and constraints.

The responsibility to manage water has been delegated to various entities established by the DWA. These entities are displayed in Figure 2.2 alongside the South African Water Industry value chain.



**Figure 2.2 The water value chain in South Africa**

**Source: DWA, 2011**

The National Water Infrastructure Branch (NWIB) is at the top, first in the value chain (Figure 2.2). The responsibility of the NWIB is to build new dams and maintain existing dams. The development of new dams is done in conjunction with the Trans-Caledon Tunnel Authority (TCTA). The responsibility of the TCTA is to raise funds from the market with a government guarantee, where the government cannot fund the project (DWA, 2011).

DWA (2011) mentioned that there are 13 Water boards established to manage bulk water and also to purify raw water into potable water. This is critical in ensuring that the public in general, industries and agricultural have water on a daily basis. The Water boards have the responsibility of submitting their business plan to DWA as and when required. The municipalities are not part of DWA but they play an important role in ensuring that people are able to access potable water (DWA, 2011).

## **2.5 The importance of IT solutions in the Water Industry**

The Water Industry has many technologies for managing water resources and these technologies need to be improved to address the security of water that is threatening Global economies are also threatened. Technology has a role in providing new water

resources but this might affect the ecosystem if research and development is not done properly (Cambedessus & Winpenny, 2003).

Storage areas for water need to be managed properly to avoid flooding and excessive flow of water from surface to the sea. The Water Industry has developed hydrological technology to monitor the quantity and the flow of water. This assists the Water industry in managing water resources and the scarcity of water (Chong et al., 2010).

The building of dams requires sophisticated technology to monitor the structure of the dam and quality of water in the dams. If these technologies are not constantly upgraded this will have an effect on sustainability of the Water Industry across the country (Chong et al., 2010).

South Africa like other country faces challenges of ensuring that the technologies they have are relevant to today's global challenges. The quality of water is deteriorating and as a result, there is a need to invest in technology that will prevent the deterioration of the quality of water (DWA, 2011). According to the DWA (2011) there are proposals in place to avoid future water shortages. In the near future South Africa may increase water desalination methods to ensure that there is enough water to drink and to grow the economy. Water is the heart of the economy and without water there will not be any production and electricity generation. The other source of water is the exploration of ground water. The development of ground water in South Africa is not enough and the investment in the technology to extract and treat ground water is still minimal (Molle, 2008).

The National Water Act of 1998 requires that the Minister of Water and Environment Affairs must establish national information systems regarding water resources. The information systems may include, amongst others:

- A hydrological information system;
- A water resource quality information system;
- A ground water information system;
- A register of water use authorisation.

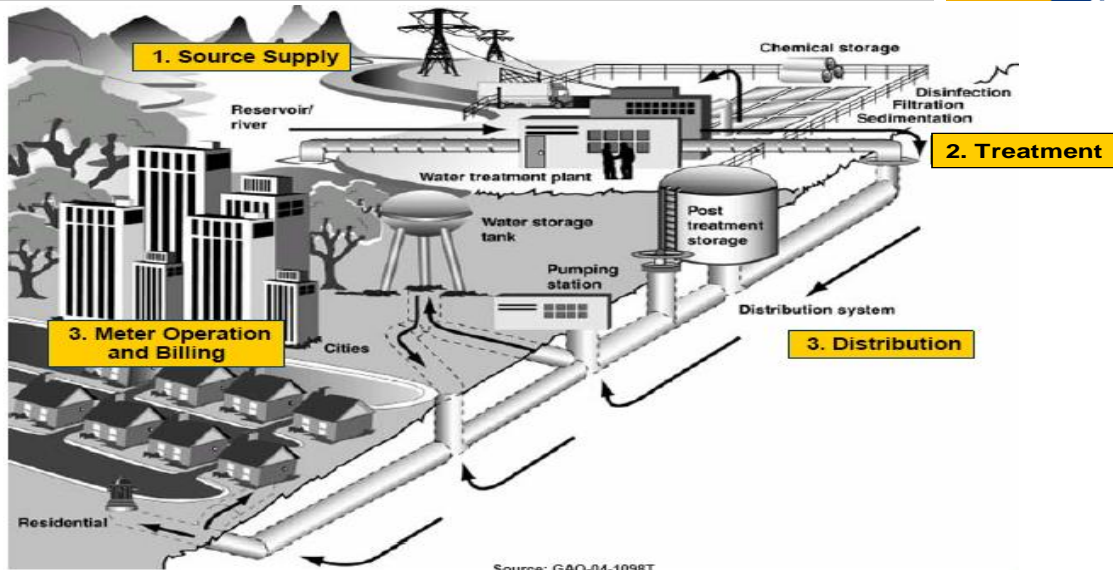
The objectives of the national information system are as follows (National Water Act, 1998):

- To store and provide data and information for the protection, sustainability and management of water resources;
- To provide information for the development and implementation of the national water resource strategy;
- To provide information to water management institutions, water users and public.

The information system is currently in place and is mainly used by the water management institutions (Figure 2.4). These institutions use the information on the national information system for both financial and non-financial purposes. The national information system is managed by the DWA as mandated by the National Water Act. The water institutions augmented the national information system with their own system to handle both financial and non-financial information (National Water Act, 1998). They opted to implement an ERP system to manage their business effectively and recover the costs of doing business.

This shows the importance of IT within the Water Industry (Figure 2.3). The information system is an enabler to the organisation that enables business processes. To run the activities ERP systems like SAP and Oracle have developed functionality specific to the utility industry. The utility module of an ERP system manages the whole value chain of the Water Industry from the source to billing customers (Panorama Consulting Group, 2011). The water utility performs the following activities:

- Source supply;
- Treatment of water;
- Distribution of water;
- Meter operation and billing.



**Figure 2.3 Water Utility Activities**

**Source: SAP, 2003**

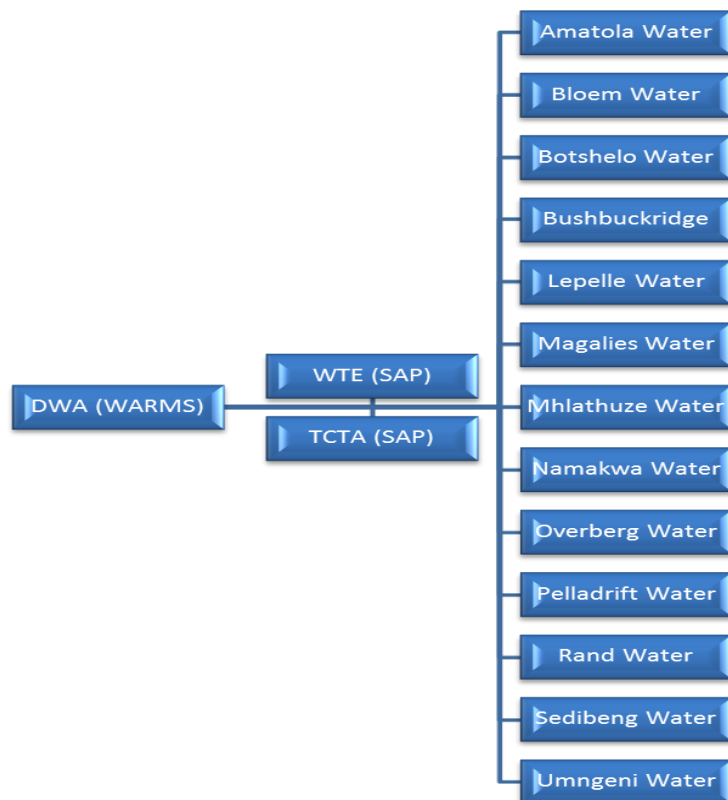
The Water Industry in South Africa focused on implementing an ERP system to enable it to do financial controlling and reporting (FI/CO) and hydrological technology to report the status of water in a particular catchment. Entities like the Water Trading Entity (WTE) have received a disclaimer report from the Auditor General South Africa (AGSA) citing the absence of an ERP system that functions correctly. According to AGSA they could not rely on the financial information provided by the WTE ERP system (DWA, 2011). AGSA recommended that the ERP system be re-implemented with a special focus on FI/CO, utilities, project system and other modules (DWA, 2011). The information that is generated from the modules of the ERP system is used for performance and financial reporting. During the process of implementation, management accountants as the custodian of internal accounting play an important role of ensuring that the Water Industry is implementing the FI/CO module correctly to enhance financial information reporting and decision making.

**2.6 The Water Industry**

The Water Industry develops and maintains the water infrastructure to meet regional, social, economic and environmental objectives for all South African citizens. The Water Industry has around 359 dams and weirs to look after. The management of

the Water infrastructure ensures that enough water is available for consumption by industry, agricultural and domestic use.

The Water Industry has the responsibility to supply raw and bulk water for domestic, agricultural and industrial use. The Water Industry uses information systems to manage availability of water and reports to decision makers on the status of Water Infrastructures. The ERP systems are used by the Water Industry to manage the value chain of water resources. Management accountants play an important role in ensuring that information is available for decision makers through the use of ERP systems. The Water Trading Entity (WTE) provides raw water to all the 13 Water Boards (Figure 2.4). The WTE uses SAP as their ERP system to manage the water resource infrastructure.



**Figure 2.4 Water Industry**

**Source: DWA, 2011**

According to the DWA (2011), the WTE was first established as a Water and Equipment Trading Account which was approved in 1983 through Circular SY3/6/B under the Exchequer Act, 1975 (Act No. 66 of 1975) as amended, and was subsequently amended by the Public Finance Management Act, 1999 (Act No. 1 of

1999) as amended, which converted it into a Water Trading Entity. Under the PFMA, 1999 (Act No.1 of 1999) as amended, the WTE was required to change from cash-based accounting to accrual-based accounting.

The Water Trading Entity (WTE) develops new water resource infrastructure across South Africa. The WTE is also responsible for the rehabilitation, operations and maintenance of existing water resource infrastructure assets. It is the goal of the WTE management to achieve financial sustainability and independence to reduce reliance on the government grant. WTE has 65000 water accounts that must be billed on a monthly basis. The replacement value of the assets is R147 billion (DWA, 2011).

The assets must be maintained according to assets management plans. In 2006 WTE implemented SAP as an ERP system to manage infrastructure assets and be able to bill the customers correctly. The modules implemented were as follows Material management (MM), Plant maintenance (PM), Financials (FI), Controlling (CO), Assets Management and Sales and Distributions (SD). The modules were implemented to assist WTE ensure that there is proper financial management.

The financial management division consists of Chief Financial Officer, Deputy Chief Financial Officer, management accountants, SAP specialist, cost accountants, financial accountants, assets accountants, project accountants, revenue managers, supplier chain practitioners and administrators. The different departments within financial management consist of Management Accounting, Financial Accounting, Revenue Management, Supply Chain and Assets Management. The SAP support function is performed by an external service provider.

## **2.7 Summary**

In this chapter the importance of the global and national Water Industry was explained. It was determined that the Water Industry is important to economic growth and is regarded as a basic human right. Without water, the existence of living creatures is impossible. This chapter also highlighted that there will be a shortage of water in the near future if governments are not investing enough on the water infrastructure and on technologies that will assist to explore ground water. The chapter also explained the way in which the industry, agriculture and mining affects



the quality of water. The future availability of water is dependent of the management of the water cycle from the source to the consumption of water. The recycling of water must be made to ensure that the availability of water is increased.

The chapter further explained the importance of water technology and information systems within the Water Industry. Technology is needed to increase water security and information systems are needed to ensure that decisions can be taken on future investment on the Water Industry. The Industry requires water information that is integrated with financial information to facilitate decision making. This chapter has answered the research RQ<sub>1</sub> and the research objective RQ<sub>1</sub> which was to identify from the literature the importance of Water Industry and the information technologies used. The role and importance of management accountants in the Water Industry will be discussed in the next chapter. The problems they experienced after the ERP has been implemented will be evaluated empirically. In Chapter 3 the role of management accountants in the Water Industry will be discussed.

## Chapter 3

### The Role of Management Accountants

#### 3.1 Introduction

In Chapter 2 a literature study was conducted to determine the importance of the Water Industry and the IT solution used in this industry. In this Chapter the research question RQ2 will be investigated “*What is the role of management accountants in the Water Industry?*” The research objective RO2: *The role of management accountant in the Water Industry will also be addressed.*

The increase in competition between organisations requires that companies must find a means of controlling costs within an organisation. This is not an easy task as costs of doing business have been escalating due to an increase in oil and other commodity prices. In order to remain competitive there is a need for organisations to properly plan and for this they need information that enables management to take a decision (Mowen & Hansen, 2008).

This has resulted in a need for internal accounting within the organisation. Internal accounting functions are performed by management accountants on behalf of management. In order for management accountants to perform these functions, proper techniques and technology must be in place (Mowen & Hansen, 2008).

In this chapter, the definition of management accounting will be examined (Section 3.2). The role of management accountants in the Water Industry will be discussed (Section 3.3). The importance of budgets in management accounting will be discussed (Section 3.4). The use of cost accounting systems by management accountants will be evaluated (Section 3.5). The use of technology by management accountants in preparing information required for decision making by management will be evaluated (Section 3.6).

#### 3.2 Management Accounting

Gowthorpe (2008) defines management accounting as a process that is concerned with the provision of information for use internally, within the organisation, for decision making by managers and for control of business activities. Management

accounting systems in such cases are likely to be informative and informal. The information provided is used by all stakeholders within the organisation i to measure the organisation's performance. Management accounting requires the collection, generation, analysis and interpretation of relevant information to provide the following secondary functions (Atkinson et al., 2004):

- Inform strategic decisions and formulate business strategy;
- Plan long, medium and short- term running of the operation;
- Determine capital structure and fund that structure;
- Design reward strategies for executives and shareholders;
- Inform operational decisions;
- Control operations and ensure the efficient use of resources;
- Measure and report financial and non-financial performance to management and other stakeholders;
- Safeguard tangible and intangible assets;
- Implement corporate governance procedures, risk management and internal controls.

Drury (2001) defines management accounting as concerned with the provision of information to people within the organisation to help them make better decisions and improve the efficiency and effectiveness of existing operations. This has led to management accountants being called internal accountants. Management accountants are distinguished from the other branch of accounting, namely financial accounting. The purpose of financial accounting is to generate information for external use, whereas in management accounting is for internal use.

Based on the above information management accounting has the following key concepts: information, stakeholders and decision making. This shows that management accounting is the heart of the organisation. The future competitive advantage of organisations is dependent on the information that management accountants provide to managers for decision making.

Management accounting information refers to financial and non-financial information used within the organisation for decision making. The financial information includes product cost, departmental cost, cost of delivering service, cost of performing

activities and overheads costs. The cost information is measured against the budget on a monthly or daily basis. Management accountants also monitor non-financial information which includes production units, sales units, wastage, plant performance and strategic setting (Atkinson et al., 2004:3).

In order to generate meaningful information that can be used to develop a strategy, management accountants must have a wide understanding of the organisation. Management accountants should understand what other departments are doing as well as have an understanding of business models. They must be able to integrate business knowledge with financial performance i to provide proper financial analysis (Bhimani & Bromwich, 2010).

### **3.3 The role of management accountants in the organisation**

During the early 19th century the role of management accountants was perceived as scorekeeping and maintenance of financial records for internal and external use (Yazdifar & Tsamenyi, 2005). Bhimani and Bromwich (2010) argue that the role of management accountants has evolved from being bean counters to formulating cooperate strategy and designing management information systems. Similarly, Yazdifar and Tsamenyi (2005) argue that the role of the management accountant is perceived as business performance evaluation and business process evaluation. Management accountants must have analytical skills, business process knowledge and IT skills.

Management accountants play a pivotal role of being a business partner. They have developed into a new role from being traditional accountants. Management accountants provide decision support to management by sound financial analysis for making sound strategic decisions. Management accountants spend most of their time in financial planning, financial risk management, strategic formulation and financial analysis. Management accountants add value to the overall planning of the organisation. In order for management accountants to fulfil their role they must design an information system that will aid them in decision making and must integrate both financial and non-financial information (Bhimani & Bromwich, 2010).

Management accounting is also a support function within an organisation similar to IT. Management accountants are part of the management team within the

organisation; they only differ from other managers because they possess both financial knowledge and business knowledge. A lack of teamwork affects the role of management accountants as they obtain information from other line managers. Communication skills and team work is a prerequisite to perform the function of management accounting. The role of management accountants is constantly changing as they now have to be hybrid accountants possessing accounting as well as business skills (Mowen & Hansen, 2008).

Management accountants provide financial information that is integrated with production or service information to managers to help them make informed decision. Reporting can be done on a continuous basis or periodically. The periodic reports provide information such as profitability per segment, product, department and production lines. The reports assist managers in taking decisions on cost cutting or discontinuing certain production lines if they are not profitable. Information can also be required to allocate resources to a certain product mix or to a production line (Drury, 2001).

Periodic reports are required to make certain strategic decisions. Routing or continuous reports are prepared to measure the performance of the organisation on a daily or monthly basis. These are extracted from management accounting systems which measure daily production, expenditure and sales by product. Management accounting systems are control measures to managers within the organisation. Management accountants provide guidance to managers on how they are running their organisation. The information to be reported on is captured through the costing system. The accuracy of the costing system plays a major role in the decision making of product profitability and non-profitability. If the cost system does not capture the costs accurately enough, the consumption of resources by products will be distorted. This affects decision making and the future planning of the organisation (Drury, 2001).

Management accountants provide information for planning, control and performance measurement through the system developed. Planning involves translating the objectives and goals of the organisation into the activities and resources required to meet the goals and objectives of the organisation. In developing both short-term and long- term plans, management accounting plays an important role in the process.

Short-term objectives, in the form of a budget, are prepared in more detail than long-term objectives. The purpose or plan is used to measure organisational performance by managers within the organisation (Atkinson et al., 2004).

Managers must evaluate performance to make informed decisions on which direction the company must take. Management accountants provide economic feedback on how the organisation is spending the budget and they propose solutions on ways they can control costs within the organisation. Reports are used to measure organisational performance and also the performance of the individual and the team. The accuracy and the reliability of the information provided are important, as this can affect management in terms of decision making. The setting of targets on the plan must be realistic and reviewed regularly as some targets might be unrealistically high (Atkinson et al., 2004).

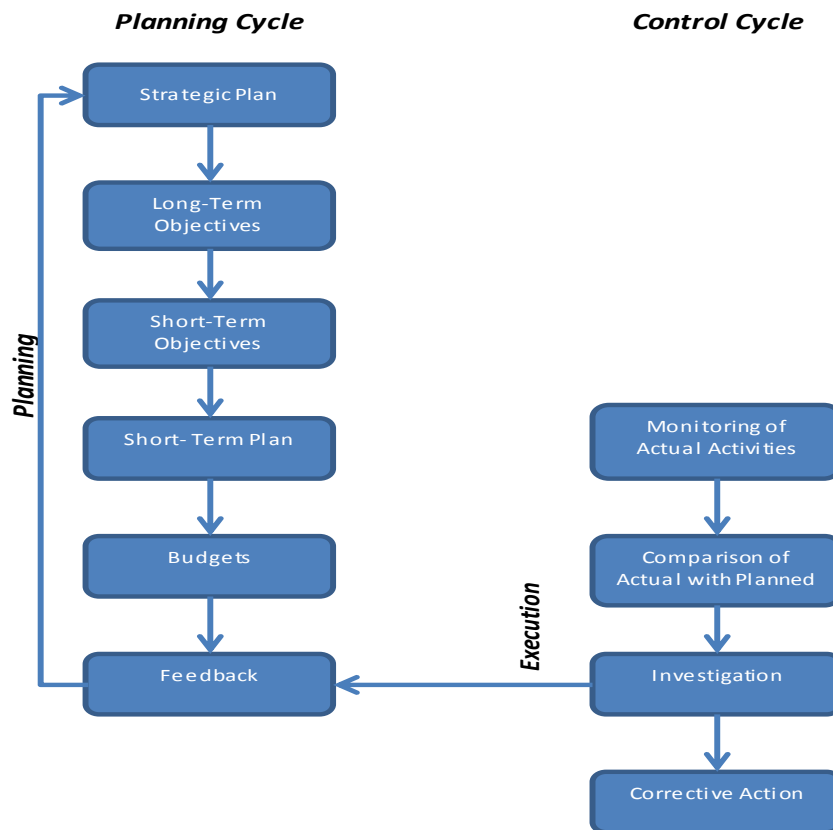
The information supplied to management for decision making is generated by using techniques, such as Budgeting, Capital Budgeting, Activity Based Costing (ABC) and standard costing. The basis of allocating has not changed much if costing in the past and costing today is compared. The major change is in management accounting systems because of technological advancement (Bhimani & Bromwich, 2010).

### **3.4 The importance of budgets in management accounting**

Mowen and Hansen (2008) define budgeting as the foundation of the management accounting control process in the organisation. Budgets are used for planning and control where they play an important and vital part. Planning is predicting the future to realise a particular goal. Control is looking at the actual results and comparing them with the plan to determine what actually happened (previously). The comparison can be used to adjust the budget and for future planning (Gowthorpe, 2008). Budgets are viewed as important within the organisation but they are not accurate, they are just an estimated plan on what might happen in the future (Mowen & Hansen, 2008).

The budget is a costing of the activities and resources of the strategic plan and can only be prepared after the organisation has developed a strategic plan (Gowthorpe, 2008). The strategic plan identifies future activities of the operations to be performed

over five years or longer (Atkinson et al., 2004). Figure 3.1 indicates the organisational planning, control and budget cycle.



**Figure 3.1 Planning, Control and Budgets**

**Source: Mowen & Hansen, 2008**

The implementation of budgets improves decision making within the organisation as the budget becomes a control measure (Gowthorpe, 2008). Budgets are also used as a tool to communicate the strategic plan across the organisation. The organisation can determine a budget by using various types of budgeting methods. This is entirely dependent on the policy of the organisation (Gowthorpe, 2008).

The organisation normally prepares its budget on an incremental basis. Incremental budgeting approach means that management accountants look at the current activities performed and use that performance as the basis for preparing the next year’s budget. The base is then adjusted, based on inflationary adjustment, volumes,

product mix and prices. This approach has been criticised as it assumes that the same expenditure and activities incurred in the last financial period will be incurred in the next financial plan cycle (Smith, 2007). The application of this budget type over one financial year can have the result that some activities are under budgeted due to changes in economic conditions. This approach results in less interrogation of the budget and may result in increasing inefficiency over several years (Gowthorpe, 2008).

The alternative to incremental budgeting is Zero Based Budgeting (ZBB). ZBB requires that managers must justify their budget allocation and ignore any previous activities performed. The activities are justified and prioritised before the budget can be allocated to each activity. The justification process consumes managers' time and it can be argued that they would have spent their time in producing products or services somewhere else. ZBB does not focus on the department like a traditional budgeting system but rather focuses on activities that the organisation performs. The ZBB assumes that projected expenditure of each programme must start from zero activities and is then identified as a new expenditure programme from scratch. The managers are required to present their programme so that funds can be allocated based on what the organisation identifies as a priority. The cost benefits approach is applied to ensure that the organisation obtains value for money when allocating resources to the department or activities (Smith, 2007).

As noted by Smith (2007) the use of ZBB has declined since 1970. The ZBB requires that managers must put more effort into producing information for budgeting purposes than the traditional budget system. The success of this management accounting technique is dependent on support from top management. This technique requires that management sets aside time to design decision making ranking and top management is not willing to do that because of the time required. This technique is being abandoned by top management because of time constraints. Organisations are using the ZBB approach, however, it tends to be a partial implementation rather than a full implementation. Yazdifar and Tsamenyi (2005) found that almost half of local authorities used a form of ZBB by using its principles to review the base estimates for each department. It has been acknowledged that it is as important to review existing activities as it is to review new activities.



Drury (2001) stated that to manage costs effectively, organisations have introduced the use of Activity Based Budgeting (ABB) to evaluate support activities. ABB analyses cost by activity and expense by categories. Each activity has an output as a measure. The output measure is known as a cost driver. The traditional budget system analyses each expense category by expenditure without looking at the cost driver or output. ABB provides management with expenses per category and also the output that each activity will produce. This is measured by the number of times each activity is produced. An ABB budget is presented by activity and output to management. This makes decision making easier as management is able to identify the activities that are important to the organisation and allocate resources accordingly (Drury, 2001).

### **3.5 The use of cost accounting systems by management accountants**

The main purpose of cost accounting systems was initially bookkeeping of costs and revenues, with the aim of meeting accounting requirements for inventory valuation (Glad & Becker, 1994: 2). It evolved into the sophisticated way of determining product costs and the accuracy of costed jobs, batches and orders (Glad & Becker, 1994). These developments were engineered by technical people running the operations, not by accountants. The accountants who were involved then were financial accountants. Costing used to be done on a daily basis by a large number of clerks (Bhimani & Bromwich, 2010).

The costing system was easy as companies used to manufacture single products with less technology. Costs used to be allocated to single products based on volume. Integration between cost accounts and financial accounting system did not exist. The administration cost was a small percentage of product cost as there were fewer people and less administration had to be performed. Factories started to produce a variety of products at the same time. This resulted in a complex costing system and technology was necessary to aid management to determine the cost of product. Factory overheads increased to accommodate these changes. To track production costs and overhead costs which had to be allocated to the products, different costing methodologies were developed (Gubata, 2008).

The accuracy of cost accounting information is critical as it determines the pricing policy and the profitability of the products. The cost of manufacturing the products can be classified as direct and indirect costs. Direct costs include both direct materials and labour costs. Indirect costs are those costs which are not directly identified with a unit of production (Bhimani & Bromwich, 2010).

The allocation of indirect costs, using traditional costing systems, results in cross subsidisation. This is due to the fact that high volume products attract more costs while products with low volumes attract less cost. Traditional costing systems allocate cost, based on volume. The under allocation of cost will result in an increase in demand for the product due to lower pricing. The over allocation of costs will decrease the demand of products and in the long run it affects the viability of products (Gupta & Galloway, 2003).

With a traditional costing method, costs are moved from a resource pool to a cost pool attached to manufacturing activities, by using the volumes as the costs allocation basis. Overhead costs are allocated to the products by using a predetermined overhead rate. The use of predetermined overhead rates takes fixed costs and converts them into a volume base. This distorts cost as the product with a high volume attracts high cost (Bhimani & Bromwich, 2010).

The traditional costing system is still used by many organisations when it comes to inventory valuation for the purpose of financial statements. This method is easy and not complicated to use. The changes in the way we do business have a huge impact on the use of traditional costing systems. The use of these systems can be misleading, as the way business is conducted has changed. The traditional costing system has been affected by changes in technology and there has been an increase in indirect costs. Companies started to change this costing system more than 20 years ago due to factory automation and the use of robotic machines. Traditional costing systems worked well when direct labour and direct costs were still the huge production costs. The increase in overhead costs, due to the reduction of manual labour, has had the result of this costing system becoming obsolete or non-existent (Manalo, 2004).

Management accountants rely on a costing system to generate information that can be used for decision making. Without a costing system the role of the management accountant is not effective (Drury, 2001).

The global economic conditions have forced companies to improve productivity by automating their manufacturing processes to improve efficiency and lower costs. This cannot be achieved with a costing system that cannot accurately allocate overhead costs to products. The alternative method to the traditional costing system is the Activity Based Costing (ABC) method. ABC allocates costs to a product by using activities and cost drivers. It is viewed as a better costing method by management accountants as it is activity-based rather than volume-based. The use of activities as a cost driver reduces the possibility of distorting overhead costs of the products (Akyol et al., 2005).

In an ABC method the total cost of the product equals the cost of the raw material and the cost of each activity performed to ensure that the product is manufactured. The activities are attached to the resources that were used by the company during the manufacturing process of the product. Each activity and its cost can be traced to the product. The product requires a variety of activities such as design, purchasing, distribution, packaging and engineering. The activity consumes resources, for example, inspection time of the quality manager. Cost drivers are often defined by activities such as labour hours, machine hours, number of orders and set-up time (Akyol et al., 2005).

In a traditional cost accounting system, the only costs that can be directly traced to the products are direct material and direct labour. The use of ABC assists the organisation in classifying activities into value-adding and non-value-adding activities. The activities that are non-value adding can be reviewed and possibly eliminated. This has a huge impact on improving efficiency and cost reduction. ABC provides the organisation with the facility to cost products accurately, but it requires additional time to obtain information on activities and cost drivers (Gupta & Galloway, 2003).

According to Manalo (2004), most companies have abandoned the use of a traditional costing system due to incompleteness and unprocessed products costs. The users of a traditional costing system say that data provided by the system does

not show a clear correlation between cost and cost objects. ABC has been developed to remedy this problem. The use of ABC presents better information on costs for decision making. The development of ABC does not replace the traditional costing system. ABC translates the expense category on the chart of accounts into a language that all people in the organisation can understand. ABC also provides flexibility on the cost elements. The traditional costing system is a management accounting tool that is used to collect costs into a cost pool but it cannot convert these costs into meaningful information. ABC is not good for processing business transactions but is good at converting costs into various activities that management can use in making decisions (Manalo, 2004).

According to Gowthorpe (2008), ABC is a costing system used in both the service and manufacturing industries and in both private and public sectors, which identifies overhead costs as closely as possible with the drivers of cost. The principle of ABC is that overhead costs must be identified as accurately as possible and linked to the products. Costs are driven by various activities within the business environment. ABC was developed to be used by a manufacturing company; however it is also being used by the service industry. ABC is a costing methodology developed to enhance the traditional costing system due to changes in business environment. Companies using ABC claim that it allocates cost better than the traditional costing system (Gowthorpe, 2008).

Manalo (2004) defines ABC as an accounting technique that allows the organisation to determine actual cost of product and service without looking at the company organisational structure. ABC categorises activities performed within the organisation into value adding activities and non-value adding activities. The value adding activities are those activities that customers are willing to pay for the products. These are activities that directly contribute into producing a product and a service. Non-value activities are those activities that create wastage within the organisation therefore, associated costs cannot be included as product costs. ABC eliminates unnecessary costs that the organisation can incur and reduces costs and improves efficiency (Manalo, 2004).

Akyol et al. (2005) defines ABC as a model that identifies the cost pools or activity centres in an organisation and assigns costs to the cost drivers based on the number

of each activity used. Cost drivers have a relationship with the activities and they occur at different levels. Akyol et al. (2005) identifies the following level in which the activities can occur:

- Unit level drivers which assume the increase of the inputs for every unit that is being produced;
- Batch level drivers which assume the variation of the inputs for every batch that is being produced;
- Product level drivers which assume the necessity of the inputs to support the production of each different type of product;
- Facility level drivers are the drivers which are related to the facility's manufacturing process.

Users of the ABC system will need to identify the activities which generate cost and then match the activities to the level bases used to assign costs to the products. While using the ABC system, the activities which generate cost must be determined and then should be matched to the level drivers used to assign costs to the products (Akyol et al., 2005).

ABC has been designed to identify activities and assign them to the cost object which can be a product. An activity could be, for example, a quality control function for inspecting the products. The resource involved could be labour hour or set up time. The resources are allocated to the cost object to determine the rate of the activities. The cost drivers are factors that influence the level of cost (Gowthorpe, 2008).

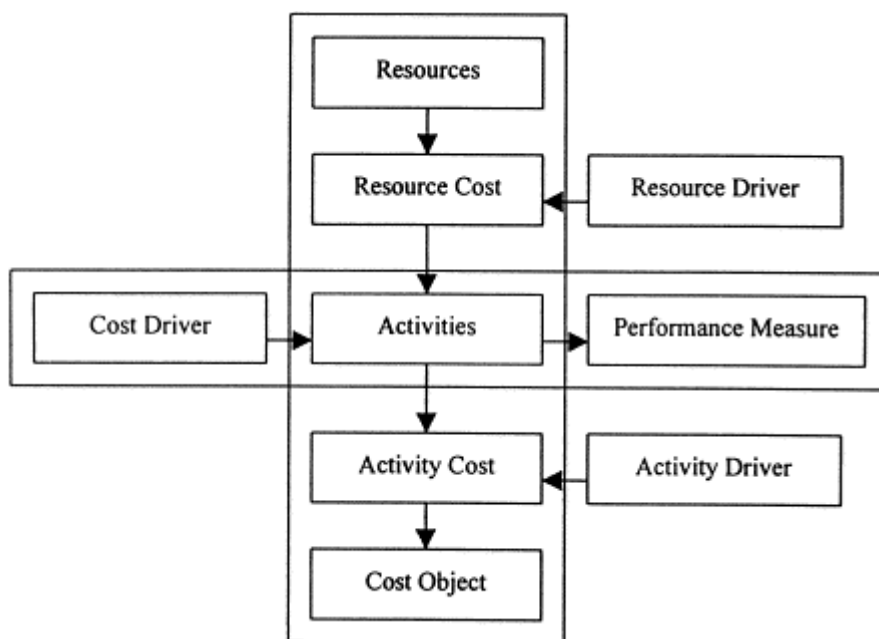
The method of cost allocation can either be job costing or process costing in the organisation. Drury (2008) defines job costing as a costing system that is required in organisations where each unit or batch of output of a product or service is unique. Atkinson et al. (2004) defines a process costing system as a method that computes and allocates an equal amount of cost to each product. ABC is unable to accumulate costs therefore ABC cannot replace these methods. ABC can only function if these traditional costing systems are implemented (Atkinson et al., 2004).

The implementation of ABC should not be based only on accurate costing and relevant decision making information. Management accountants have a

responsibility to ensure that top management understand why is it important to implement ABC. They need to challenge top management to review the use of the traditional costing system into the adoption of ABC (Atkinson et al., 2004).

The ABC model has two axes (Figure 3.2). The one axis deals with cost assignment. The cost has to be linked with activity and cost object. The activity is where the actual work is performed. The activity cost assignment process contains all the structure and tools to assign cost to the cost object, by using the cost drivers as the basis for allocating this cost (Turney, 1991).

The horizontal axis contains the process views. The cost driver is the basis of allocating cost to the activity. The horizontal view provides information about the organisation's performance and it assists management in monitoring the effectiveness and efficiency of the operation. The performance measure is important in providing information that can be used to make informed decisions (Turney, 1991).



**Figure 3.2 ABC model**

**Source: Turney, 1991**

Turney (1991) explained the ABC model is important in measuring the performance of an organisation. The model provides information so that management can take decisions on pricing, product mix, production, cost reduction and allocation of

resources. The model provides a clear relationship between resources, activities and performance measures. The resources flow to the activities and allocate cost to the cost object or production unit. The costs are traced to the product based on activity allocation. The performance measure is an indicator that defines how the organisation has achieved the output required during the performance of work through activities and resources allocated to the cost objects. ABC assists in measuring performance on activity, such as cycle time, productivity and customer satisfaction (Turney, 1991).

In order for the system to work properly, management accountants must ensure that they have proper technology in place to perform all these sophisticated calculations. The ABC system needs to be maintained like any other asset that the organisations have, to ensure that it functions properly.

### **3.6 Management accounting and the use of Information Technology**

Bhimani and Bromwich (2010) define technology as processes employed in producing output of goods and services and is an important determinant of costs and therefore of the value generated by goods and services. Management accountants have shown less understanding of technology since they have been concerned with cost allocation. If they have to be accepted as a business partner, there is a need for them to understand technology to function properly within the organisation. For management accountants to reflect a proper organisation cost structure, technology plays an important role in assisting with determining costs (Bhimani & Bromwich, 2010).

The implications of advanced technology are many within organisations and have emerged in many forms. Integrated IT (Internet, GroupWise and ERP systems) has increased the knowledge of using technologies within organisations. ERP systems like SAP, BAAN and Oracle have greatly simplified internal reporting in organisations. Management accountants spend most of their time in checking numbers for correctness rather than collecting data. The implementation of ERP systems has affected the role of management accountants as they are required to have a proper understanding of business process and IT knowledge (Granlund, 2011).

An ERP system integrates all databases into one database within the organisation; however management accountants are still using stand-alone systems; for example Excel to perform budgeting, ABC and reporting. ERP systems are only good for transaction processing rather than reporting and performing management accounting techniques like ABC and ZBB (Gabski et al., 2011). Grabski et al. (2011) further argue that ERP systems require specialised tools like a business warehouse in order to fully perform functions that management accountants perform. Without this specialised software, management accountants should continue to use a stand-alone system like Excel.

According to Grabski et al. (2011), the implementation of the Finance and Controlling (FI/CO) module of the SAP ERP system was largely unsuccessful in many organisations. Most of the work that was supposed to be done on the ERP system was done outside the ERP system, and there were errors in using the ERP system. The users were not properly trained to use the ERP system and new business processes. The successful implementation of the ERP system would have affected the role of management accountants that they became a strategic business partners (Grabski et al., 2011). Companies are now planning to upgrade into a new version of the ERP system to correct challenges that they encountered on their first implementation. The upgrade of the ERP system came at a heavy cost and there is a need to ensure that business value is realised on these new upgrades (Granlund, 2011).

### **3.7 Summary**

Management accountants provide both financial and non-financial information to management for decision making. The management accounting role is strategic in nature. The reports that management accountants produce assist management to formulate a strategic plan. The strategic plan is then translated into budgets by management accountants. Management accountants play the role of business analysts in ensuring that the ERP system is implemented correctly. Their involvement in implementing the ERP system is indispensable. The role is performed with the assistance of the management accounting system. The research RQ2 and the research objective RO2 was to investigate the role of management accountants within the Water Industry and this has been answered in this chapter.



Management accounting systems involve the use of ABC and traditional costing systems. Traditional costing systems are efficient in capturing costs to the cost objects whereas ABC costing allocates cost to various activities based on the cost drivers. Management accountants use these tools to derive the true cost of products. In order to improve efficiency ERP systems are used to perform these functions.

In Chapter 4, ERP system implementation applications and frameworks are investigated. The challenges experienced by management accountants are empirically evaluated and an ERP system implementation framework is proposed for the Water Industry (Chapter 4).

## Chapter 4

### ERP Implementation Applications and Framework

#### 4.1 Introduction

In Chapter 3, a literature summary was conducted to explain the role of management accountants and the impact of ERP systems on their work. This was done by taking into account management accounting techniques. In this chapter the research question RQ4 will be investigated “*What is the importance of the ERP systems and their impact on management accountants?*” Research objective RO4 will be addressed, which is to explain the importance of the application of ERP systems and their impact on management accountants.

The research question RQ3 will also be investigated namely; “*What are the problems experienced in the Water Industry regarding the implementation of ERP systems?*” Research objective RO3: *To identify problems experienced by management accountants during the implementation of ERP systems, will be empirically evaluated.* The chapter will also address the research question RQ5 “*Can an ERP system implementation framework be developed for the Water Industry?*” and research objective RO5 which is to develop an ERP systems implementation framework for the Water Industry.

The use of ERP systems in organisations has contributed to improving efficiency and productivity (Dowlatshani, 2005). ERP systems are more users friendly when compared with most legacy systems. Manufacturing companies rely on ERP systems for their manufacturing processes and applications throughout their enterprises. An ERP system can handle the ordering process from requisition until the disposal of assets (Dowlatshani, 2005).

Several definitions of ERP systems have been made and the benefits of implementing ERP systems identified (Section 4.2). The critical success factors of implementing ERP systems are evaluated (Section 4.3). The phases of ERP system implementation using the Accelerated System Application (ASAP) methodology will be evaluated (Section 4.4). The ERP system implementation framework will be discussed and the steps will be outlined (Section 4.5). The Challenges that

management accountants experienced during and after the implementation of ERP system will be empirically evaluated (Section 4.6). The proposed ERP system implementation framework to be used by management accountants when implementing and after implementing the ERP system is discussed and explained (Section 4.7).

## **4.2 Benefits of ERP systems**

Ngai et al. (2008) refer to ERP systems as a generic term for a broad set of activities supported by multi-module application software that helps organisations to manage their resources. ERP systems are perceived to be the driver behind improvements in efficiency, productivity and service quality, reduction of cost and improvement in decision making.

Fui-Hoon Nah and Delgado (2006) define ERP systems as software packages that enable companies to integrate their business processes and all information relevant to their organisations. ERP systems standardise business processes across the organisation and they also assist in ensuring that management receives real time data in financial and production information. ERP systems such as SAP are complex to implement and they often result in changes to companies' internal processes.

The implementation of an ERP system forces an organisation to embark on Business Process Re-engineering (BPR). In an ERP system business processes are mapped according to best practices. A business process can be defined as a collection of related, structured activities to produces a service or product (Pycraft et al., 2010:12)

Pycraft et al. (2010:559) define BPR as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. The BPR approach assists the organisation to improve process and customer service. The views of customers must be taken into consideration to ensure that the system satisfies them. Processed views are required to remove the problem and focus on activity.

The use of ERP systems has gained some popularity amongst large organisations. For instance, SAP, the ERP system with the largest market share is used by 60% of

multinational national corporations and even small and medium size companies are now using ERP systems (O'Leary, 2004).

The key benefit of an ERP system is integration. System integration is bringing together all the subsystems into one system and ensuring that a single system is used to cater for all financial and non-financial information for the organisation (Pycraft et al., 2010). An ERP system can improve company profitability through cost reduction across the various departments. This is done by the centralisation of certain functions. An ERP system replaces separate databases with one central database where information is stored and controlled. Information can only be entered once and replicated to other modules within the ERP system. The integration happens within the organisation and also with external clients. Customers are able to place an order remotely without filling in forms. An ERP system is an ideal application to improve cooperation amongst departments and employees as well as to improve communication with customers (Granlund, 2011).

An ERP system provides an organisation with the technology that improves efficient and effective use of resources. The software has resulted in improved decision making by managers due to the fact that information is generated quickly and in real-time. The implementation of an ERP system reduces and replaces manual processes with automated processes which improve speed and delivery within the organisation. Organisations that have implemented ERP systems have an improved customer service as their processes have improved (Al-Fawaz et al., 2008).

Rom and Rohde (2006) argue that ERP systems are good for transaction processing but less effective with regard to reporting and decision making. However, after implementing an ERP system, financial statements are better and they show assets more effectively. The data can be exported to other reporting tools such as Business Intelligence (BI) to assist ERP systems in generating complex reporting.

Despite the potential benefits, the implementation of ERP systems is complex and many adopters have not realised the full benefits (Rom & Rohde, 2006). The high failure rate in the implementation of ERP systems requires a better understanding of business processes. In order for the company to realise the benefits of implementing an ERP system, critical success factors must be identified and correct measures must be in place.

### 4.3 Critical success factors of implementing ERP systems

According to Muscatello and Chen (2008) organisations must ensure that they do not bring in complex IT and business processes when implementing ERP systems. They must embark on business process re-engineering to ensure the use of best practices during the automation of business processes.

In order to implement an ERP system successfully the organisation must attempt to know the critical success factors (CSFs) up front beforehand. The identification of CSFs helps the organisation to do proper planning before it can acquire and implement ERP systems. Many studies have tried to identify the CSFs in order to reduce the risk of failure of ERP systems. Ngai et al. (2008) define the CSFs as a list of areas that need to be addressed in order to gain competitive performance of a department or organisation. CSFs help organisations to identify process issues before the implementation of an ERP system. The understanding of CSFs gives organisation guidance on what to do in order to ensure that the system is implemented successfully (Umble et al., 2003).

The implementation of an ERP system can be complicated and expensive. According to Umble et al. (2003) 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems. It is important to examine these factors in detail to ensure the successful implementation of ERP systems. Several authors identify a list of CSFs to be considered when implementing ERP systems (Ngai et al., 2008). The frequently identified CSFs are discussed below.

*Top management support.* The ERP system should be driven by top management in order to ensure that the project is a success. Top management should provide leadership and the resources required to implement the project. The ERP system implementation project affects different groups within the organisation and top management must mediate between interested groups to resolve misunderstandings (Gyampah, 2005). The involvement of top management in the project is regarded as a CSF in the implementation of an ERP system. Al-Fawaz et al. (2008) argue that the role of top management does not end with the introduction of the project but it must be extended throughout the project. Top management must monitor the

progress of the project and ensure that necessary decisions are taken to ensure that the project is a success (Ngai et al., 2008).

*Business plans and vision.* The implementation of an ERP system should be to support the business plan and the vision of the organisation (Bhagwani, 2009). The business plan and vision of the project must be developed before the project can be implemented. This provides management and the stakeholders with the clear direction during the implementation process. The project initiation should always start with the conceptualisation of a goal and how the goal can be achieved (Galani et al., 2010). The goal should be properly outlined and operationalised. The biggest challenge that the project manager can encounter is not from the implementation itself, but from the management of expectations from top management, the senior manager and other stakeholders. A clear goal must be developed and communicated before the project can start (Umble et al., 2003).

*The re-engineering of business processes.* This is a critical factor that needs to be taken into account when implementing an ERP system (Ngai et al., 2008). The adopter of an ERP system should select software that should be able to fit with the organisation's business processes. A gap analysis must be performed to ensure that the ERP system being selected has the least gaps when compared with business processes of the organisation. Selecting the software with the least gaps reduces the risk of customisation and implementation failure. There might be a need of business processes re-engineering to ensure that business fits well with the system. BPR requires that employees must be trained in the new processes (Elmezziane et al., 2011).

*Effective project management and project champion.* The implementation of an ERP system requires the execution of various activities and the organisation should have project management strategies to manage the implementation process. The responsibility to manage the project should be clearly assigned. This must be done to ensure that there is accountability. The project scope should also be clearly defined and controlled. Any changes to the project should be approved by senior management and changes to the scope of the project should be evaluated, based on project cost and time. The evaluation of changes of scope ensures that the project is

controllable to avoid increases in cost and avoid extending the go live date (Ngai et al., 2008).

*Teams work and composition.* The ERP team should involve people who understand the organisation and who have the technical knowledge of the job (Gyampah, 2005). The success of the project is dependent on the skills of the project team and the project manager. The team should not only consist of people with technology skills only, but also people who have an understanding of the organisation's business processes. An ERP system involves all functional departments. It is important to have cooperation between the technical expert and the end-users to ensure success. There should be trust between the implementation partner and the project management team. There is number of project activities performed and these activities involve technical people and functional people so it is important for a project team to coordinate these activities (Galani et al., 2010).

*ERP systems selection.* The process of selecting a suitable ERP system is challenging and time consuming. Ngai et al. (2008) stated that there is no single ERP system that can provide all functionality required by business. There are various ERP systems in the market that offer similar functionality but they differ in their design. These packages include SAP, Oracle, JD Edwards and BAAN (Umble et al., 2003). The organisation must select the best ERP system that will provide flexibility and that has the closest fit with the business processes. The system should be user friendly and easy to implement. The organisational fit of the ERP system minimises the risk of customisation (Galani et al., 2010).

*User involvement.* User involvement is critical in ensuring that requirements are implemented and tested accordingly. Involvement by the users of the system assists in ensuring that users accept the system and they are also able to use the system. According to Al-Fawaz et al. (2008) there are two areas of user involvement when a company decides to implement an ERP system: user involvement in the stage of definition of the organisation's ERP system needs, and when users participate in the implementation of ERP system.

*Education and training.* Education and training is important to the user of the system since an ERP system is not easy to use even if the user has IT skills. Al-Fawaz et al. (2008) argue that education and training can assist to increase success for ERP

system implementation. However, lack of education may lead to ERP implementation failure. The main reason for training is to increase knowledge and awareness on use of the system (Elmeziane et al., 2011).

*Data integrity.* The availability of data and data integrity are the important factors of CSFs as system functionality is dependent on data. If data is not properly cleansed, this can affect the success of the project. Information should be verified before it can be converted to the new ERP system. This can be a difficult exercise as data comes from different sources (Umble et al., 2003).

#### **4.4 Phases of ERP systems implementation**

Panorama Consulting Group (2011) compiled an independent report of the ERP system market. They identify the top three ERP systems as; SAP with 24%, Oracle 18% and Microsoft dynamics 11% of the market share. SAP and Oracle compete in small, medium and large companies. The popularity of SAP is with companies with \$25 million and \$500 million revenues (Panorama Consulting Group, 2011).

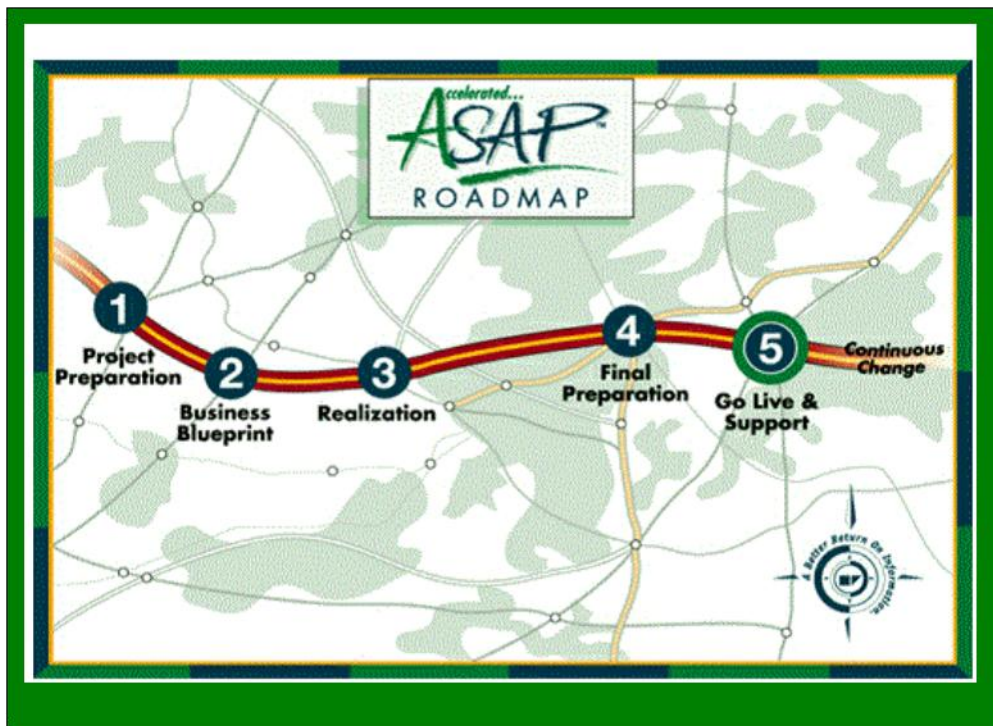
SAP has 75% of the market share of large companies. There have been several studies performed on implementations of SAP using the ASAP methodology. The study of ASAP methodology covers all other methodologies used when implementing the ERP systems (Business Science Reference, 2011). The ASAP methodology ensures the successful implementation of the SAP system by providing a standardised project plan and reporting tools.

ERP system vendors have developed methodologies for implementing an ERP system and these methodologies are similar to each other. Accelerated SAP (ASAP), Implex from Intetia and JD Edwards are examples (Business Science Reference, 2011). The most popular methodology is ASAP (Figure 4.1). The ASAP methodology focuses on actual system implementation and business processes.

The following benefits can be achieved using the ASAP methodology (Granlund, 2011):

- Higher degree of skill transfer;
- Less reliance on external support after Go live and Support;
- Potential cost reduction due to reduced external consulting time and cost;





**Figure 4.1 ASAP implementation methodology**

**Source: SAP AG, 1999**

The methodology has five steps that make the implementation easier through the road map. The road map has a single road that needs to be followed sequentially.

#### *4.4.1 Project Preparation*

The first step in a project is to plan for the route and reach agreement with all the stakeholders, in the project preparation phase. The output of this process is the project charter, establishment of steering committees, detailed project plan, a resource plan, which includes the people and infrastructure required to ensure a successful journey (Grenci & Hull, 2005).

The project charter is drawn with input from business, implementation team members and the focus group. The charter serves as an agreement between the implementer and the project sponsor. It governs the route to be followed during the implementation journey (Grenci & Hull, 2005). According to Grenci and Hull (2005) the ASAP method is similar to the Bancroft model. The first step in the model is the focus step, which is the same as the project preparation phase. The key activities identified in the first phase of the ASAP methodology are the same activities in the

focus step. After the project plan has been finalised, the organisation must provide its detailed requirements to the project implementer. This is the business blueprint.

#### *4.4.2 Business Blueprint*

During the blueprint phase, business requirements are gathered through different workshops with customers. The capabilities of the system are known by the customer and the business requirements are gathered with existing business processes that the customers are using. This exercise requires that the implementer spends most of his/her time understanding customer requirements. The blueprint is used as a foundation into which the system must be configured (O’Leary, 2004).

The existing business processes are reviewed and redesigned where possible. The complexity of the business processes is dealt with in this phase to ensure that best practices are adopted. An ERP system can reduce the complexity of business processes in the following ways (Fitz-Gerald & Carroll, 2003):

- solving maintenance problems associated with aging legacy systems;
- presenting one face to the customer;
- facilitating better business intelligence on finished goods inventory or planned production capacity “available to promise” to the customer on a regional or global basis;
- Reducing complexity of intricate transactions that involve multiple system platforms across a single business unit, multiple sites, and multiple business units.

The successful execution of the blueprint triggers the mapping of business processes to the ERP systems. The completion of the blueprint phase evolves to the realisation stage where the system is configured.

#### *4.4.3 Realisation*

The primary objective of the realisation phase is to build a fully tested ERP system to be implemented in the next phase. The realisation is a single longest running phase during the implementation. The blueprint developed according to business requirements is used to configure the system. The developed system has to be tested by looking at the end to end business processes. The integration of testing

with other modules is looked at. During this phase, the team involved should have extensive experience to ensure successful development of the system. This ensures that the implemented system contains no bugs and is able to be deployed to production successfully (O'Leary, 2004).

#### *4.4.4 Final Preparation*

During the final preparation, a final user acceptance test is performed to ensure that the ERP system is ready for production. The major activity in this phase is proper training the end- user. Users are trained to ensure that they are able to use the system effectively. On completion of this phase, the go live date is near (Fitz-Gerald & Carroll, 2003).

#### *4.4.5 Go Live and Support*

This stage allows an organisation to move from the pre-production environment to a production environment. In this phase all relevant stakeholders have received training and the project sponsor confirms that the system has been configured, based on the requirements of the blueprint. The day of go live has to be decided (Fitz-Gerald & Carroll, 2003).

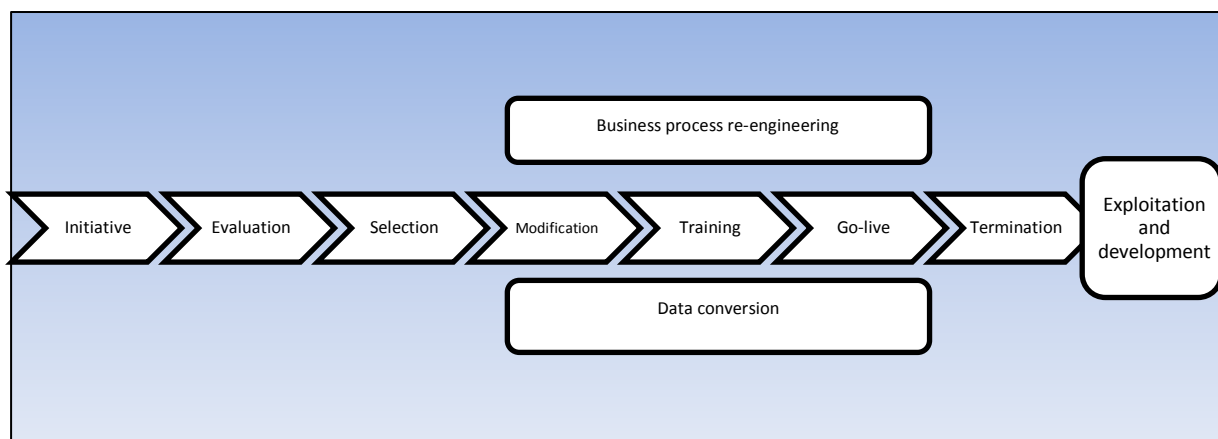
#### *4.4.6 Conclusion*

The above framework is recommended by the majority of the ERP system vendors as a phased approach towards implementing the ERP system (Grunlund, 2011). The methodology does not take into account the complexity of some of the modules that integrate all other modules like FI/CO. FI/CO modules are used by management accountants to provide management with financial information for decision making purposes. Grunlund (2011), states that there is high failure rate in implementing the FI/CO modules of ERP systems due to the lack of a framework to be followed during the implementation of ERP systems. Although the ASAP phases are important when it comes to FI/CO a new framework needs to be developed to reduce the risk of implementation failure (Grunlund, 2011).

### **4.5 ERP system implementation frameworks**

Frameworks for implementing an ERP system have various stages, depending on the ERP system vendor chosen (Makipaa, 2003). According to Makipaa (2003) the

framework describes the amount of preparative work to be done before the system is in use and the crippling effect of the system when it is implemented for the first time. The framework developed by Makipaa (2003) is viewed as an accurate framework when compared with other frameworks. This is due to the fact that the framework has various components that are critical to ensure a successful ERP implementation. The Makipaa (2003) framework has eight plus two stages and presents alternative implementation paths. The framework shows an ERP systems implementation as on-going activities. The framework is generic for implementing any ERP system and the respective modules (Figure 4.2).



**Figure 4.2 ERP system implementation framework**

**Source: Makipaa, 2003**

The Makipaa (2003) framework illustrates the implementation alternative that an organisation can choose when implementing the ERP system. The rollout of an ERP system can be ‘big bang’, incremental or the phased approach. The choice is clearly defined by the framework for implementing the ERP system. The evaluation stage is a process to investigate the ERP vendors available in the market and the requirements of an ERP system within the organisation. The selection of the ERP system is done after considering the price, availability of the system, compatibility of the organisation’s business requirements with the ERP system. The large organisation selects an ERP system based on compatibility and the flexibility of the software. The selection stage is critical as it contributes to business processes re-engineering if the business processes are not compatible with the ERP system (Makipaa, 2003).

The selection of the ERP system triggers the modification of the system to suit business requirements and users must be properly trained in the usage of the

system. Modification can be coded on the software itself, which is costly, or through customisation of the ERP system (Makipaa, 2003). The framework developed includes the choice of process customisation. The interface with other systems can also be made at this stage or later on when the need arises. The data from the legacy system must be cleansed and transferred to the ERP database in order to continue to operate business with it. The business processes' re-engineering needs to be completed, so that the new system uses the new business processes. The changes in business processes require training for the users so that they can be able to use the new system (Makipaa, 2003).

The performance of the ERP system consultant is measured by the number of end-users who are able to use the system without any assistance. According to O'Leary (2004) the big bang approach resulted in a higher level of user satisfaction than the phased implementation in a study of 35 European companies. The framework ended with the termination of tasks performed during the implementation of ERP system (O'Leary, 2004).

Gyampah (2005) found no complete implementations in the study of nearly 200 companies. ERP functions are implemented as a continuous process. The Financial and Controlling module of the ERP system has been implemented, but organisations are continually re-implementing or upgrading the module to enhance their financial reporting facilities. This has resulted in the existence of role of project manager after the implementation of the modules. The personnel who are tasked with the configurations of the system continue with their work although their expertise is needed in other areas. Exploitation and development involves everything, other than daily use (Gyampah, 2005). It includes, for example, maintenance, adaptation of new modules, training new users and developing new ways to utilise the ERP system (O'Leary, 2004).

#### **4.6 Current problems experienced by management accountants during or after the implementation of ERP systems in the Water Industry**

The Water Industry like other industries is faced with challenges relating to the implementation of ERP systems. One of the functions affected by the challenges is the management accounting role which is strategic to the organisation.

A preliminary study was conducted to identify the main ERP systems challenges currently being experienced at the Water Industry in South Africa. This was achieved by means of handing out an open-ended questionnaire (Annexure 1) to the Management Accountants, Financial Manager, Financial Analyst and Chief Financial Officer at the Water Industry.

The preliminary study questionnaire (Annexure 1) contains questions to identify the main challenges faced by management accountants in an ERP systems' environment. These questions are obtained from the literature presented in Chapter 3 and Chapter 4. The questionnaire makes provision for the respondent to express general problems that may be experienced with the ERP systems environment.

The aim of this Section is to identify the current problems that management accountants experienced on the use of ERP systems within the Water Industry. The open-ended questions in the questionnaire (Annexure 1) included the ERP systems critical success factors (Chapter 4) and the role of management accountants (Chapter 3). The questionnaire was distributed to a small sample (n=14) within the WTE, TCTA and Rand Water. The above entities are using SAP as their ERP system. A summary of the problems is provided (Table 4.1).

Management accountants in the Water Industry require management information to improve the management decision-making process. The preliminary survey shows eleven (P1-P11) problems that management accountants experience during and after the implementation of ERP systems.

Problem	Main Problems	Percentage agree (n=14)	Category
P1	Lack of integration between an ERP system and management accounting techniques	100%	Integration
P2	There are other systems used with separate databases over and above the ERP system	93%	Inter-phase
P3	There is a lack of reporting capabilities in the ERP system	93%	Performance
P4	There is a lack of an ERP strategic plan and top management involvement	86%	Strategic plan and top management involvement
P5	There is a lack of understanding of business processes	79%	Business process
P6	The data is not properly cleansed	71%	Data quality
P7	The ERP system is configured according to business requirements without looking at the best practices.	64%	Customisation
P8	The role of management accountants is not reviewed after ERP system implementation	57%	The role of management accountants
P9	There is a lack of training of management accountants on how to use a new ERP system	50%	Training
P10	Lack of involvement on ERP system testing	43%	Testing
P11	The ERP system doesn't meet user requirements	36%	User requirements

**Table 4.1 ERP challenges experienced by management accountants within the Water Industry.**

One hundred percent of respondents identified that there is a lack of integration between the ERP system and management accounting techniques. The respondents indicated that management accountants are still performing their activities, such as budgeting and costing outside the ERP system and then upload this into the ERP system. It is time-consuming to upload the information, generated from stand-alone system to ERP systems and this has an impact on the time that management accountants spend analysing information or adding value within the organisation. Although business requirements are mapped properly, the implementer tends to focus on transactional processing of ERP systems rather than on management accounting tools.

A total of 93% of respondents identified that the Water Industry uses other systems besides the ERP system. This affects the main objective and the benefits of implementing the ERP system.

A majority of respondents (93%) identified that ERP systems are not efficient at reporting. The respondents mentioned that they extract information from the ERP

system and use other tools to report information. In the Water Industry, several management accountants prepare their reports on an Excel spread sheet. The use of other systems to prepare management reports resulted in delays in reporting financial and non-financial information to management and this has an impact on decision making.

A total of 86% of respondents identified that there is a lack of ERP strategic planning and top management involvement regarding the implementation of the ERP system. In the absence of a strategy it is difficult for top management to monitor the progress of the project and the goals that need to be achieved. The project timelines are not met by the project team and these results in the budget of the project being exhausted. The project timelines are extended beyond the initial project plans. This increases the costs of implementing ERP systems. Even though the project team plans to implement the project within the specific period, there is always a reason to extend the initial plan as there is no monitoring mechanism (Grabski et al., 2011).

If the project is not managed by senior management there is normally resistance within the organisation and change management is also a challenge. The implementation is viewed as less important as people who are managing the projects have less authority. When there are challenges, decisions are needed and it takes longer to make them as people who are involved cannot make strategic decisions (Grabski et al., 2011).

A total of 79% of respondents identified that there is lack of understanding of business processes amongst the implementation team. Only the business analysts, involved in the implementation of ERP systems, understand the system and they do not have proper business knowledge. Although requirements are gathered from people with business knowledge, it is difficult to translate the business processes into the system if the business people are not fully involved. The respondents further explained that the business processes are found to be incompatible with the ERP system and as a result the ERP system is customised to meet the business needs. The ERP is not implemented based on best practices. The management accounting techniques like budgets and ABC are not considered as people involved concentrate on cost centre reporting.



The data is converted from the legacy systems without cleansing to suit the new system. A total of 71% respondents identified that less time is spent on cleansing master data. The credibility of the data being migrated on the ERP system is poor as more time is spent on configuring the system than in cleansing master data. The cost structure and chart of accounts is migrated, as it is, from the legacy system. According to the respondents, the Water Industry has challenges with customer information and as a result customers are being billed incorrectly. This affects the financial information to be presented to management for decision making. The job of management accountants becomes that of a data collector rather than that of transactional analysis. The benefits of implementing ERP systems have been affected by the credibility of information that is being migrated to the ERP systems.

A total of 64% of respondents identified that the ERP system implemented, has been highly customised. The respondents further explained that the Water Industry implements their business processes as they are in the ERP system instead of using best practices. The customisation of the system exposes the organisation to a risk. The Water Industry spends money in maintaining these customisations.

A total of 57% of respondents identified that the role of management accountants is not reviewed after the implementation of ERP systems. The implementation of the ERP system has affected the role of management accountants as the ERP system transfers financial knowledge to non-accountants. The respondents further agreed that their role is more of an analyst than that of performing an information gathering function.

A total of 50% of respondents identified that there is a lack of user training in the ERP system environment. The training is not adequate for the end- users. The users struggle to use the ERP system after receiving training. Half of the respondents disagree with the lack of training. The respondents stated that the adequacy of training is supported by proper change management. If change control is not properly executed, people are reluctant to use the ERP system.

A total of 43% of the respondents identified lack of testing the system as a challenge. Management accountants have insufficient time to test the system. The testing of the system is performed after the configuration which gives the organisation less time to validate the configurations. Majority of the respondents believe that they are involved

in testing the ERP system. The effectiveness of testing is also determined by the knowledge that the testing team has in terms of the business and ERP system knowledge.

A total of 36% of respondents identifies that ERP system does not often meet user requirements. The ERP system requires that user requirements be changed to the best practices. The requirements of users are no longer important. Most of the respondents agreed that ERP system meets user requirements, however if the implementing team does not fully understand business requirements, it results in ERP system customisation.

In order to address the challenges that management accountants experience during and after the implementation of an ERP system, the development of an ERP system implementation framework is needed (Section 4.7).

#### **4.7 Development of the ERP systems implementation framework**

The ideal framework that will assist in ensuring that the system implemented is fully utilised, needs to be developed. The framework should focus on improving the implementation of the FI/CO module within the Water Industry. The Water Industry has also been affected by the failure of implementation of the FI/CO modules. They have been constantly upgrading the functionality and the version of ERP system modules to improve their reporting capabilities.

An ERP system implementation framework is defined as activities to be performed before the ERP system can be functional and identifies the crippling effects to be considered to ensure the success of the system (Makipaa, 2003). The phases of ERP systems implementation are guidelines to be followed when implementing an ERP system in any organisation. Although the methodology and the generic ERP system framework can be followed, there are several CSFs for ERP system implementation (Section 4.3). The CSFs assist the organisation to plan upfront before the ERP system can be acquired (Muscatello and Chen, 2008). The Water Industry experienced several problems during and after the implementation of the ERP system (Table 4.1). As the organisational business processes become more complex, more sophisticated ERP system implementation frameworks and control policies are needed to solve the ERP's system implementation problems. These

problems (P1-P11) are experienced by management accountants during and after the implementation of an ERP system.

#### *4.7.1 ERP system business plan and vision*

The 4<sup>th</sup> problem identified by the preliminary study was the lack of ERP strategic plan and vision (Problem 4 Table 4.1). A business plan must be developed before any attempt is made to implement an ERP system (Section 4.3.2). The goal that the ERP system wants to achieve must be outlined upfront and endorsed by top management. This becomes a measuring tool that management can use to monitor and track the progress of an ERP system implementation.

The ERP system strategy should outline the benefits that organisation will derive from the implementation of the ERP system. The benefits that accrue to an organisation that embarks on implementing an ERP system are many one, of which is integration (Section 4.2). The strategic plan will outline the ERP system that will assist the organisation to integrate all the other standalone systems used. Without the strategic plan, the implementation will cost the organisation money (O'Leary, 2004). The plan should address the ERP methodology to be followed when implementing the system. The resources required and the timeframes of implementing an ERP system are outlined in the ERP strategic plan.

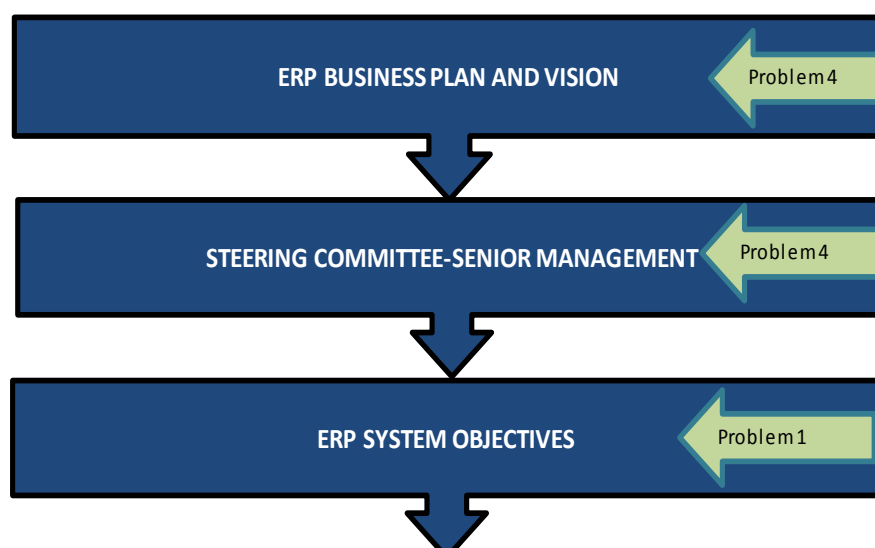
#### *4.7.2 Steering committee- senior management*

The absence of an ERP system governance structure has been identified as one of the key problems. The non-involvement of top management in the ERP system governance structure has been identified as part of the problem that management accountant experienced (Problem 4). This aspect has been defined in the project preparation phase of the ASAP methodology. The steering committee manages the project at the strategic levels. The project team reports to the steering committee on project issues and the changes required. Top management support has been identified (Section 4.3) as a CSF in the ERP system implementations. The successful implementation of an ERP system is dependent on the involvement of senior management at a strategic level. Management should therefore be part of the ERP system implementation (Al-Fawaz et al., 2008).

### 4.7.3 ERP systems objectives

The lack of integration of the ERP system with other systems has been identified as Problem 1 on the preliminary study. The preliminary study identifies that, although the ERP is implemented to integrate systems into one database, this objective is not met within the Water Industry. Management should set clear objectives before they can implement the ERP system (Section 4.2). The objectives of implementing an ERP system are improving operational efficiency and reduction of cost of doing business. Management must define their objectives for implementing an ERP system and be able to measure the progress (Granlund, 2011).

Management accountants provide information to management to improve the decision making within the organisation. The ERP system model includes comprehensive objectives on information and the integration with other modules to be supplied to management (Yazdifar & Tsamenyi, 2005). The importance of management information has been identified (Section 3.2). The information is used to develop a strategic plan and also to make strategic decisions. It is important for business to develop clear objectives before and after the implementation of the ERP systems. Management should develop an ERP system business plan that outline short and long term objectives to be achieved. The next step is involvement of senior management in the steering committee to take decisions. The ERP system business plan and vision block have been placed as a priority before the steering committee in the framework (Figure 4.3), as the business plan will guide senior management on the ERP system strategy and objectives.



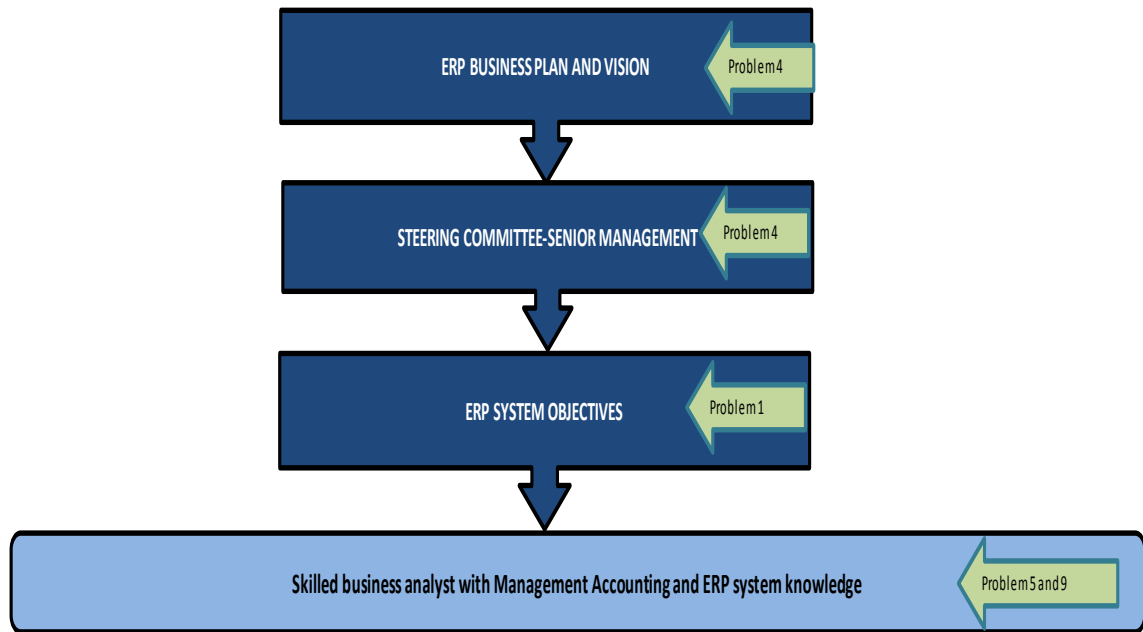
## **Figure 4.3 Development of ERP implementation framework at strategic level**

**Source: Authors own construction**

### *4.7.4 Skilled business analyst(s) with management accounting and ERP system knowledge*

Lack of understanding of the business process has been categorised as Problem 5. The ERP system framework requires that a person who documents business processes must have both business knowledge and ERP system knowledge. The organisation must nominate a person with extensive internal business skills who will be trained on how to use the ERP system. This will ensure that the configuration of the system matches the business processes of the organisation. The management accountants should be involved in the implementation of the ERP system as they are most likely to represent business needs when it comes to reporting both financial and non-financial information (Ngai et al., 2008).

Lack of proper training has been identified as Problem 9. The implementation of the system requires that the organisation must re-engineer the current business processes. The users of the system must be trained on how the new business processes will work before they can even be trained on how to do transactions on the ERP system. Management accountants should have both system knowledge as well as business knowledge to ensure the success of the ERP system implementation (Bhimani & Bromwich, 2010). The involvement of management has been identified as one of the critical success factors of implementing an ERP system (Section 4.3). The business analyst block, is below the ERP system objectives, to ensure that the business processes are in accordance with the ERP system implementation objectives outlined by senior management (Figure 4.4).



**Figure 4.4 Development of ERP implementation framework at strategic level**

**Source: Authors own construction**

#### 4.7.5 Master data management

Data cleansing forms the backbone of any ERP implementation system. The model should comprehensively cover the steps that must be followed to ensure that data from the legacy system is cleansed and is ready to be migrated into the ERP system. This challenge has been identified and is categorised as Problem 6. The cleansing of data should go hand in hand with business process mapping and re-engineering. This is to ensure that any information identified by the process is cleansed to ensure that it is ready for migration to the ERP systems. The generic ERP implementation model (Figure 4.2), deals with data conversion without looking at the quality of data.

#### 4.7.6 Controlling and reporting

Another major problem identified by the preliminary study was Problem 3, which is a lack of reporting capabilities. The role of management accountants is to provide financial reporting and non-financial reporting (Drury, 2001). The other element of management accounting is cost allocation (Section 3.7). Management accounting uses techniques like ABC in cost allocation or traditional costing systems. The ERP is not used to perform these techniques (Gowthorpe, 2008).

A framework should comprehensively cover the end to end processes of management accounting (Gowthorpe, 2008). The business process and the business requirements should include the cost allocation. The FI/CO modules should be configured to handle ABC to avoid the use of other systems by management accountants. This should be the first priority during the gathering of business requirements. ERP systems should be able to handle the budget of the organisation by other means than using a spread-sheet and other software that does not integrate with the ERP system (Section 4.6).

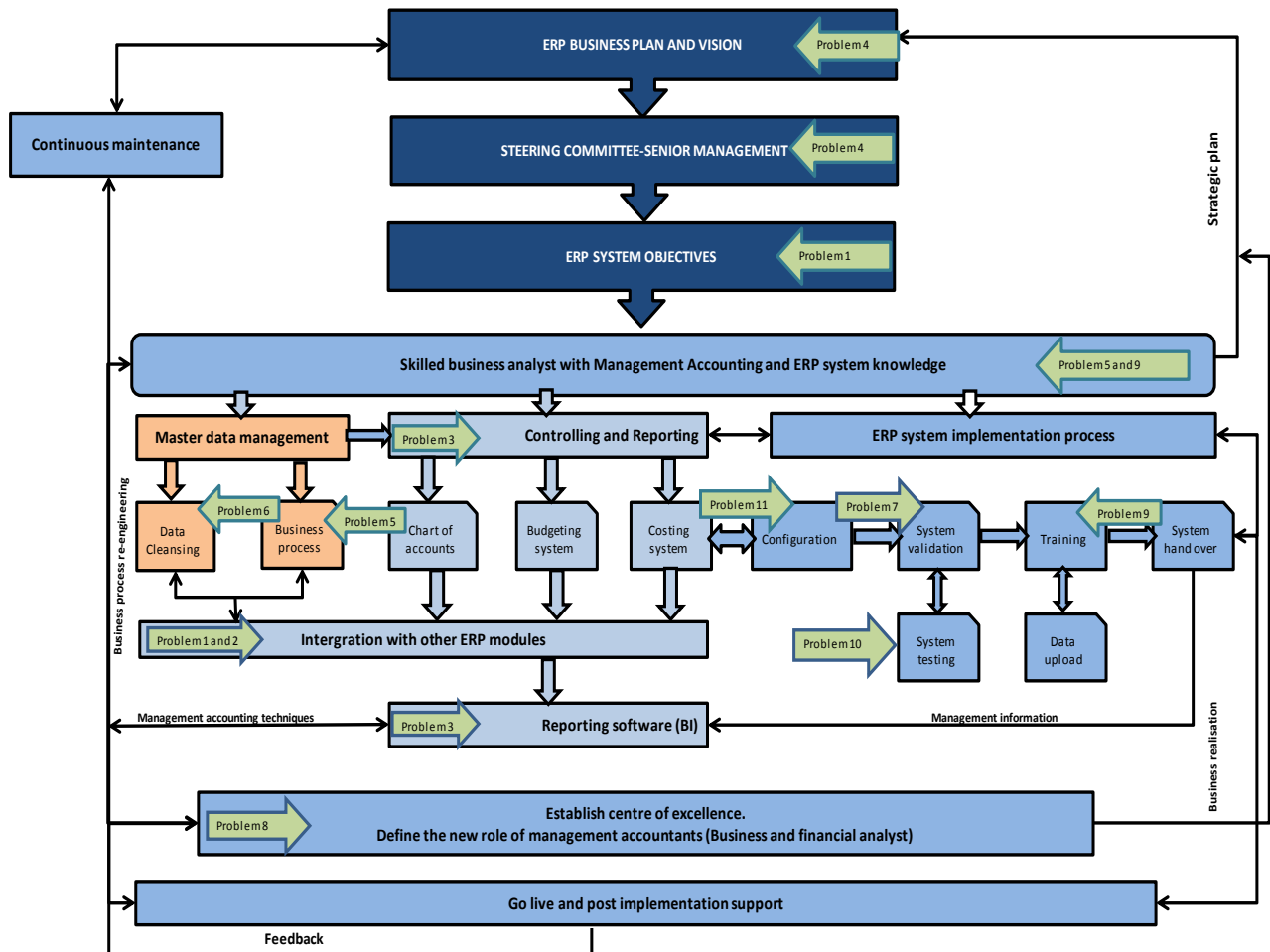
Management accounting has to do with proving financial information (Section 3.3). Yazdifar and Tsamenyi (2005) argue that ERP systems are good at transactional processing whereas special software like Business Intelligence (BI) is needed to be built on top of the ERP system to cater for reporting functionality. This has been supported by Problem 7 as obtained during the preliminary survey. A framework should comprehensively identify why reporting tools are needed to supplement the weakness of the ERP systems. The reporting capabilities are also supported by Problem 4, which is lack of integration between the management accounting techniques and the ERP system. A proposed ERP system implementation framework integrates the ERP system modules with other reporting tools.

#### *4.7.7 ERP system implementation process*

An ERP system implementation process has been developed to solve Problem 7, 10 and 11. Problem 7 is the configuration of an ERP system deviating from best practices to suit business requirements which results in customisation. During the implementation of an ERP system, there is lack of business involvement in testing and validating the system (Problem 10). The success of the ERP system is dependent on testing the system appropriately. Another problem reported was that the ERP system does not meet business requirements (Problem 11).

A model is a step by step approach in ensuring that all activities are performed to ensure the successful implementation of the ERP system (O'Leary, 2004). The implementation of the ERP system needs to be supported by business and consultants after the go live. Figure 4.5 illustrates the steps that have to be followed after the appointment of a skilled business analyst. The blocks below indicate the importance of master data and business process re-engineering to ensure that the

implementation of an ERP system is a success. The block ERP system implementation shows the step by step process to be followed to ensure that the system is implemented according to the standard ASAP methodology.



**Figure 4.5 Development of ERP implementation framework at operational level**

**Source: Author's own construction**

#### 4.7.8 Establish Centre of Excellence and define the new role of management accountants

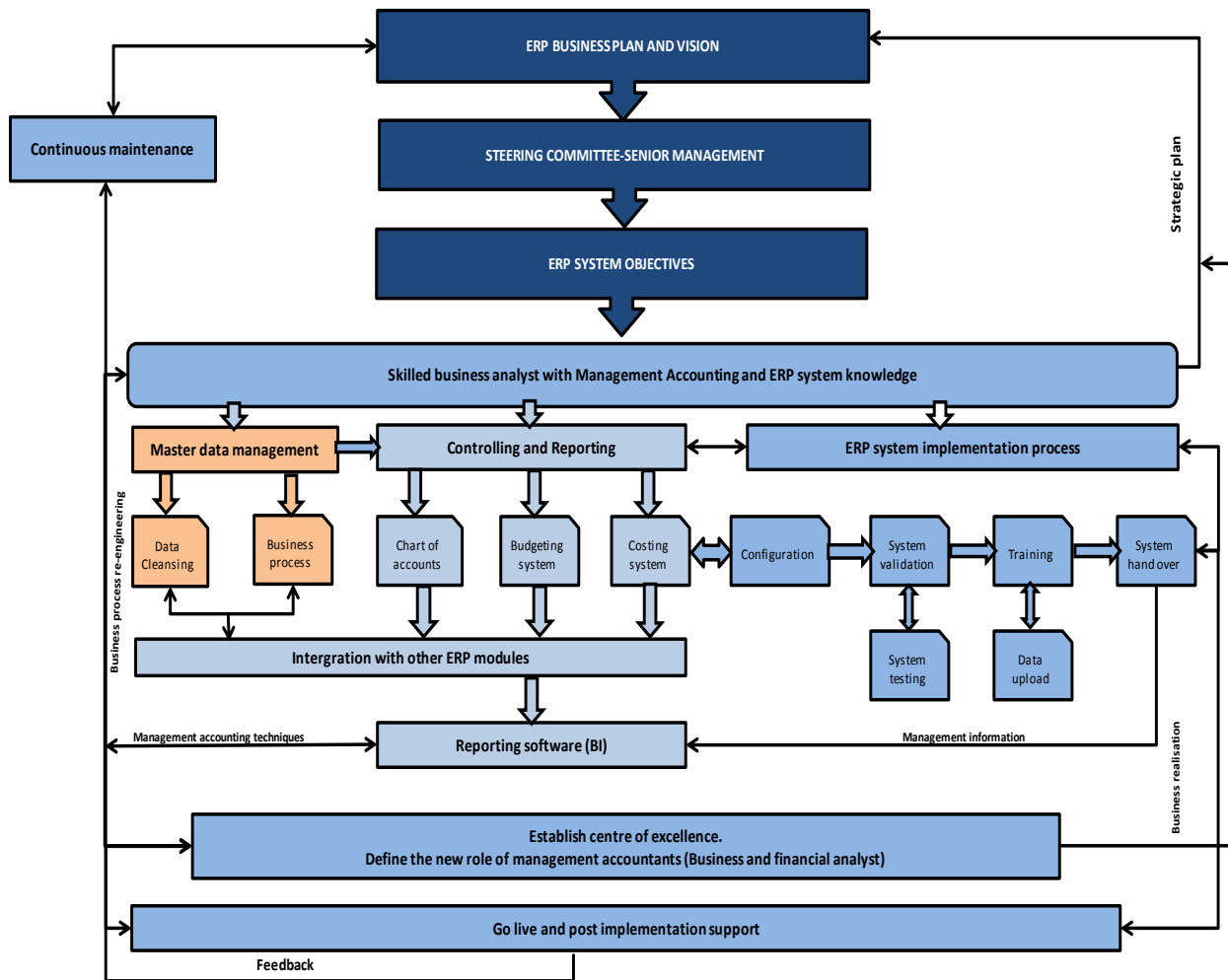
The framework makes provision for the establishment of a Centre of Excellence to avoid over reliance on consultants and a shortage of skills within the organisation. A preliminary survey identified Problem 6, which is lack of training. Problem 8 mentioned that the role of management accountants is not reviewed after the implementation of an ERP system. Granlund (2011), states that the role of management accountants should be reviewed after the implementation of the ERP



system. Management accountants should occupy the role of the business analyst. They should have both ERP system knowledge and management accounting knowledge (Granlund, 2011).

The employees who form part of the ERP system implementation should form part of the Centre of Excellence (Granlund, 2011). The Centre of Excellence provides first-line support to business after the implementation of the ERP system. They understand the business and the technical configuration of the ERP system. The proposed framework provides business continuity after the ERP system implementation. This assists the organisation in ensuring that employees receive proper training on the usage of the ERP system (Granlund, 2011).

The ERP system implementation framework was proposed for the Water Industry by identifying the problems experienced and by taking into account CSFs as well as the ASAP methodology (Figure 4.6). After the implementation of the ERP system there is a need to continue with the support for the system. To identify if this framework can be used in industry, it will be evaluated by a sample of employees in various departments, namely, management accounting, financial management, revenue management, financial accounting, project management and supply chain.



**Figure 4.6 Comprehensive ERP implementation framework**

**Name of framework: Management Accountant ERP Framework**

**Source: Author’s own construction**

#### 4.8 Summary

In this chapter, the benefits and CSFs of implementing ERP systems were identified. The success of implementing an ERP system is dependent on appropriate governance structure and also the choice of the ERP system vendor to be selected. The ERP system is implemented by using a phased approach or methodology developed by the ERP system vendors. One of the well-known methodologies is ASAP which is used by SAP implementers and even by non-SAP vendors.

In this chapter the research question RQ4 and research objective RO4 have been answered, which is the importance of ERP systems application and their impact on

management accountants. The research question RQ3 and research objective RO3, which was to investigate the challenges that management accountants encountered during and after the implementation of ERP systems at the Water Industry has been answered in this chapter (Table 4.1).

The chapter further answered the research question RQ5 and research objective RO5, which is the development of an ERP system framework to be used by the Water Industry (Figure 4.6). In this chapter a generic ERP system implementation framework which highlights the phases to be followed when implementing the ERP system was analysed. The proposed framework will now be evaluated in an empirical study which will be discussed in Chapter 5.

## Chapter 5

### Research and Design Methodology

#### 5.1 Introduction

A proposed ERP system implementation framework to be used by management accountants in the Water Industry were developed (Chapter 4). An empirical study was conducted to verify the challenges that management accountants encounter after the implementation of an ERP system and to investigate if the proposed ERP system implementation framework could be used to solve the current challenges experienced by management accountants during and after the implementation of an ERP system at the Water Industry.

This chapter outlines the research methodology used. (Section 5.2) will provide the research design. Section 5.3 will discuss the research methodology used in the study, and Section 5.4 is the summary of the chapter.

#### 5.2 Research design

Research designs are the overall plan for relating the conceptual research problem to relevant empirical research and eventually to its conclusion. Since the problems always vary, the designs are also different. The following research methods were applied in this study (Lee & Lings, 2008):

- Exploratory and descriptive;
- Quantitative and qualitative research.

Exploratory research is conducted if there are very few or no early studies to which reference can be made for information about an issue or problem (Jankowicz, 2000). The study looks at the patterns, the idea or hypothesis, rather than testing or confirming the hypothesis. The techniques used in exploratory research include case studies, observation and historic analysis, which can provide both quantitative and qualitative data. These techniques are flexible as there are few constraints on the types of data collected. Exploratory research provides a conclusive answer to the

problem and gives guidance on the future research to be conducted (Lee & Lings, 2008).

Descriptive research is used to identify and obtain information on the characteristics of a particular problem or issue (Collis & Hussey, 2009). Descriptive research examines the problem more than exploratory research. Descriptive research goes further in examining a problem, since it is undertaken to ascertain and describe the characteristics of the pertinent issues (Hussey & Hussey, 1997).

Researchers who use logical positivism or quantitative research employ experimental methods and quantitative measures to test hypothetical generalisations and they also emphasise the measurement and analysis of causal relationships between variables (Collis & Hussey, 2009).

Phenomenological or qualitative paradigms seek to understand a given research problem or topic from the perspectives of the local population it involves. Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviours, and social contexts of particular populations (Collis & Hussey, 2009). A positivistic approach suggests that closed questions should be used, whereas a phenomenological approach suggests open-ended questions (Collis & Hussey, 2009).

### **5.3 Research method used for the study**

The research approach applied in this study is both exploratory and descriptive, in that the research focused on a specific management process in the form of a case study, in order to provide a detailed description of this process. The descriptive aspect of the research incorporated perspectives drawn from both the participants in the study and those drawn by the researcher from relevant literature. The research method applied in this study was conducted in a way that the research questions will be answered appropriately.

#### *5.3.1 Preliminary study*

In order to understand the current problems that management accountants experienced during and after the implementation of ERP system at the Water Industry, a preliminary study was conducted which was presented to the different

departments in the Water Industry. The preliminary study identified the current problems that management accountants experienced after and during the implementation of an ERP system (Chapter 4). The preliminary study for this research used a simple random sampling method to identify the main problems experienced after the implementation of the ERP system within the Water Industry.

A random sample allows every member of the population to have an equal chance of being selected. The researcher assumes that the results of the sample generalised the representation of the whole population (Lee & Lings, 2008). In order for the researcher to understand the problems fully, the questions are open-ended which allows the respondent to express an opinion. Open ended questions allow the respondents to answer the questions in their own words (Pellissier, 2007). There are eleven main problems identified (Chapter 3). In order to solve the problems identified by the preliminary study, an ERP system implementation framework was developed.

### *5.3.2 Empirical study*

The proposed ERP system implementation framework was developed (Chapter 4). To determine if this framework is applicable to solving the problems that management accountants experienced after the implementation of ERP system within the Water Industry, it is evaluated in an empirical study.

The empirical study was conducted using questionnaires that were distributed to employees in the management accounting, financial management, information technology and project management departments within the Water Industry (n=50). These questionnaires (Annexure 2) were hand delivered to a sample of 50 participants. The eleven main problems that management accountants experienced in the implementation of ERP system that were identified (Chapter 2) in the preliminary study are presented in Section B. Section C1 presents the proposed ERP system implementation framework as an annexure with statements relating to the model. Section C2 presents open ended questions relating to the model. The questionnaires will be used to determine:

- The frequency of problems encountered by the employees in the different departments namely, Management Accounting, Financial Management, Information Technology and Project Management in the Water Industry.
- How the employees rate the proposed ERP system implementation framework that will assist to solve the problems that management accountants experienced during and after the implementation of ERP system.
- Any potential problems with implementing the framework in the Water Industry, for ERP system implementation.

#### *5.3.2.1 Sample design*

The sample is representative of the population from which it is drawn. When a sample is selected, care needs to be exercised to ensure that the sample is unbiased in the way it represents the population under study (Collis & Hussey, 2009). Sampling plays an important role in providing information for making business decisions. It is impractical for the researcher to survey the whole population as it is not cost effective (Salkind, 2009).

Convenience sampling will be used in the empirical study to select employees in the following departments: Financial Management, Management Accounting, Information Technology and Project Management within the Water Industry in South Africa. A survey will be sent by email in a questionnaire format. Collis and Hussey (2009) state that this will prevent bias as the views of each population will be recorded in balance.

In a positivism paradigm, also known as a quantitative paradigm, a large sample is used as compared with a qualitative paradigm. The data used tends to be quantitative and the questions used are normally closed questions. Positivist, paradigms or quantitative research employ experimental methods and quantitative measures to test hypothetical generalisations and they also emphasise the measurement and analysis of causal relationships between variables. Reliability is high and validity low in this paradigm. This paradigm generalises from the sample to the population (Collis & Hussey, 2009).

In an interpretivism paradigm, also known as a qualitative paradigm, a small sample is used to understand a given research problem or topic from the perspectives of the

local population it involves (Pellissier, 2007). Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviours, and social contexts of particular populations. A case study may consist of as little as one participant (Collis & Hussey, 2009). Interviews and open-ended questions are often used to gather the information needed in the study. Reliability is normally low and validity high in this paradigm (Lee & Lings, 2008). The qualitative approach will be used in this study to understand the research problem and propose a framework to resolve the problem.

#### *5.3.2.2 Data Collection*

Researchers can only draw a conclusion if they have sound data to analyse and interpret. Data can be collected through self-completion questionnaires and interviews (Collis & Hussey, 2009). The data collection method that was used for the preliminary study and the main study was a questionnaire. Open-ended questions can be used in a preliminary study as respondents are able to respond using their own words (Collis & Hussey, 2009). Closed questions are used when the data to be collected is large (Collis & Hussey, 2009).

The questionnaire used in the study uses a five-point Likert scale. The scale ranges from 1 to 5 as follows:

1. Strongly agree
2. Agree
3. Neutral
4. Disagree
5. Strongly disagree

The questionnaire was divided into four sections. Section A is about the biographical information of the respondent, Section B is the confirmation of the eleven main ERP system implementation problems identified by the preliminary study, Section C1 presents statements on the proposed ERP system implementation framework and Section C2 poses open-ended questions on the proposed framework. Annexure 2 indicates the types of questions that are included in the chosen data collection method.



In the covering letter and accompanying questionnaire (Annexure 2), the aim of the research was briefly explained and the respondent was also assured that the content of the questionnaire would be regarded as strictly confidential. The covering letter was sent out attached to the questionnaire to the participants at my Water Industry. A pilot study was undertaken with employees in the financial management department to establish if they would have any issues in answering the questions. Feedback from the respondents was used to make several changes on the questionnaires. The changes included the inclusion of the open-ended questions that give respondents an opportunity to comment on the framework proposed.

#### *5.3.2.3 Data analysis, reliability and validity*

The data obtained from the study may be numeric (quantitative) or non-numeric (qualitative) form. The researcher analysed the data with the help of the NMMU statistician by using Microsoft Excel. Statistical methods, such as the Cronbach Alpha and T test, could not be used in this study due to the small populations in each group. The qualitative and quantitative analysis was performed.

Salkind (2009) states that there are three types of validity and these can be summarised as follows:

- Content validity is concerned with the content of the instrument samples and the types of things about which conclusion are to be drawn;
- Construct validity is the extent in which the results of the test are related to an underlying psychological construct and
- Face validity is often used to indicate whether the instrument, on the face of it, is measuring what it claims to measure.

Validity was reached by considering content, face and construct validity (Salkind, 2009). The content validity was supported by the specific questionnaire items. Content validity was supported by the questionnaires constructed strictly according to the definition of each section. Construct validity was underpinned by the fact that, although the questionnaire focused on different sections, the items all dealt with aspects which were important concerning the challenges that management accountants experience after the implementation of ERP systems, that lead to the development of ERP system implementation framework or model.

Validity or valid evidence was central to the way in which research was conducted (Lee & Lings, 2008). Both types of validity, internal and external, were important and desirable attributes of the research design. There is little point in having results that are coherent, and which were sustained completely by the research procedure utilised, if they are merely self-referring. Similarly, there is no point in conducting research that pays great attention to external validity if the design is flawed and leads to spurious results. In the process of gathering valid evidence (validity) and to address uncertainty the methods for my research were:

- To use more than one source of information when investigating the problem;
- Avoid the presumption that the use of certain methodological and systematic models can prove that data or analyses are absolutely correct;
- Semi-structured interviews to confirm the questionnaires.

#### **5.4 Summary**

In this chapter the research methodology being followed for this research was described in depth. This chapter described the purpose of the research, the research approach and how the empirical study was conducted. The research approach used for this study is both exploratory and descriptive. The preliminary study was used to discover the problems that management accountants encounter. Simple random sampling was used to conduct the preliminary study while convenience sampling was used on the empirical study. The data collected by means of questionnaires will be analysed and discussed in greater detail in Chapter 6.

## Chapter 6

### Research Findings

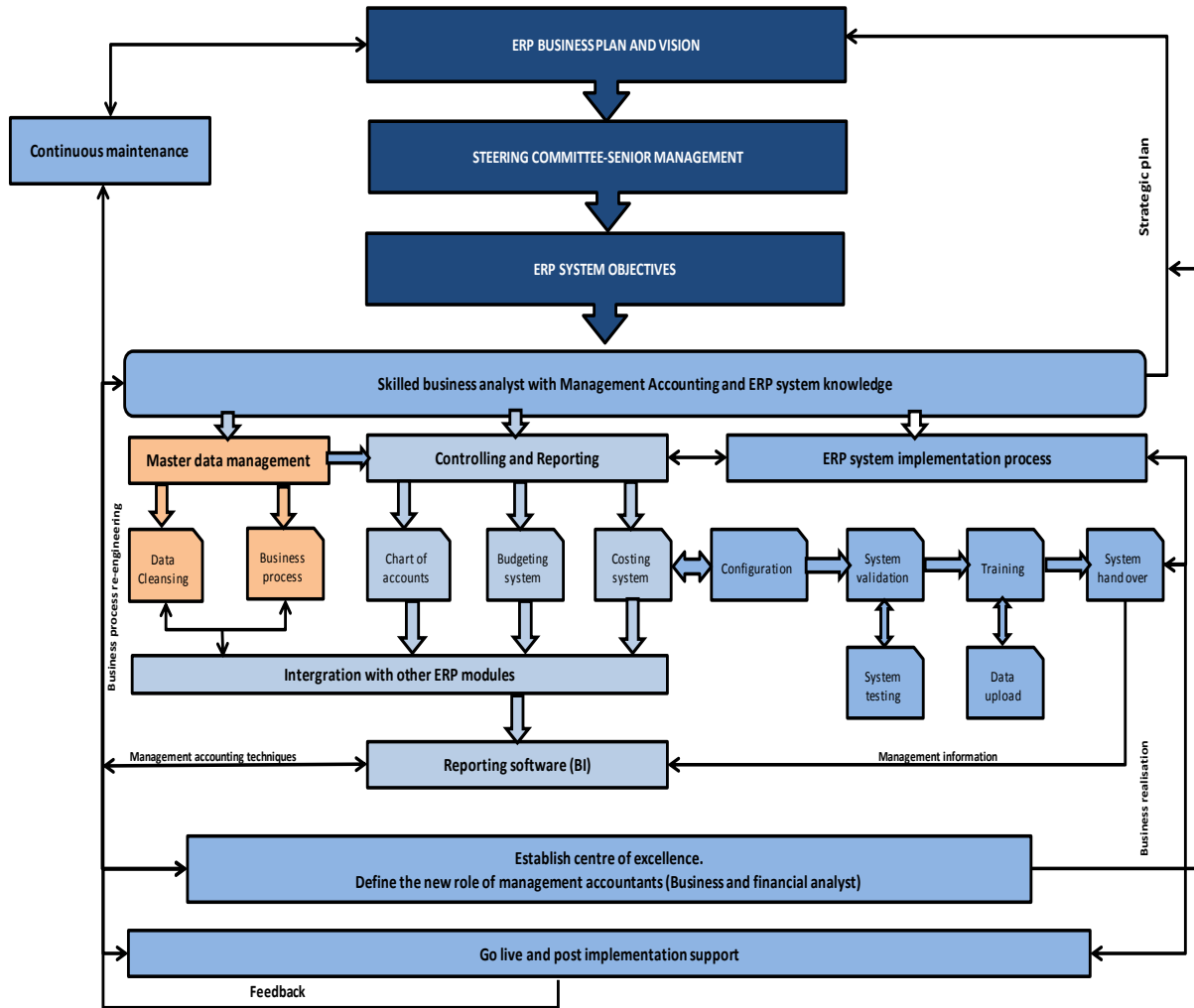
#### 6.1 Introduction

In Chapter 5 the research methodology was discussed. This chapter will analyse and interpret the data obtained from the empirical study. The research question RQ6 and research objective RO6 *“To identify if the proposed ERP system implementation framework developed for the Water Industry can be evaluated”* will be investigated. A survey, by means of distributing questionnaires, was conducted to investigate the opinions of the respondents at the Water Industry. The data obtained from these questionnaires was used to analyse the empirical results.

This chapter will include the analysis of the empirical results. The response rate and data analysis will be evaluated (Section 6.2). The eleven problems identified during the preliminary study will be empirically evaluated (Section 6.3) and the summary of the findings analysed (Section 6.5). The proposed ERP system implementation framework will be empirical evaluated (Section 6.6). The respondents' views on the proposed framework will be analysed (Section 6.7). The conclusions and the improved framework will be presented (Section 6.8).

#### 6.2 Response rate and data analysis

The respondents that participated in the research were employees of the Water Industry in South Africa. The analysis covered two issues. The first objective is the confirmation of the problems identified in the preliminary study (Chapter 3) and the second objective is to identify if the proposed ERP system implementation framework will work within the Water Industry. The proposed ERP system implementation framework to be evaluated in this chapter is shown (Figure 6.1).



**Figure 6.1 Comprehensive ERP implementation framework**

**Name of framework: Management Accountant ERP Framework**

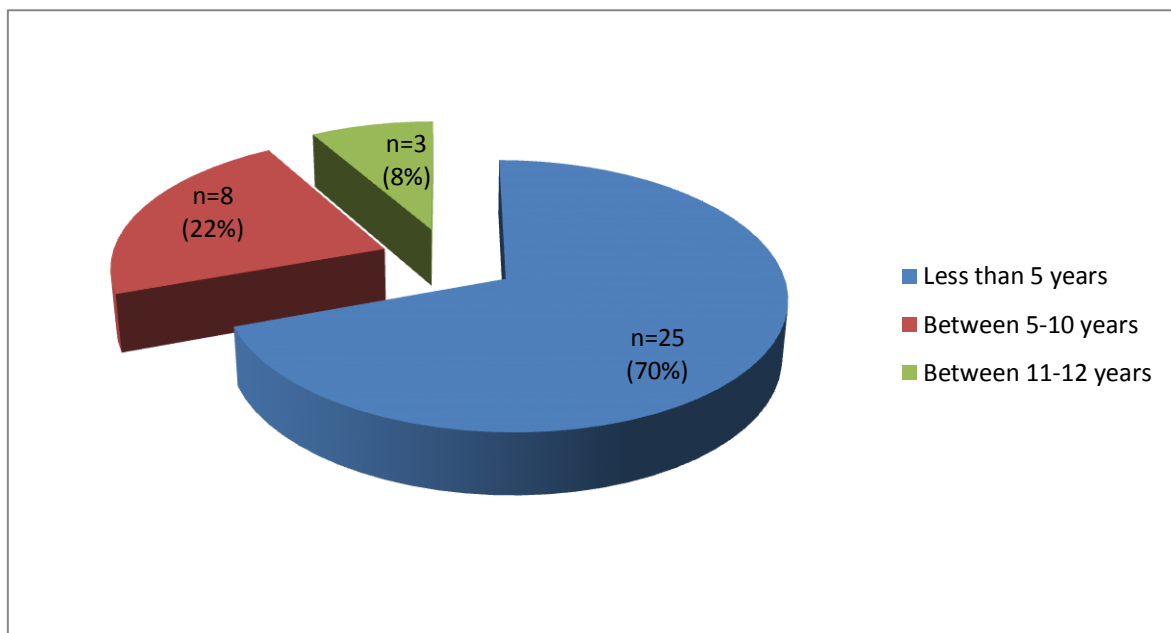
**Source: Author's own construction**

The following key positions were included on the distribution list: management accountants, financial accountants, supply chain practitioners, financial managers, revenue accountants, asset accountants, financial analysts, accountants and SAP specialists within the Water Industry. The above employees are the key users of the ERP system hence they were selected to evaluate the framework proposed. The feedback obtained from the above employees will be representative of the population. A total of 50 employees were targeted and 36 responded which produced a response rate of 72%.

### 6.3 Biographical data analysis

The biographical data was analysed according to years of service in the company, the department in which the respondent is currently working, the current position and years of service in the current position (Annexure 3).

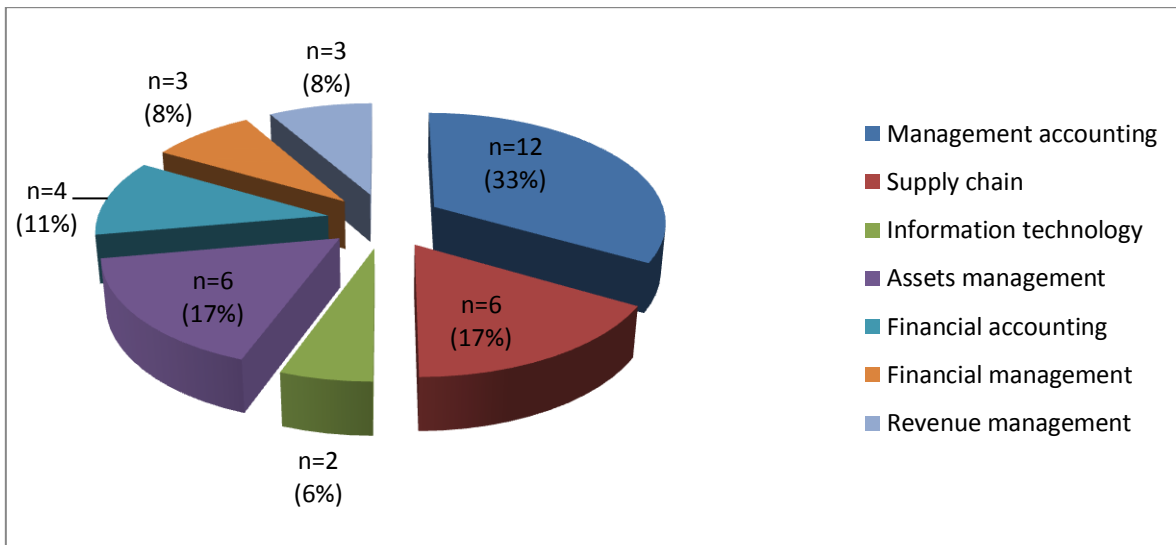
The majority of the respondents are still new to the Water Industry which is an advantage as they will provide a new perspective on implementing ERP systems (Figure 6.2). It can be seen that 70 percent of respondents have served the company for less than five years while 22 percent between five and ten years and eight percent more than ten years. Around 30 percent of the respondents are more than five years in the industry so they understand business processes and systems for the Water Industry. This affirms that the respondents will be able to evaluate the ERP system implementation framework with the different perspective from those who have been with the industry for more five years.



**Figure 6.2 Number of respondents according to the number of years of service**

The majority of the respondents are from management accounting which is 33 percent of the population selected (Figure 6.3). This is a true reflection as the ERP system framework developed and will be used by management accountants within the Water Industry. The other main departments that had respondents are assets management 17%, supply chain 17% and financial accounting 11%. These

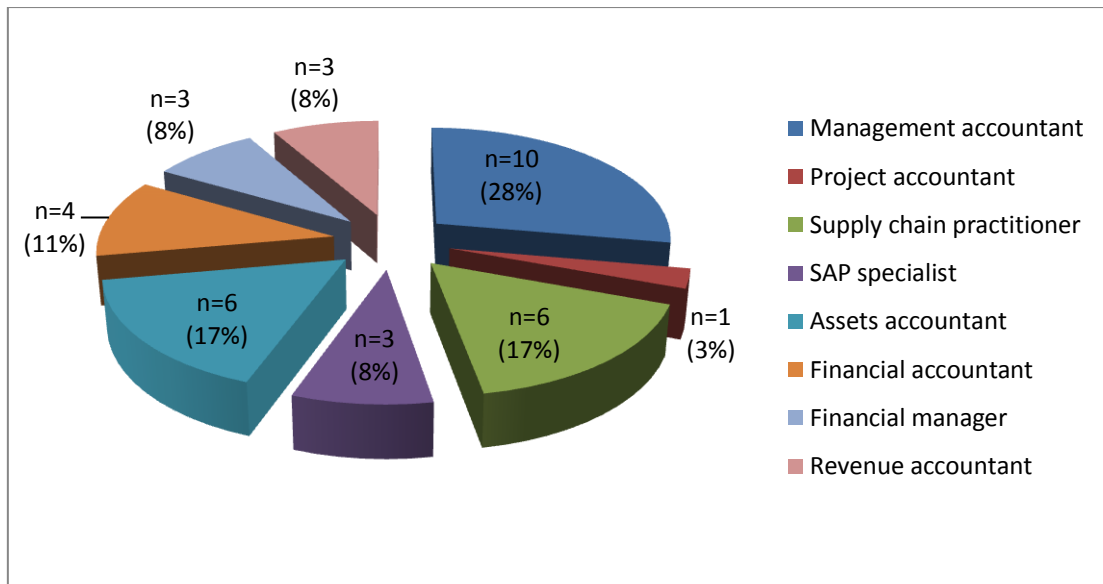
departments are the main users of the ERP systems as they are more into transactional processing.



**Figure 6.3 Number of respondents by department**

The 28% respondent from Management Accountants is the highest which is an advantage as they will be using the ERP system implementation framework developed (Figure 6.4). The supply chain practitioners and assets accountants both have a representative of 17%. The effect of the transactions processed by both supply chain practitioners and assets accountants has a direct influence on how management accountants use the ERP system.

The project accountant and financial manager respondents combined, contribute 11%. These two positions are also part of management accounting as they both perform a similar function which is reporting in nature. The ERP system implementation framework developed will also be crucial to them.



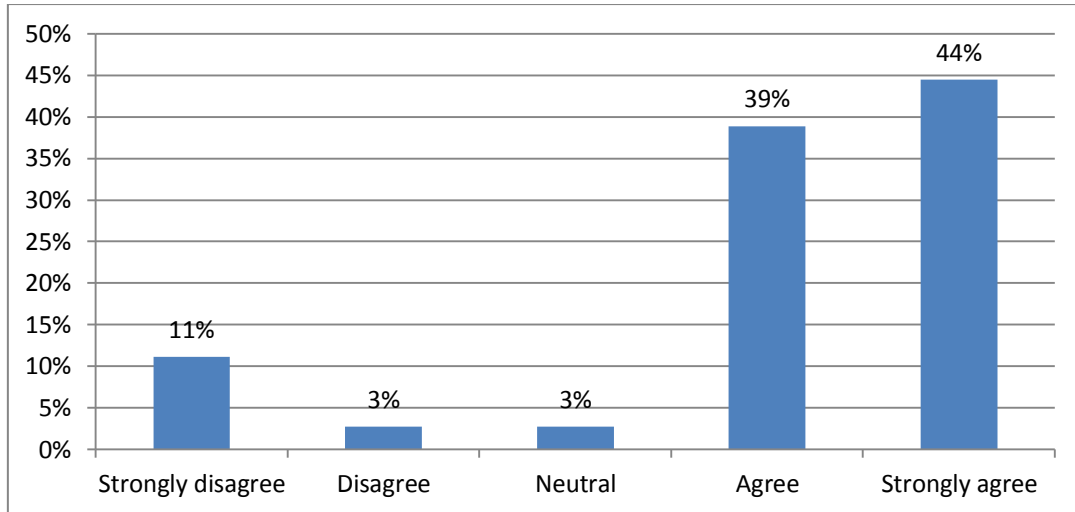
**Figure 6.4 Number of respondents by position**

#### 6.4 Preliminary study problem statements

The preliminary study was conducted and 11 main problems were identified (Table 4.1). The respondents were asked their opinions by means of a questionnaire to obtain a response from a bigger sample (Section B). The responses to the problems are summarised per problem and per department (Annexure 4 and 5). The problem number (P1 to P11) with the description of the problem statement will be presented for each explanation.

**Problem (P1):** Lack of integration between an ERP system and management accounting techniques.

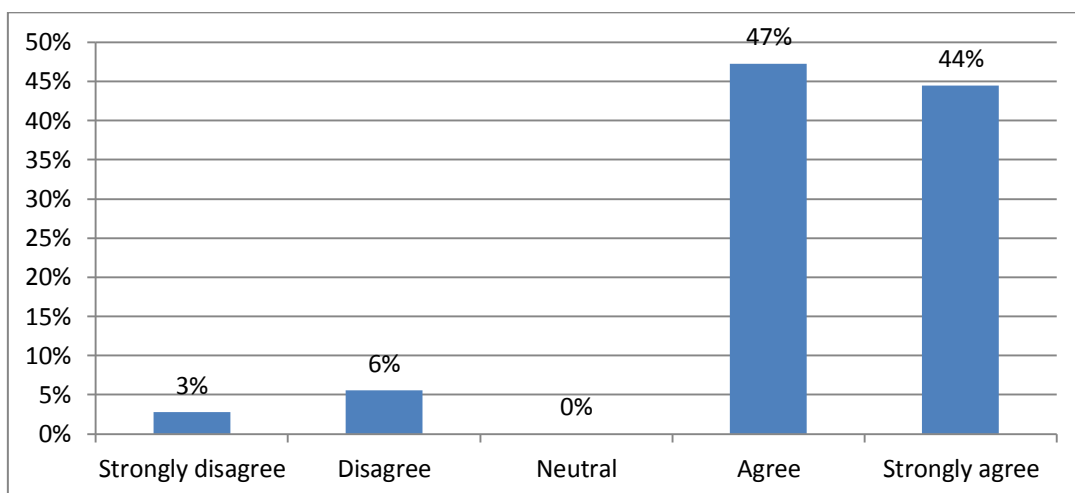
The majority of the respondents agreed that there is a lack of integration between an ERP system and management accounting techniques (Figure 6.5). The graph below indicates the responses as follows: 44% strongly agree, 39% agree, 3% neutral, 3% disagree and 11% strongly disagree. There is strong evidence that in the Water Industry there is a lack of integration between an ERP system and management accounting techniques.



**Figure 6.5 Response to P1**

**Problem (P2):** There are other systems with separate databases used over and above an ERP system.

The response from the respondents indicates that 44% strongly agree, 47% agree, 0% neutral 6%, disagree and 3% strongly disagree (Figure 6.6). 92% of the respondents confirmed that there are other systems with separate databases used over and above an ERP system while 8% disagree with the problem. This confirms that P2 is a challenge that management accountants faced during and after the implementation of the ERP system.

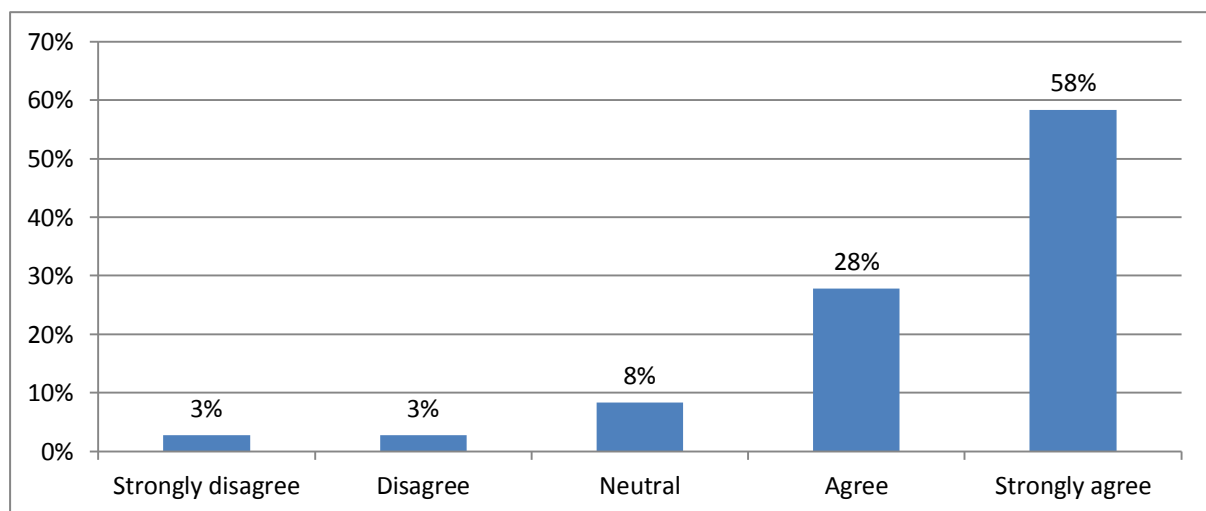


**Figure 6.6 Response to P2**



**Problem (P3):** There is a lack of reporting capability in the ERP system.

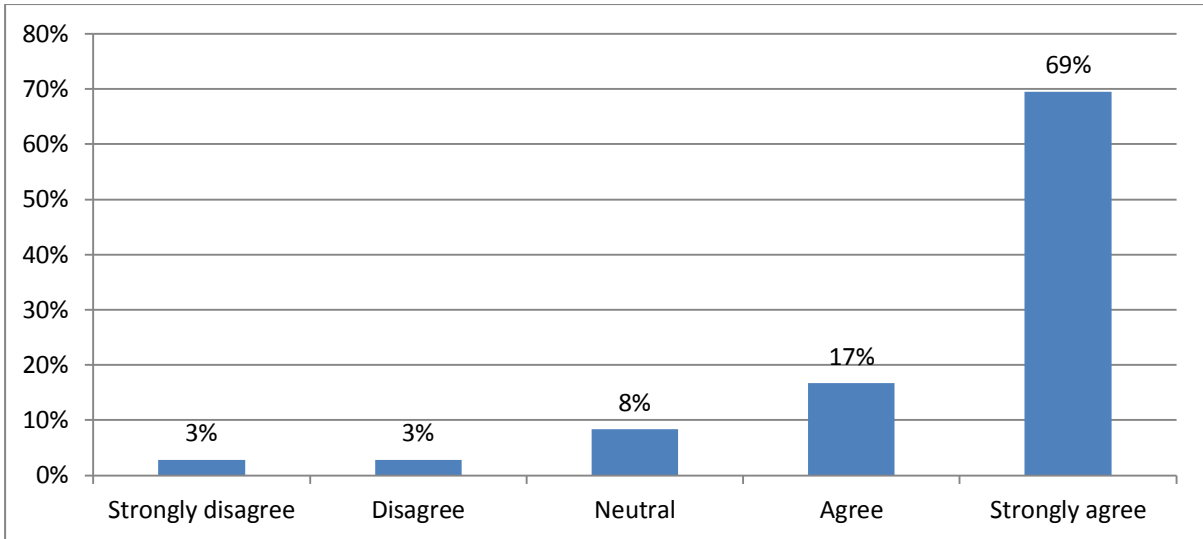
The respondents were asked to rate the reporting capabilities of the ERP system. The graph below indicate the opinions of the respondents as follows, 58% strongly agree, 28% agree, 8% neutral, 3% disagree, and 3% strongly disagree (Figure 6.7). This shows that 86% of the respondents agree that there is a need to enhance the reporting capabilities of the ERP system. 8% of the respondents are neutral; this might be due to the fact that the respondents are more involved with transacting on the ERP system than reporting.



**Figure 6.7 Response to P3**

**Problem (P4):** There is a lack of an ERP strategic plan and top management involvement.

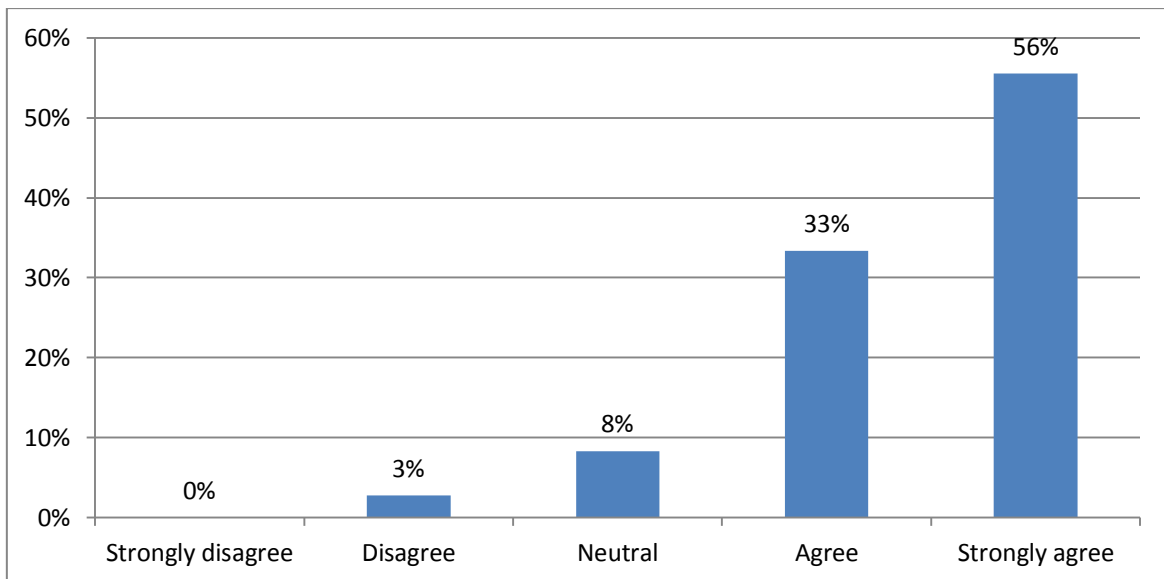
The figures in Problem 4 (Figure 6.8) show that 69% of the respondents strongly agree while 17% agree, 8% neutral, 3% disagree and 3% strongly disagree. This shows that 86% of the respondents agree that there is a lack of an ERP system strategic plan and top management involvement while 6% disagree with Problem 4. Enough respondents agreed to conclude that there is a lack of an ERP system strategic plan and top management involvement. The lack of the strategic plan and top management affects the success of implementing an ERP system.



**Figure 6.8 Response to P4**

**Problem (P5):** There is a lack of understanding of business processes.

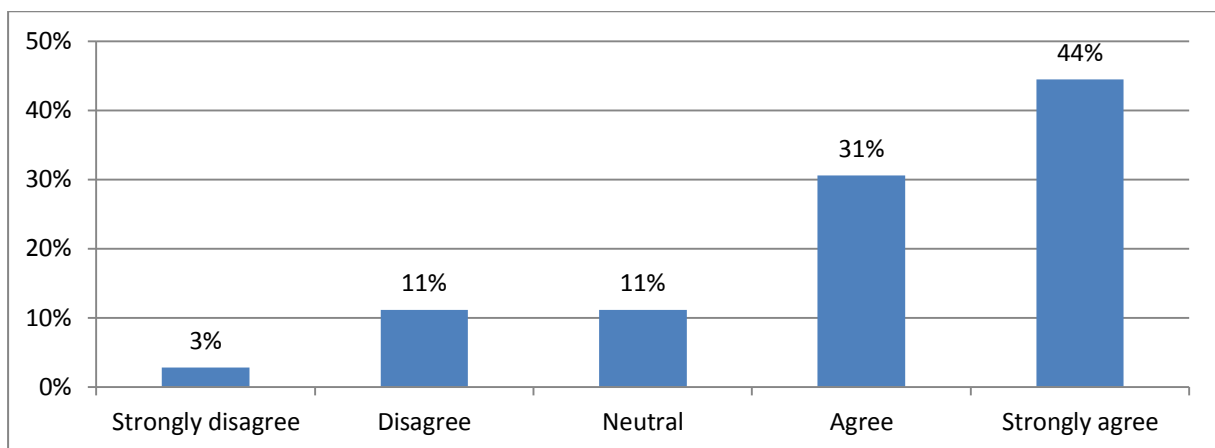
The respondents were asked if there was a lack of understanding of business processes. 56% strongly agree, 33% agree, 8% neutral, 3% disagree and 0% strongly disagree (Figure 6.9). The responses indicate that 89% of the respondents agree while 8% are neutral and 3% disagree. There is overwhelming response that indicates that the Water Industry has a challenge of lack of understanding of business processes when implementing the ERP system.



**Figure 6.9 Response to P5**

**Problem (P6):** The data is not properly cleansed.

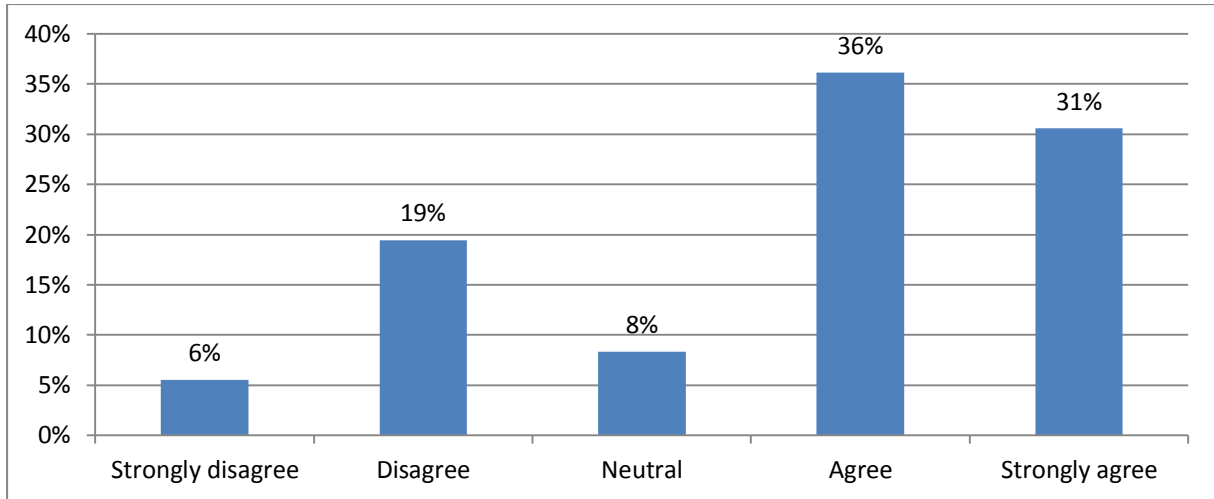
The result indicates that there is a need for a data clean-up when implementing the ERP system. The majority of the respondents confirmed that data cleansing is the problem that they encounter during and after the implementation of the ERP system. The responses show that 44% strongly agree, 31% agree, 11% neutral, 11% disagree and 3% strongly disagree with Problem 6 (Figure 6.10). This shows that 75% of the respondents agreed while 14% disagree with Problem 6. The proposed ERP system implementation framework has to solve this problem to ensure successful implementation of the ERP system.



**Figure 6.10 Response to P6**

**Problem (P7):** The ERP system is configured according to business requirements without looking at best practices.

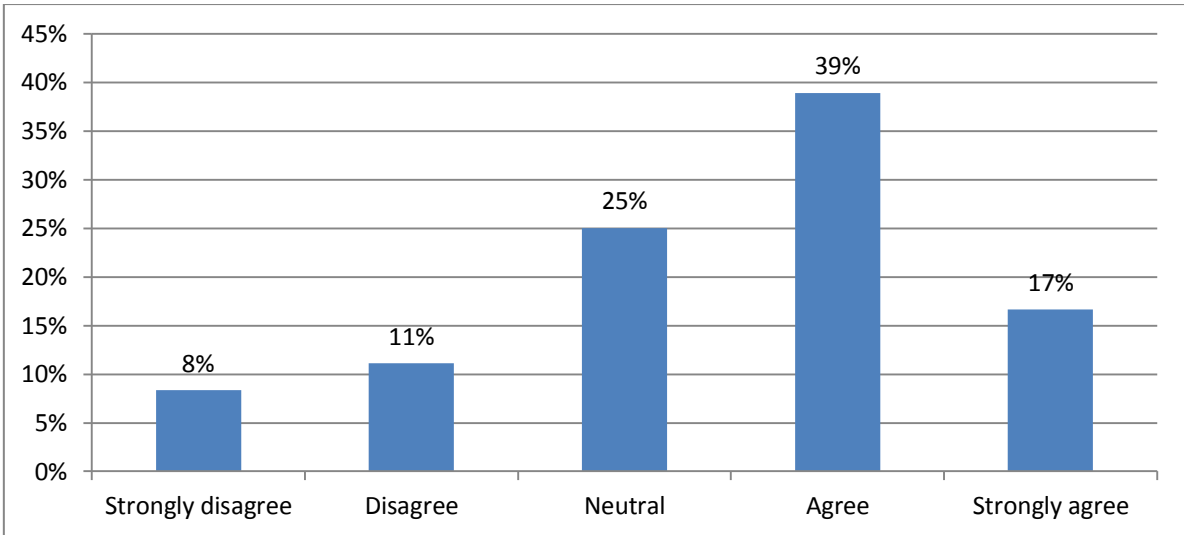
The results indicate that 31% of respondents strongly agree with the problem identified while 36% agree, 19% disagree, 6% strongly disagree and 8% are neutral (Figure 6.11). The majority of the respondents confirmed that ERP system is configured to suit business needs rather than implementing best practices. The ERP system needs to be configured according to the best practices with minimal customisation as required by business.



**Figure 6.11 Response to P7**

**Problem (P8):** The role of management accountants is not reviewed after ERP system implementation.

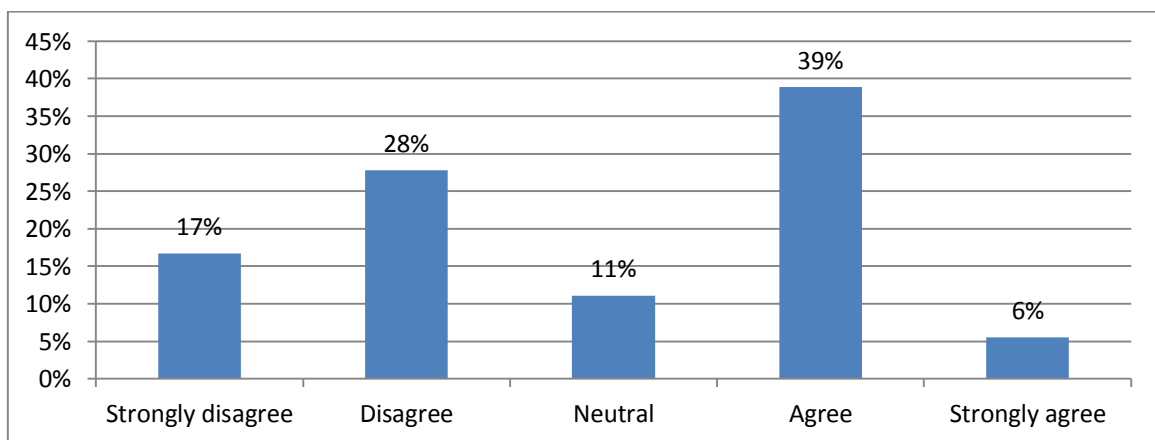
The results of Problem 8 indicate that 17% strongly agree, 39% agree, 25% neutral, 11% disagree and 8% strongly disagree (Figure 6.12). Those that agree with the fact that the role of management accountants must be reviewed after the implementation of ERP system accounts for 56% while 19% disagree. The reason why there is high rate of respondents who are neutral is the fact that some respondents might not be familiar with the role that management accountants play during and after the implementation of the ERP system. There are enough responses that the conclusion can be drawn that the problem is valid and needs to be looked at when designing the framework of implementing the ERP system.



**Figure 6.12 Response to P8**

**Problem (P9):** There is a lack of training of management accountants on how to use a new ERP system.

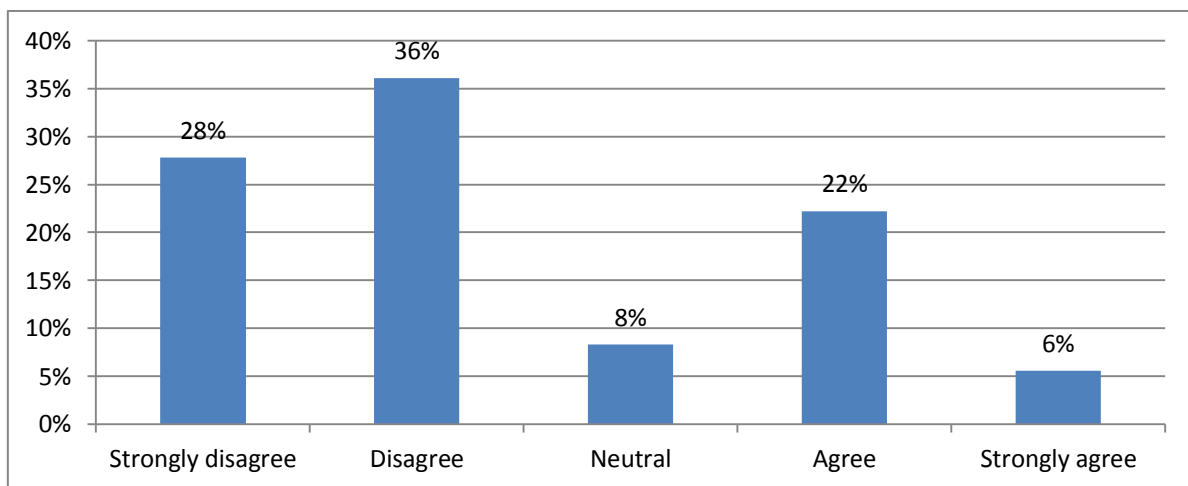
The responses indicate that there is no lack of training of management accountants on how to use a new ERP system. The respondents that strongly disagree with the findings are 17% while 28% disagree, 11% neutral, 39% agree and 6% strongly agree with the findings (Figure 6.13). This shows that training might not be a challenge in the Water Industry, however, training plays a critical role in ensuring that the implementation of the ERP system is a success and people are able to use the system.



**Figure 6.13 Response to P9**

**Problem (P10):** Lack of involvement on ERP system testing.

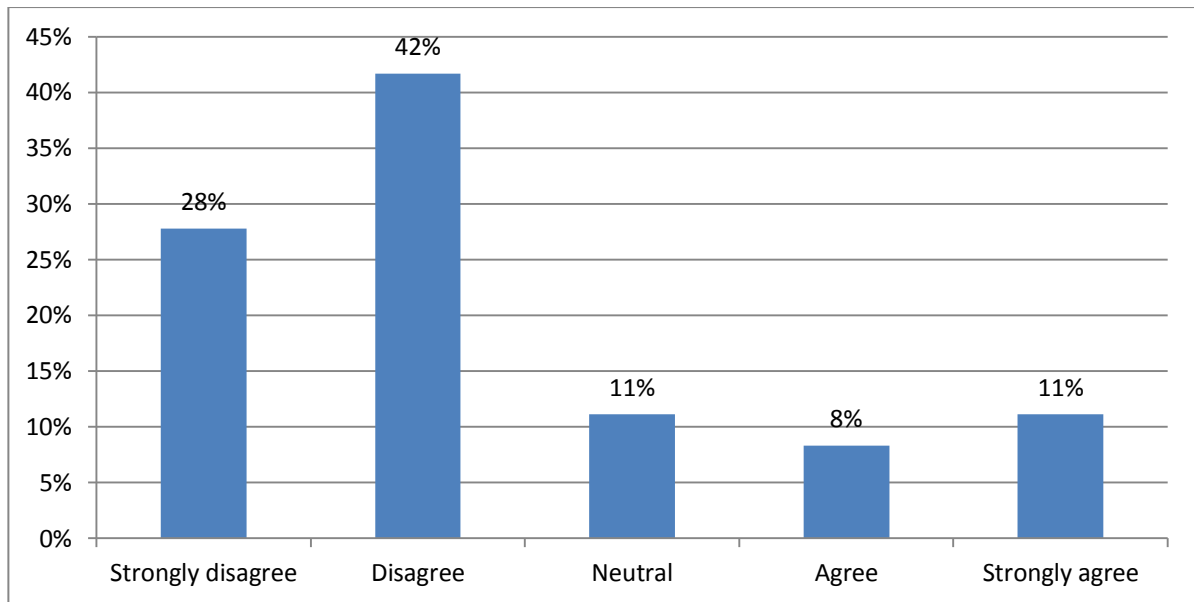
The results indicate that 22% strongly agree, 22% agree, 8% neutral, 36% disagree, and 28% strongly disagree (Figure 6.14). This can be translated to 28% agree while 64% disagree with the problem. There are overwhelming responses that indicate management accountants are involved on the ERP system user acceptance testing. The initial survey indicates that this is not a main concern which was supported by the final survey distributed to the larger population.



**Figure 6.14 Response to P10**

**Problem (P11):** The ERP system does not meet user requirements

The responses to Problem 11 indicate that 11% strongly agree, 8% agree, 11% neutral, 42% disagree and 28% strongly disagree (Figure 6.15). The responses indicate that only 19% confirm the problem while 69% disagree. There is an overwhelming response that indicates that ERP system meets user requirement, therefore this is not the major challenge when and after implementing the ERP system.



**Figure 6.15 Response to P11**

## 6.5 Summary of findings

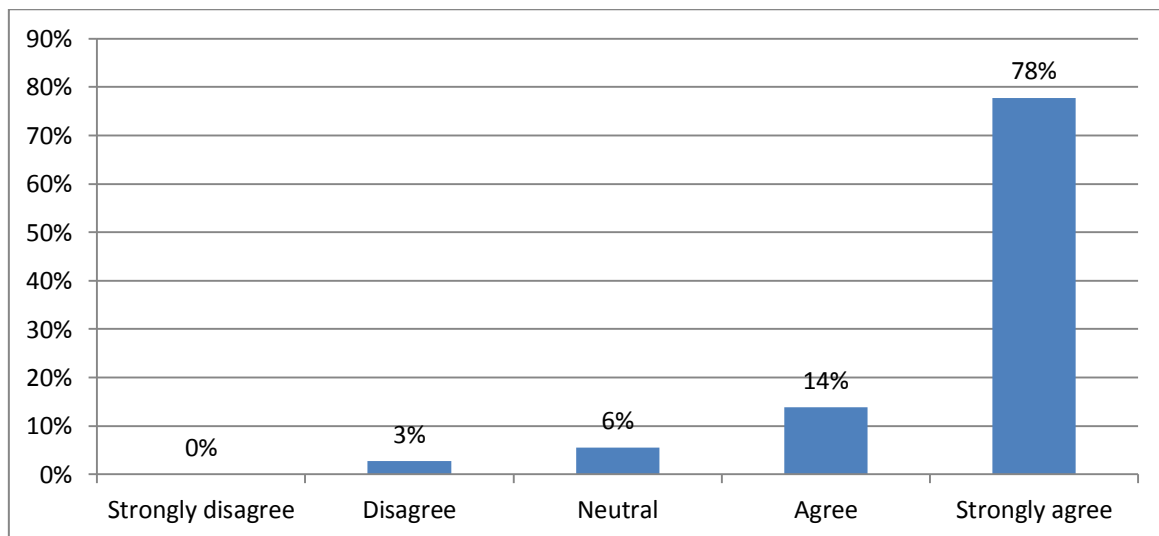
The selected sample indicates that there is a good response from all departments and from all positions within the Water Industry that agree with the problems identified (Figure 6.5 to 6.12). It can be seen from the results that some of the problems identified were not supported by the respondents (Figure 6.13 to 6.15). There is also a concern that some of the managers are neutral about the problem identified. The unsupported problems are still crucial in ensuring that the framework proposed is functional.

## 6.6 Section C1: Proposed ERP system implementation framework

An ERP system implementation framework was developed for the Water Industry in Chapter 4 (Figure 4.6). This framework was developed with the help of the generic ERP system implementation framework the ASAP methodology and from the eleven main problems identified from the preliminary study (Chapter 3) as well as from the critical success factors (Chapter 4) and management accounting techniques (Chapter 3).

**Statement (S1):** It is important to integrate an ERP system with management accounting techniques (like budgeting).

There is an overwhelming response that confirms the importance of integrating an ERP system with management accounting techniques (like budgeting). Only 6% respondents are neutral and 3% disagree (Figure 6.16). This indicates that those that disagree might be uncertain if the proposed element of the framework is important. This could indicate that these accountants have become complacent with the current way of performing management accounting functions within the Water Industry.

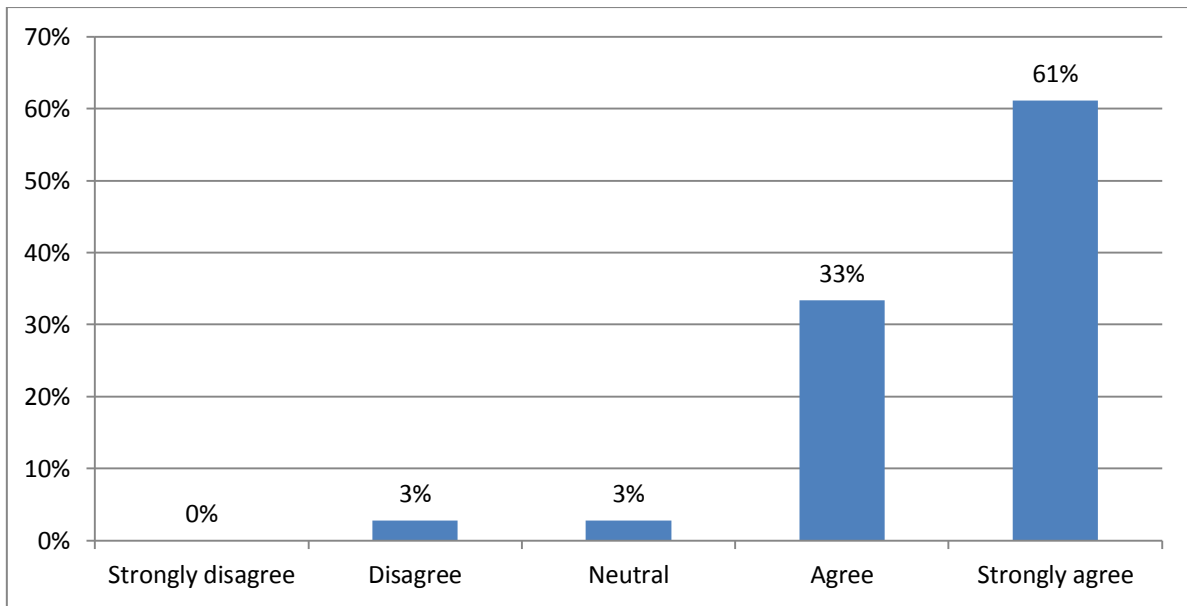


**Figure 6.16 Response to S1**

**Statement (S2):** One of the main benefits of implementing an ERP system is to have one central database where the information can be stored.

There are overwhelming numbers of responses that indicate that the majority of the respondents agree with the benefits of implementing an ERP system which is to have one central database where information can be stored and accessed centrally (Figure 6.17). There is 1 respondent who is neutral and 1 that disagrees. This indicates that they are not sure whether the implementation of ERP system will result in having a central database where information is retrieved and accessed.

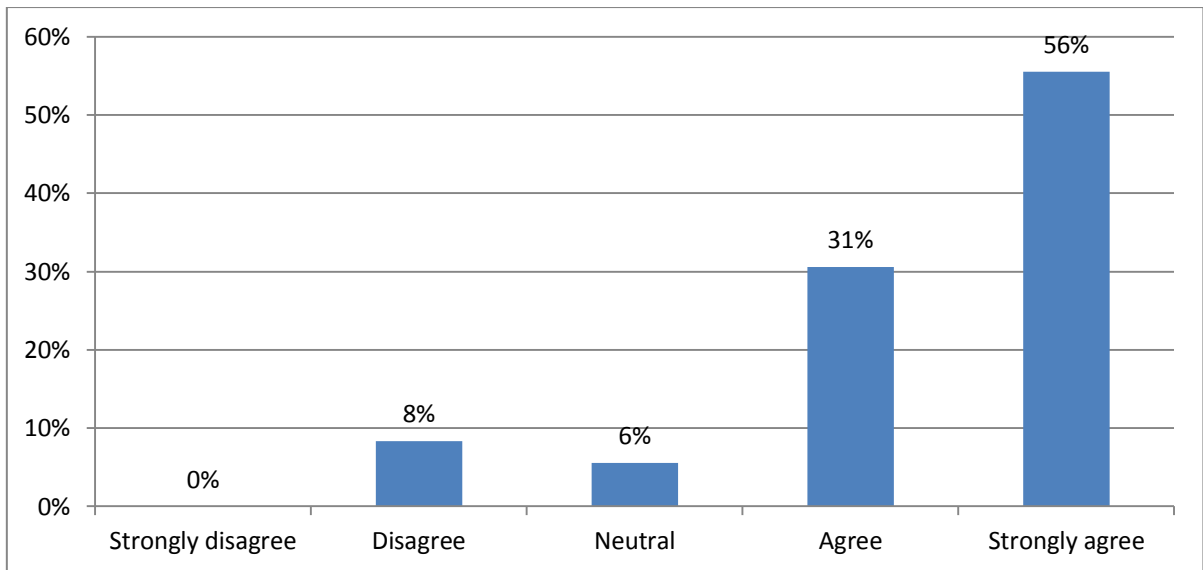




**Figure 6.17 Response to S2**

**Statement (S3):** The ERP system lacks reporting capabilities, therefore specialised software like Business Intelligence (BI) must be implemented to enhance the reporting capabilities of the ERP system.

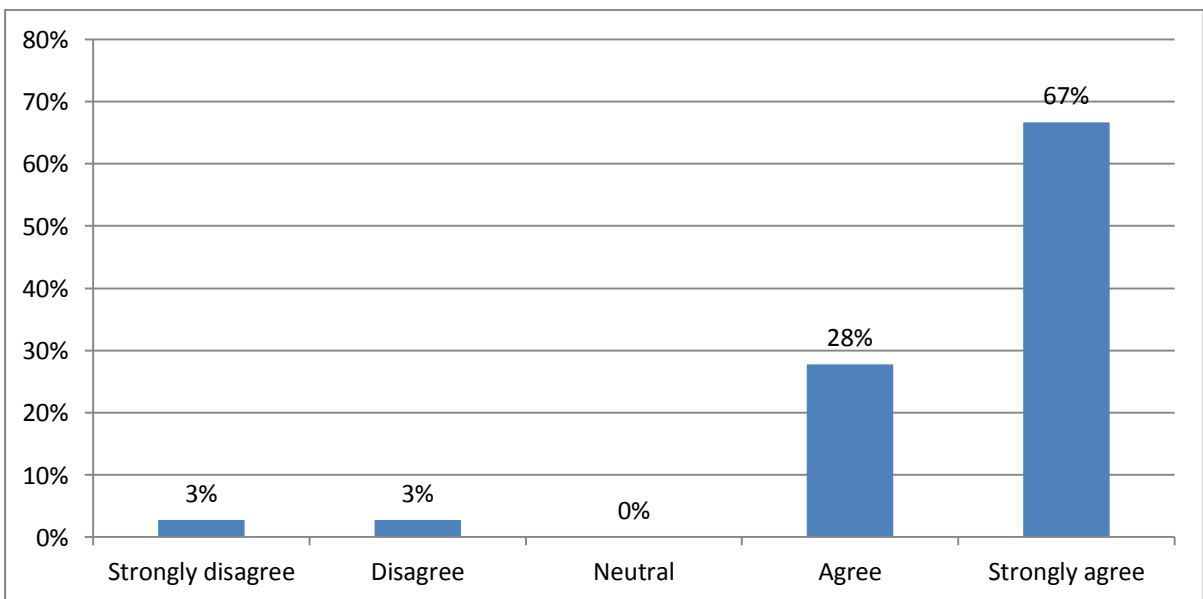
The majority of respondents agree that the ERP system lacks reporting capabilities and there is a need to implement specialised software like BI to enhance the reporting capabilities of the ERP system (Figure 6.18). There are 6% of respondents who are neutral and 8% disagree. This might be due to the fact that these employees are comfortable with the manner in which they report at the moment and they do not trust if BI can enhance reporting capabilities. The other contributing factor is that these employees might be doing less reporting at the moment so they do not see any reason for this to be part of the proposed ERP system implementation framework.



**Figure 6.18 Response to S3**

**Statement (S4):** It is important to have a steering committee to develop an ERP system business plan/vision.

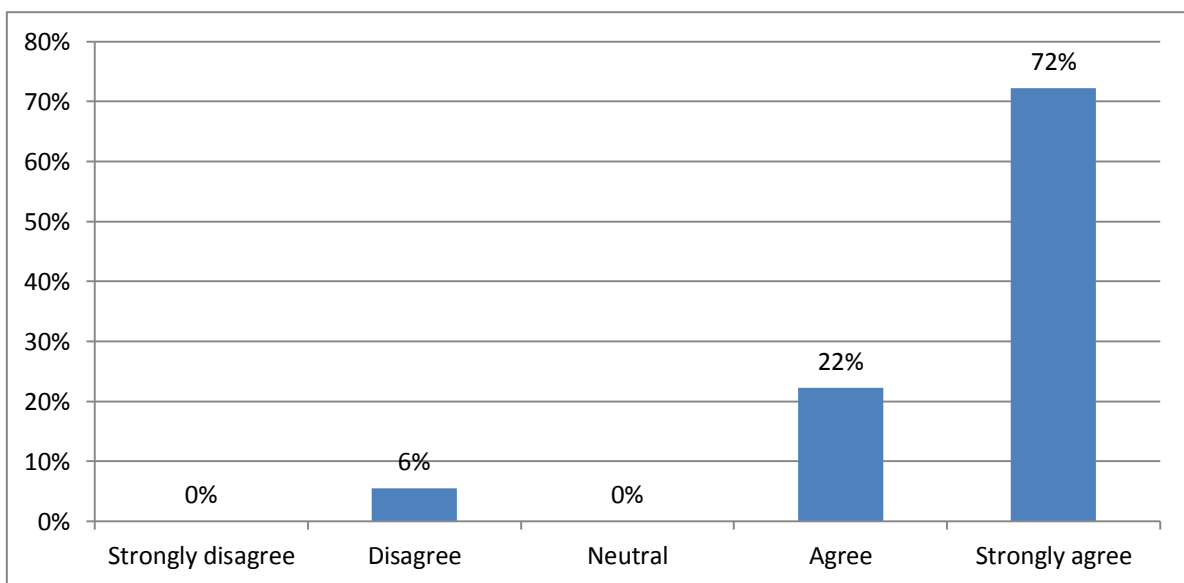
The results indicate that the majority of responses confirm that this is a critical element of the ERP system implementation framework proposed (Figure 6.19). All respondents agree with the statement that the framework proposes except 1 respondent that disagrees and 1 that is neutral.



**Figure 6.19 Response to S4**

**Statement (S5):** Having a steering committee will encourage senior management involvement in the implementation of ERP system.

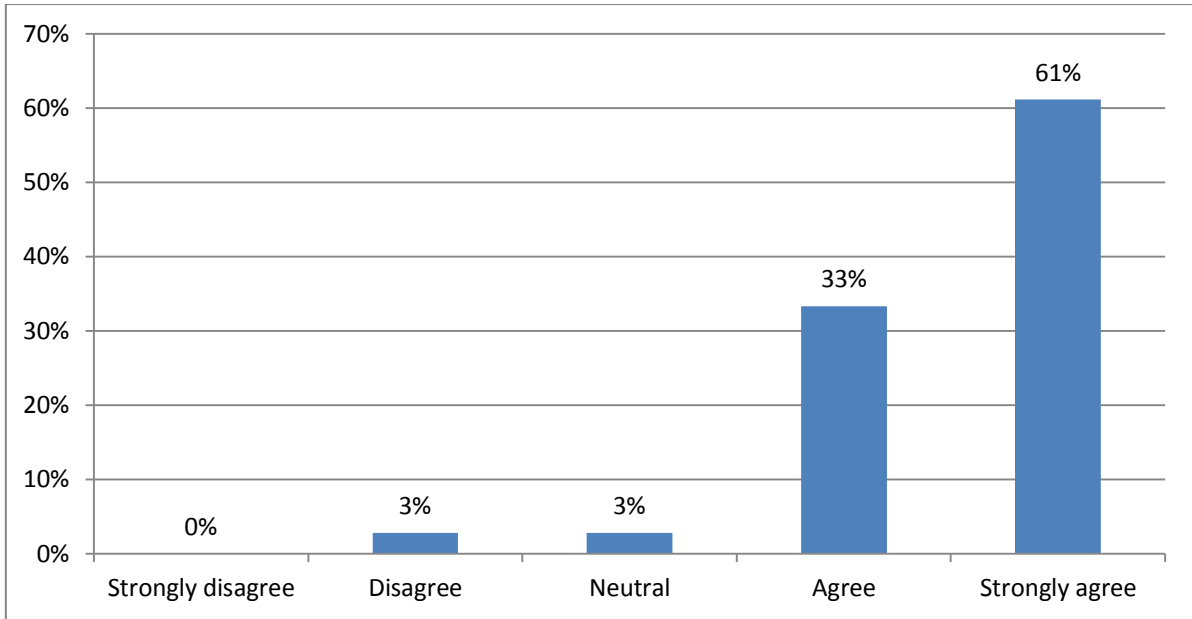
The majority of respondents agree that having a steering committee is a critical element of the ERP system implementation framework proposed (Figure 6.20). All respondents agree with the statement that the framework proposes except 2 respondents that disagree. This shows that they are not certain if the establishment of a steering committee will encourage senior management participation in the implementation of ERP system.



**Figure 6.20 Response to S5**

**Statement (S6):** Management accountants have an understanding of business and they should form part of ERP system implementation team to ensure that business processes are correctly documented.

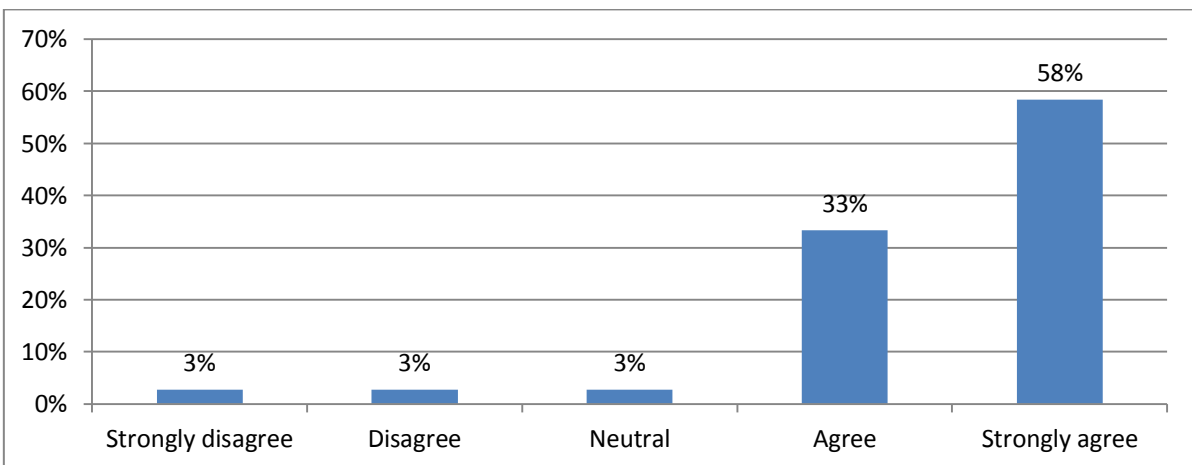
There are overwhelming numbers of responses that indicate that management accountants should form part of the ERP system implementation team as business analysts to ensure that business processes are correctly documented. Most of the employees agree with the statement except 1 respondent who is neutral and 1 respondent who disagrees (Figure 6.21). This indicates that the employee is not certain if this element of proposed framework is important.



**Figure 6.21 Response to S6**

**Statement (S7):** The Company must implement the ERP system based on best practices to avoid system customisation.

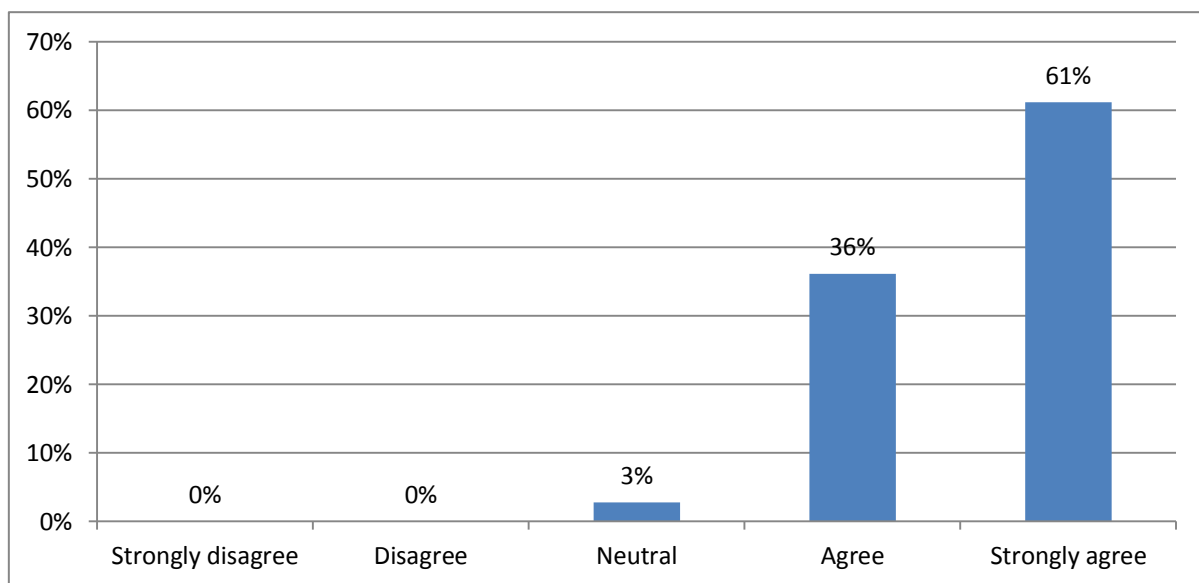
The results indicate that there is a good response from all departments in agreeing that the adoption of best practices is a critical element of the proposed ERP system implementation framework (Figure 6.22). The majority of respondents agree with the statement while 1 respondent is neutral, 1 respondent disagrees and 1 respondent strongly disagrees. This indicates that those who disagree might be complacent with the current practices within the Water Industry and they are not willing to change.



**Figure 6.22 Response to S7**

**Statement (S8):** Data cleansing forms an integral role in ensuring that the ERP system implementation is a success.

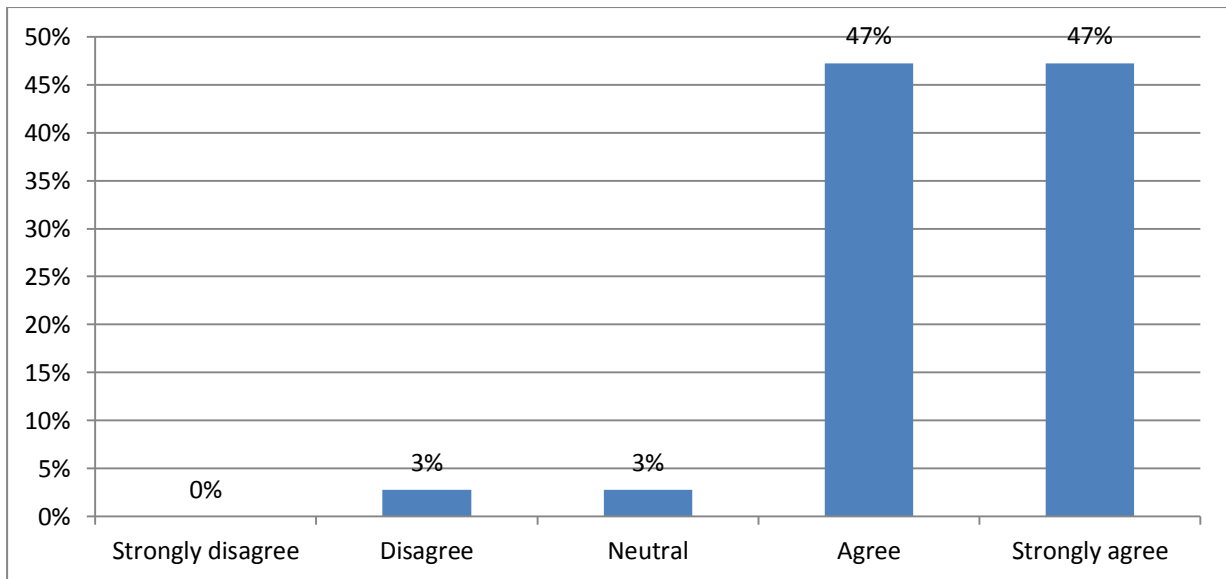
There is an overwhelming response that indicates that data cleansing forms a critical element of the proposed ERP system implementation framework (Figure 6.23). All the respondents agree with the statement except 1 respondent that disagrees. This indicates that the respondent is not certain if this element of proposed framework is important. This can also be an indication that the respondent is happy with the current data that the company has uploaded on the ERP system.



**Figure 6.23 Response to S8**

**Statement (S9):** The role of management accountants needs to be reviewed after the implementation of an ERP system as the ERP system transfers financial knowledge to non-finance people.

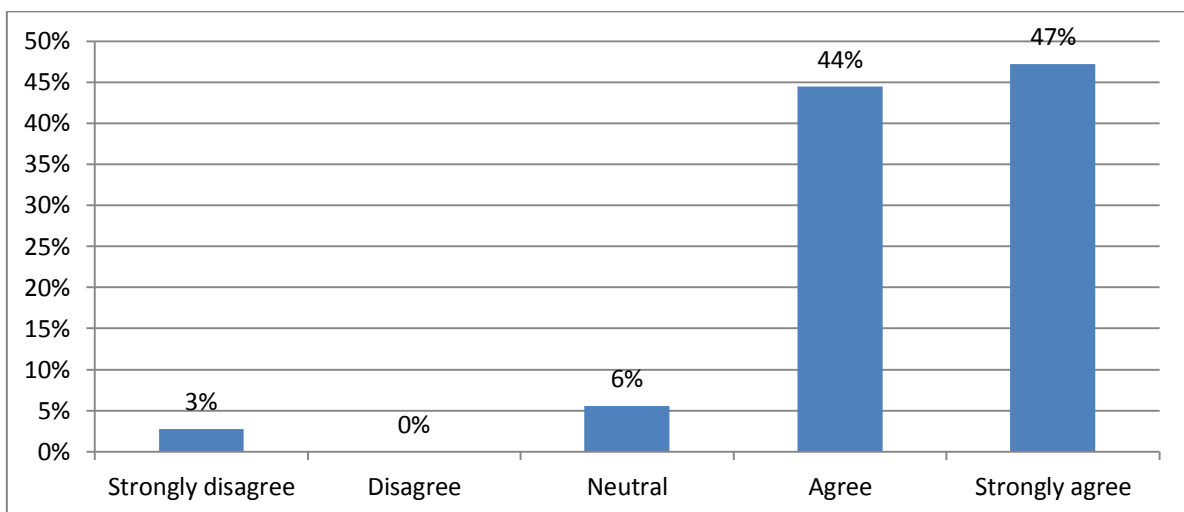
There is a good response that supports the review of the role of management accountants after the implementation of the ERP system (Figure 6.24). The majority of the respondents agree with the statement except 1 respondent who is neutral and 1 respondent who disagrees. This indicates that the respondent is comfortable with the current role of management accountants. This might also be caused by the fact that the respondent is complacent with the current role of management accountants and is not willing to change.



**Figure 6.24 Response to S9**

**Statement (S10):** The implementation of an ERP system requires the company to establish a Centre of Excellence.

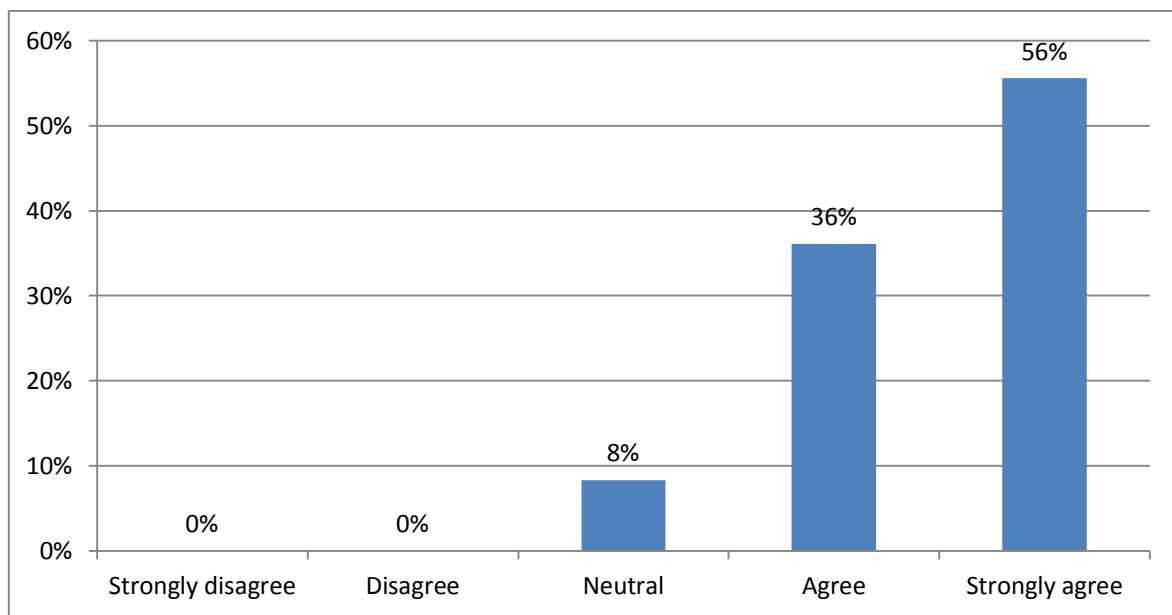
There is an overwhelming response that indicates that the establishment of a Centre of Excellence to support the implementation of the ERP system is a critical element of the proposed ERP system implementation framework (Figure 6.25). The majority of the respondents agree with the statement except 2 respondents who are neutral and 1 respondent who strongly disagrees. This indicates that the respondent is comfortable with the current support structure of the ERP system.



**Figure 6.25 Response to S10**

**Statement (S11):** The implementation of an ERP system should include proper training for management accountants.

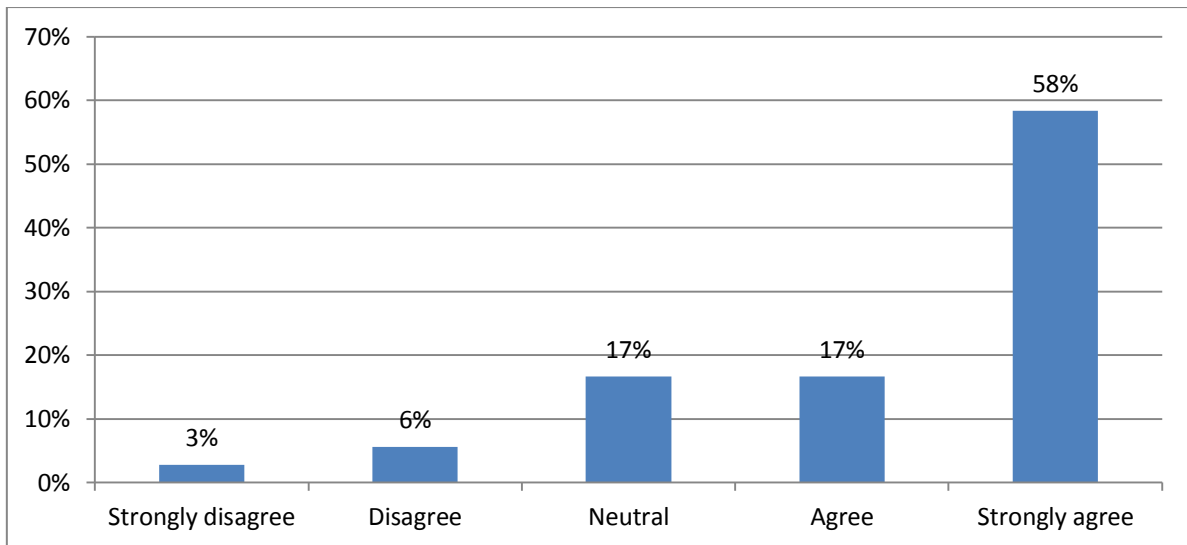
The results indicate that training is an important element of the proposed ERP system (Figure 6.26). Most of the respondents agree with the statement except for 3 respondents who are neutral. This indicates that the respondents are not certain if this element of proposed framework is important. The respondents might also be comfortable with the current training that is offered within the Water Industry.



**Figure 6.26 Response to S11**

**Statement (S12):** Management accountants should be involved in testing the functionality of ERP system.

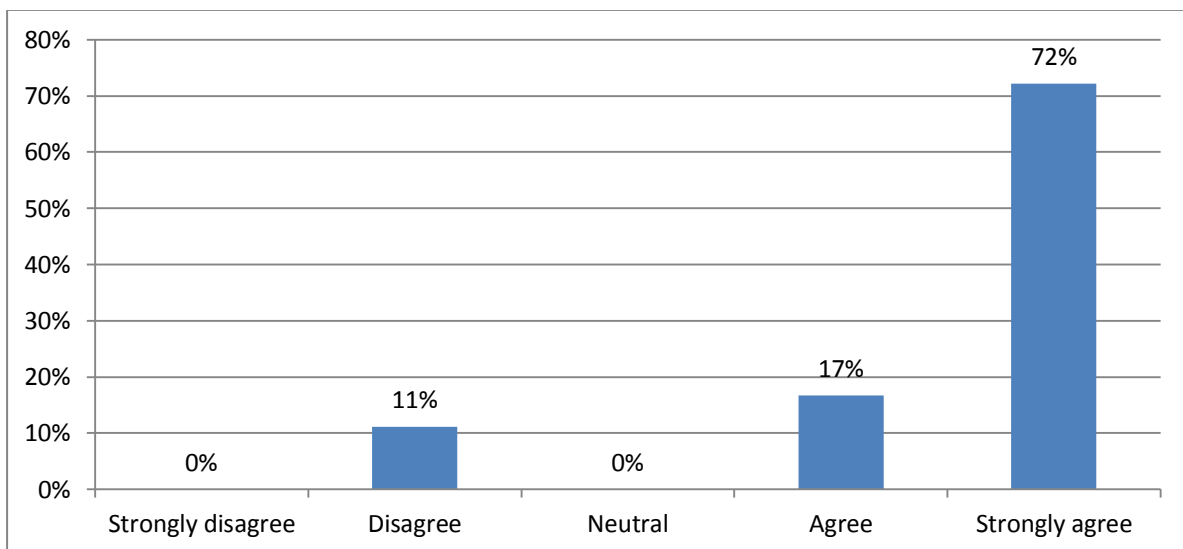
The results show that testing is a critical element of the proposed ERP system implementation framework (Figure 6.27). The majority of the respondents agree with the statement except 6 respondents who are neutral, 2 respondents disagree and 1 respondent strongly disagrees. This indicates that the respondents are not certain if this element of proposed framework is important. The respondents may also be comfortable with their involvement during testing the functionality of the ERP system.



**Figure 6.27 Response to S12**

**Statement (S13):** The ERP system that best matches user requirements should be selected for implementation.

There is an overwhelming response that indicates that the ERP system that best match user requirements should be selected for implementation (Figure 6.28).The majority of the respondents agree with the statement except 4 respondents who disagree. This indicates that the respondents are not certain if this element of proposed framework is important. This might also show that the respondents are happy with the current ERP system they have implemented.

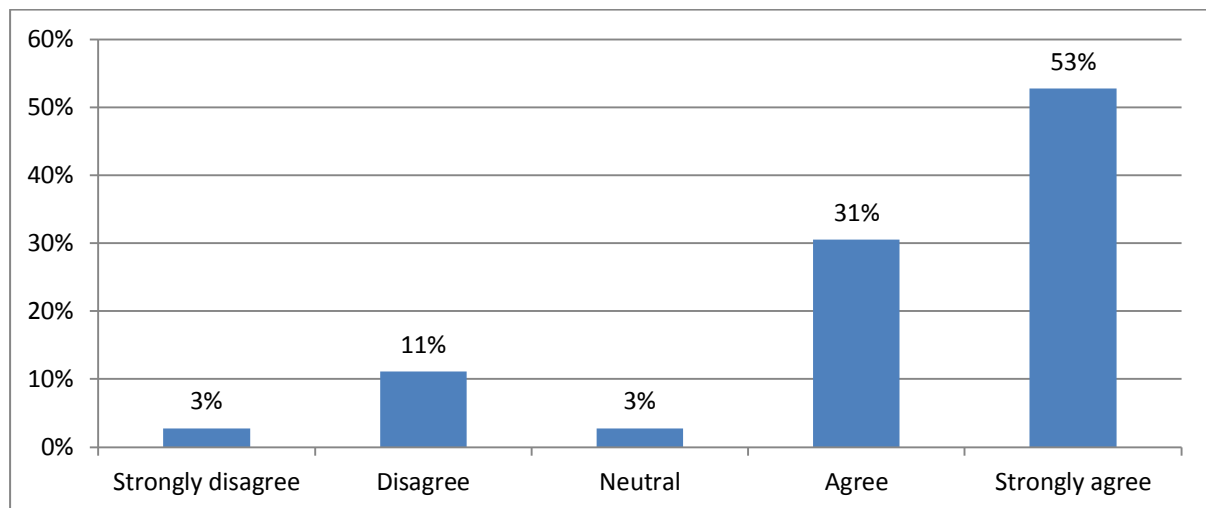


**Figure 6.28 Response to S13**



**Statement (S14):** The involvement of management accountants in ERP system will ensure that the ERP system is fully utilised for management accounting purpose.

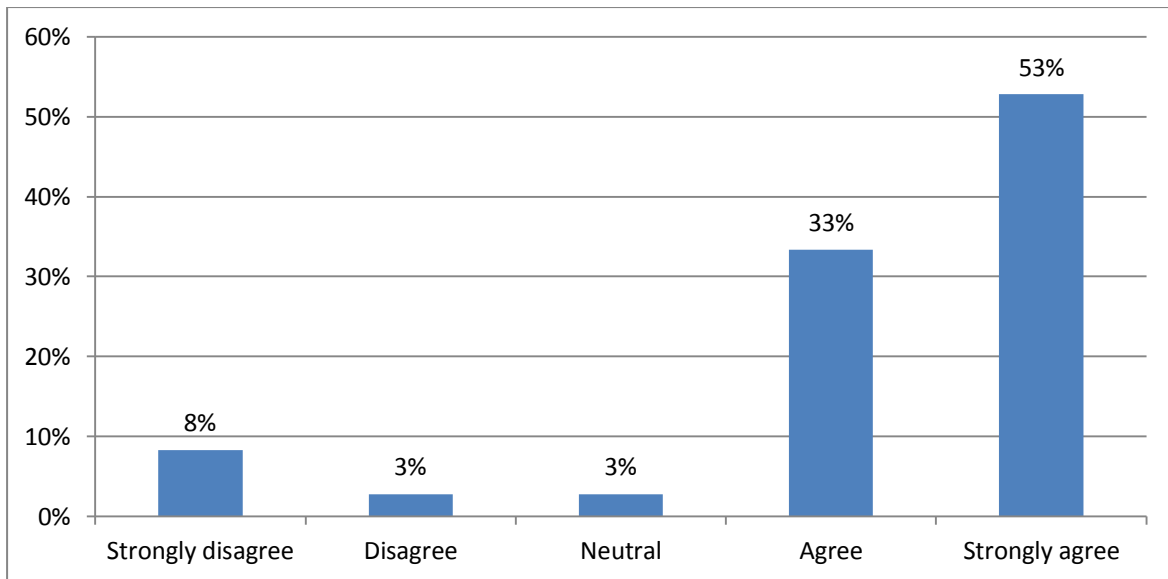
All departments have an overwhelming response to agree with the framework that proposes the involvement of management accountants on ERP system implementation (Figure 6.29). The majority of the respondents agree with the statement while 3% of respondents are neutral, 11% respondents disagree and 3% strongly disagree. This indicates that the respondents are not certain if this element of proposed framework is important. This also indicates that the respondents are satisfied with the current involvement of management accountants on ERP system implementation.



**Figure 6.29 Response to S14**

**Statement (S15):** The expectation of the project should be clearly communicated from the start.

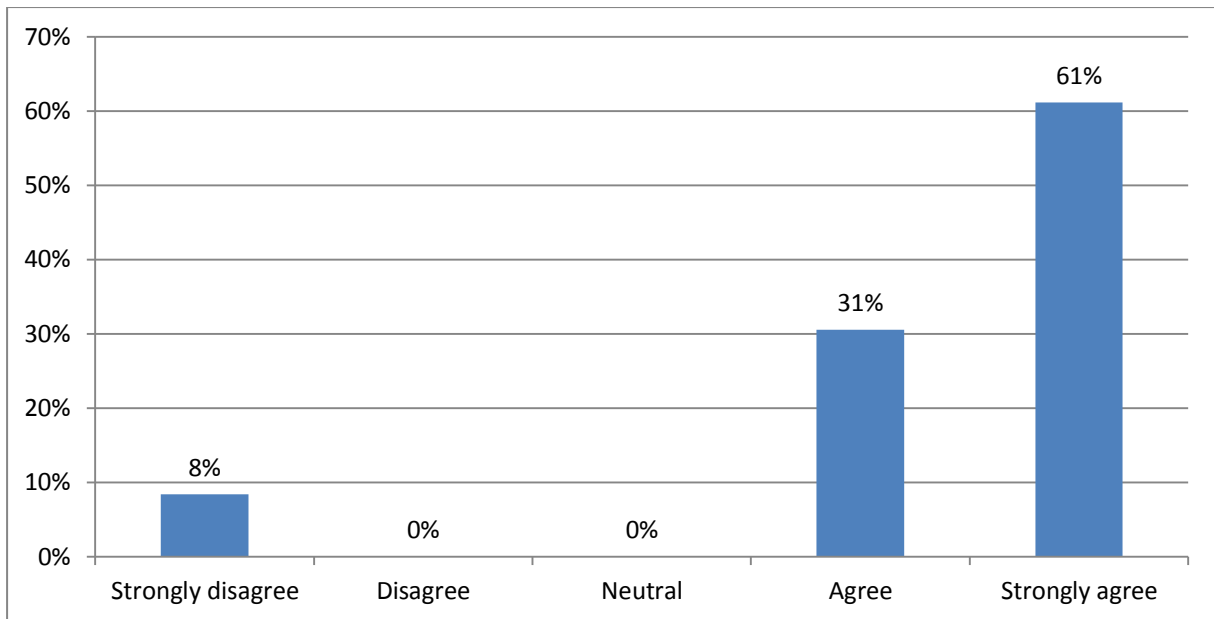
There is an overwhelming response that indicates project communication is a critical element of the proposed ERP system implementation framework (Figure 6.30). The majority of the respondents have agreed with the statement except that 1 respondent is neutral while 1 respondent disagrees and 3 respondents strongly disagree. This indicates that the respondents are not certain if this element of proposed framework is important. This also indicates that the respondents are satisfied with the current project communication expectations.



**Figure 6.30 Response to S15**

**Statement (S16):** The proposed ERP system framework will help to ensure the successful implementation of ERP system.

The results indicate that all departments thoroughly agree that the proposed ERP system implementation framework will help to ensure successful implementation of ERP system (Figure 6.31). There are 3 respondents who are uncertain that the proposed ERP system implementation framework will be effective. This could indicate that these respondents would like to see the model implemented before giving their opinion.



**Figure 6.31 Response to S16**

*Section C1: Summary of findings*

The selected sample indicates that there is an overwhelming response that indicates that the proposed ERP system implementation framework will be effective in the Water Industry (Figure 6.31). There are positive results that support having a steering committee to encourage senior management involvement in developing the ERP system business plan and to define the objectives of an ERP system implementation (Figures 6.19 & 6.20).

The respondents are in favour of having management accountants as part of an ERP system implementation team to ensure that the business processes are correctly documented as management accountants have appropriate business knowledge (Figure 6.21). The respondents agree that the involvement of management accountants in the implementation of the ERP system will ensure that management accounting techniques, such as budgeting will be integrated into the ERP system (Figure 6.16). The respondents also agree that the ERP system needs an additional tool like BI to enhance the reporting capabilities of the ERP system. The respondents further agree that there is a need for data cleansing as the quality of data determines the quality of the reports to be generated (Figures 6.18 & 6.23). The respondents indicated that after the implementation of the ERP system the role

of management accountants must be reviewed and there is a need to establish a Centre of Excellence to provide training and ensure continued support of the system (Figures 6.24, 6.25 & 6.26). This will help to reduce over-reliance on the consultants.

## **6.7 Section C2: Respondent's views**

This is the section whereby the respondents were asked their view on the following open-ended questions:

1. What problems do you foresee with implementing this proposed ERP system implementation model in your company?
2. What improvements can be identified with the introduction of this proposed ERP system implementation model?

The summaries of responses from the open-ended questions are outlined below (Tables 6.1 & 6.2). Annexure 6 gives a list of the problems that were received from the respondents that gave their opinion on the two open-ended questions.

The findings in Table 6.1 are related to the respondents' opinion on what they might foresee if this proposed ERP system implementation framework had to be implemented in the Water Industry. Similar problems that appear the most across the respondents are summarised. Thematic analysis was used to gather and analyse data on the open-ended questions from the respondents. In order to simplify data analysis, the coding system was done before data could be analysed. These problems will be analysed (Table 6.1).

Number	What problems do you foresee with implementing this proposed ERP system implementation model in your company?
1	Data quality: transferring old data into the new system
2	Lack of focus on change management
3	Lack of support and involvement of key stakeholders
4	Project management is always a challenge
5	Support cost will be high due to lack of in-house capacity
6	Lack of skills to implement the model
7	Communication strategy must be developed

**Table 6.1 Respondents opinion to open ended question 1**

The respondents feel that there must be a clear understanding of the data to be transferred from the legacy system to the new system so that when the framework is implemented it is clear how to convert the data. The framework does not consider change management. The respondents feel that the component of change management needs to be included in the framework to ensure that it covers the entire value chain of ERP system implementation. This is understandable as it is important to get employees to use the new ERP system and to avoid resistance in using the ERP system.

The respondents feel that this framework will increase the work load of management accountants as well as of senior management. This may result in the core business suffering as people may put more emphasis on ERP system implementation. This could indicate that there are conflicting priorities if proper planning is not done before the implementation of the framework. The respondents feel that this framework requires good project management skills to ensure that all the links on the framework are properly executed. If there is a lack of project management skills the implementation of the framework might be a failure.

The implementation of the proposed framework may result in high support costs after the implementation if the organisation does not ensure that proper skills to support the ERP system are available. The respondents feel that management accountants must be properly trained in this framework so that when the framework gets implemented there is a clear understanding on what needs to be done to ensure that the model is effective. The respondents further indicate that a communication

strategy must be properly developed to ensure that consistent messages are communicated across the organisation. This supports the organisational ERP system strategy to ensure that goals and objectives of implementing the ERP system are properly communicated.

The findings below are in relation to the improvements that can be identified with this proposed ERP system implementation framework for the Water Industry (Table 2). The table below summarised the problems identified on the proposed framework and the important ones that stand out were selected.

<b>Number</b>	<b>What improvements can be identified with this proposed ERP system implementation model?</b>
1	Cost reduction
2	Easy reporting
3	Improvement on communication with the decision makers
4	A good representation on the steering committee
5	Improved training
6	Performance evaluation must be incorporated on the framework
7	Improvement on the implementation of the ERP system
8	Integrating management accounting techniques with the ERP system
9	Improved data cleansing
10	Better understanding of business requirements

**Table 6.2: Respondents opinion to open ended question 2**

The respondents feel that the proposed ERP system implementation framework will result in cost reductions after the implementation of the ERP system as the organisation will have the internal capacity to continue supporting the ERP system. The respondents feel that the framework will improve reporting within the organisation. The improved reporting will aid the organisation in quick decision making as it will take less time to compile reports than before.

The other respondents feel that the framework will improve communication between the decision makers and the implementation team as senior management will be part

of the steering committee. The respondents feel that the steering committee proposed by the framework should have a good representation. The respondents also feel that the framework will result in improved training as the training will be conducted in-house. The respondents feel that it will be easier to evaluate the performance of the ERP system against the objectives set on the business plan. This is due to the fact that performance evaluation has been incorporated the proposed framework.

The respondents feel that the implementation of the framework will improve the integration of management accounting techniques with the ERP system. The respondents further confirm that the framework will ensure that there is proper data clean-up and a better understanding of business requirements. The respondents, in general, believe that the implementation of the framework will improve the success rate of implementing the ERP system and reduce costs.

## **6.8 Conclusions**

The proposed ERP system implementation framework was presented to the sample of respondents with the aim of finding out if there will be any problems with the implementation of the framework within the organisation. The results of this would be used to improve the framework so that the framework to be implemented can add value within the organisation. The majority of the respondents agree with the statements on the proposed ERP system implementation framework and they feel that the framework will bring a solution to the problems that management accountants encounter during and after the implementation of the ERP system (Table 4.1).

The main study presented eleven problems that management accountants encounter during and after the implementation of ERP system (Section B). There was a good response from the respondents that these problems exist within the Water Industry (P1-P8).

The proposed ERP system implementation framework was presented with the statements to the sample of respondents (Section C1). The respondents demonstrated that they are in favour of implementing the proposed framework. The framework will be supported by senior management and it will assist management

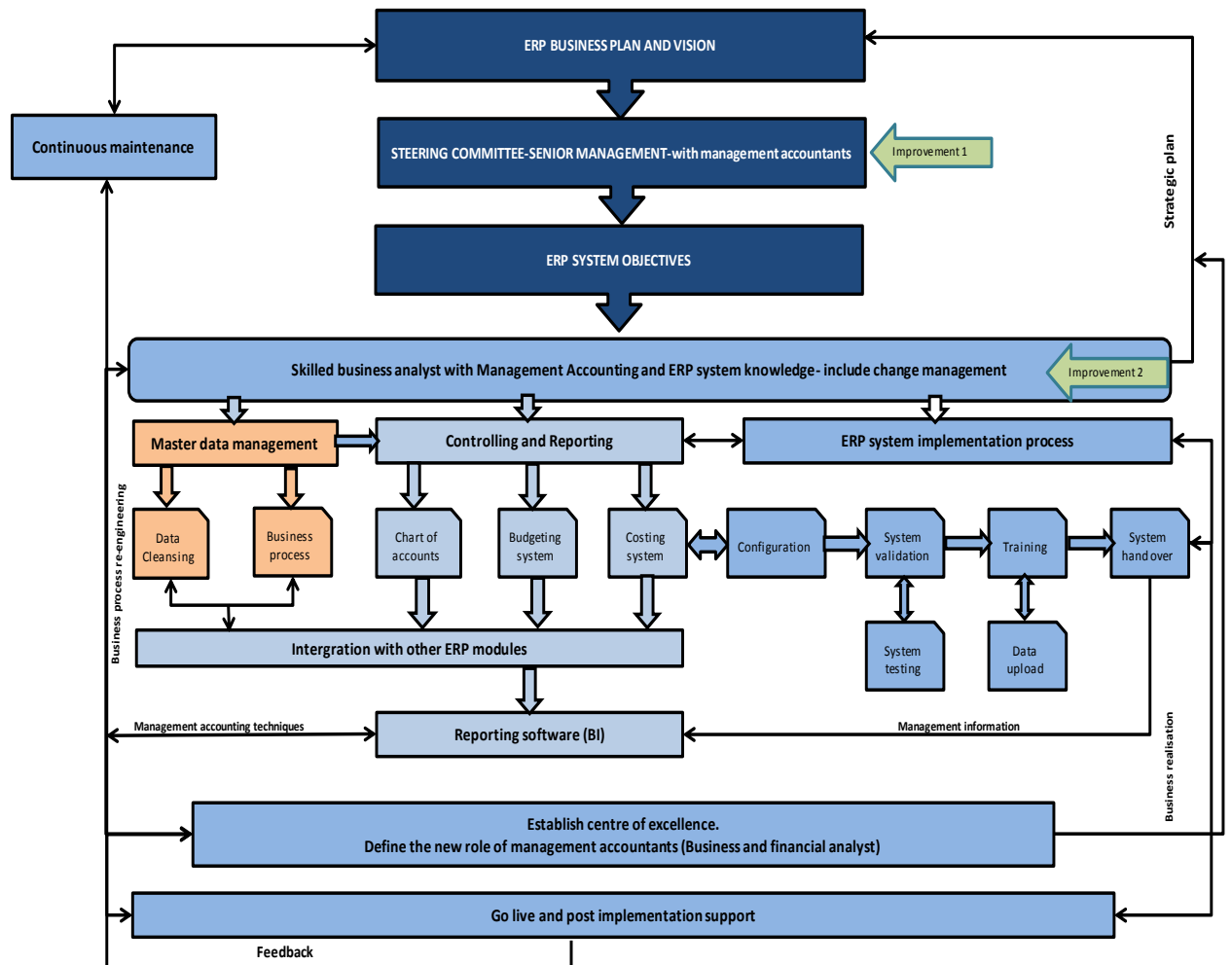
accountants to benefit from the implementation of the ERP system. The statements (S1 to S16) presented have a good response rate that support the framework.

The respondents were asked about the problems they foresee with the proposed framework (Table 6.1). The respondents feel that the framework must also include change management to ensure that there is no resistance during the implementation of the framework. The respondents agree that the framework will improve the success rate of implementing the ERP system and facilitate reporting within the organisation.

The respondents were asked about the improvements that this framework can bring to the company (Table 6.2). The respondents feel that change management should be included in each and every stage of the model. They also feel that during the steering committee period, there should be a good representation and management accountants should be part of that representation. This could indicate that management accountants want to be involved in the decision making process throughout the implementation of the ERP system. The researcher feels that these are valid points to improve the current ERP system implementation framework.

The improved ERP system implementation framework is proposed so that it can be implemented in the Water Industry (Figure 6.32). The updated model incorporates the suggestions obtained from the analysis of the findings in this chapter. The first improvements will be to include management accountants on the steering committee to ensure that there is a good representation. The second improvement is to include change management throughout the proposed improved framework. This will ensure that change management becomes a priority within the Water Industry when implementing or upgrading the ERP system.





**Figure 6.32 Improved ERP system implementation framework**

**Name of framework: Management Accountant ERP Framework**

**Source: Author's own construction**

In this chapter, the researcher presented and analysed the research questionnaires (Annexure 2). An improved ERP system implementation framework was presented to take into account the results from the survey. In the next chapter, the researcher will present the summary of the research findings which are based on the empirical survey. Recommendations and additional research opportunities will also be presented in the next final chapter.

## Chapter 7

### Conclusions and Recommendations

#### 7.1 Introduction

Even though water is core to any economy, it is not properly reflected in macro- and sector strategies. The national budgets allocated to water do not reflect the importance of water as a strategic and scarce resource. Management accountants play an important role within the Water Industry to ensure that resources are allocated correctly. Management accountants perform an internal accounting reporting function on behalf of management. In order for management accountants to perform these functions, proper techniques and technology must be in place (Mowen & Hansen, 2008).

ERP systems like SAP, BAAN and Oracle have greatly simplified internal reporting in organisations. The implementation of the ERP system has affected the role of management accountants as they are required to have a proper understanding of business process and IT knowledge (Granlund, 2011). Management accountants have experienced challenges during and after the implementation of ERP systems. In order to address these challenges an ERP system implementation framework has been developed. The ERP system implementation framework proposed provides guidance on how management accountants should implement an ERP system (Figure 6.32).

In Chapter 2, a literature study was conducted to determine the importance of the Water Industry and the IT solutions used in this industry. In Chapter 3, a literature summary was conducted to explain the role of management accountants. This was done by taking into account management accounting techniques. Chapter 4 presented a literature study on the nature and the importance of the ERP system. A preliminary study was also conducted in Chapter 4 to investigate the main challenges that management accountants experience with ERP systems implementations.

The generic ERP system implementation framework was analysed on which the proposed ERP system implementation framework for the Water Industry was based

(Chapter 4). The research methodology of this study was identified (Chapter 5). In Chapter 6, an empirical study was conducted to verify the challenges that management accountants encounter after the implementation of ERP system and to investigate if the proposed ERP system implementation framework could be used to improve the current situation regarding challenges experienced by management accountants during and after the implementation of ERP system at the Water Industry. An improved ERP system implementation framework was presented at the end of Chapter 6.

In this chapter, the research questions will be discussed to determine whether the research conducted, effectively answers the questions set by these problems (Section 7.2). There are some recommendations that the Water Industry can look at which will be discussed (Section 7.3). The limitations of the research will be discussed (Section 7.4) and the opportunity for future research will be discussed (Section 7.5).

## **7.2 The research question and objective investigated**

The main research question and objective for the study was addressed by developing several research questions and objectives. The summaries of the research questions are explained below.

### *7.2.1 The main research question (RQm)*

The main research question was stated as, “*Can an ERP system implementation framework be developed for management accountants in the Water Industry in South Africa*”. The RQm was answered by developing and evaluating an ERP system implementation framework (Figure 7.1)

The following research questions were asked to answer the main research question:

- RQ1: What is the importance of the Water Industry and what IT solutions are used?
- RQ2: What is the role of management accountants in the Water Industry?
- RQ3: What are the problems experienced in the Water Industry regarding ERP systems’ implementation?

- RQ4: What is the importance of ERP systems application and their impact on management accountants?
- RQ5: Can an ERP systems implementation framework for the Water Industry be developed?
- RQ6: Can an ERP systems implementation framework for the Water Industry be evaluated?

### 7.2.2 *The main research objective (ROm)*

The main research objective of this study was:

ROm: *To develop and evaluate a management accounting ERP systems implementation framework for the Water Industry in S.A.*

The research objectives of this study were:

- RO1: To identify the importance of the Water Industry and the information technology (IT) solutions which it uses;
- RO2: To review the literature in order to establish the role of management accountants within the Water Industry;
- RO3: To identify the current problems experienced by management accountants in the Water Industry in South Africa;
- RO4: To understand the importance of ERP systems and the impact they have on management accounting practices;
- RO5: To develop and implement an ERP systems implementation framework for the Water Industry;
- RO6: To evaluate an ERP systems implementation framework for the Water Industry.

### 7.2.3 *Research question (RQ1) and objective (RO1)*

The research question was answered, “*What is the importance of the Water Industry and what IT solutions are used?*” and the research objective was also addressed, to identify the importance of the Water Industry and the information technology (IT) solutions which are used. In Chapter 2, a literature study was conducted which focused on the Water Industry and the IT solution used. It was important to look at the value chain of the Water Industry and the systems that support the management

of water. This includes the importance of water in a global economy and in a human's life.

The water utility activities process which included from source, treatment, billing and metering were discussed (Figure 2.3). The water utility activities require a system as an enabler. To run the activities ERP systems like SAP and Oracle have developed functionality specific to the utility industry. The utility module of an ERP system manages the whole value chain of the Water Industry from the source to billing customers (Chapter 2).

#### *7.2.4 Research question (RQ2) and objective (RO2)*

The research question to be answered was stated as, "*What is the role of management accountants in the Water Industry?*" and the research objective addressed was, to review the literature in order to establish the role of management accountants within the Water Industry. In chapter 3, it was important to obtain a holistic view of the role and functions of management accountants within the organisation. Management accounting is a process that is concerned with the provision of information for use internally, within the organisation, for decision making by managers, and for control of business activities (Gowthorpe, 2008). The information provided is used by all stakeholders within the organisation to measure the organisation's performance.

The management accounting techniques that management accountants used in performing their function includes Budgeting, ABC, ZBB and reporting. These techniques required a proper information system to be executed correctly and reliably. The role of management accountants is dependent on the ERP system that the organisation has implemented and their functions are performed with the assistance of an ERP system (Chapter 3).

#### *7.2.5 Research question (RQ3) and objective (RO3)*

The research question to be answered was stated as, "*What are the problems experienced in the Water Industry regarding ERP systems implementation?*" The research objective addressed was, to identify the current problems experienced by management accountants in the Water Industry in South Africa. The problems were identified throughout the preliminary study. The preliminary study consisted of open-

ended questions (Annexure 1) about the ERP system that management accounting uses when they perform their functions (Chapter 2). The preliminary study results identified eleven main problems with the ERP system implementation (Table 4.1). These problems were identified as Problem P1 to Problem P11 in Chapter 4.

#### *7.2.6 Research question (RQ4) and objective (RO4)*

The research question to be answered was stated as, “*What is the importance of ERP systems application and their impact on management accountants?*” and the research objective addressed was stated as, to understand the importance of ERP systems and the impact they have on management accounting practices. In Chapter 4, the literature study investigated the importance of an ERP system in the organisation. The benefits of implementing an ERP system include improving efficient and effective use of resource. ERP system improves system integration by bringing together all the subsystems into one system and ensuring that a single system is used to cater for all financial and non-financial information for the organisation.

The success of implementing an ERP system is dependent on CSFs which include top management support, business plan and vision, re-engineering business processes, effective project manager and project champion, team work and composition, ERP system selection, user involvement, education and training, and data integrity. In order to implement an ERP system successfully, the organisation must attempt to know the critical success factors (CSFs) up front. The identification of CSFs helps the organisation to do proper planning before ERP systems can be acquired and implemented (Chapter 4).

#### *7.2.7 Research question (RQ5) and objective (RO5)*

The research question to be answered was stated as, “*Can an ERP systems implementation framework be developed for the Water Industry?*” The research objective addressed was, to develop and implement an ERP systems implementation framework for the Water Industry. In order to identify how the framework can be developed, a literature study on generic framework was investigated (Chapter 4). The ASAP methodology providing steps that need to be followed when implementing the ERP system was discussed in Chapter 4. The

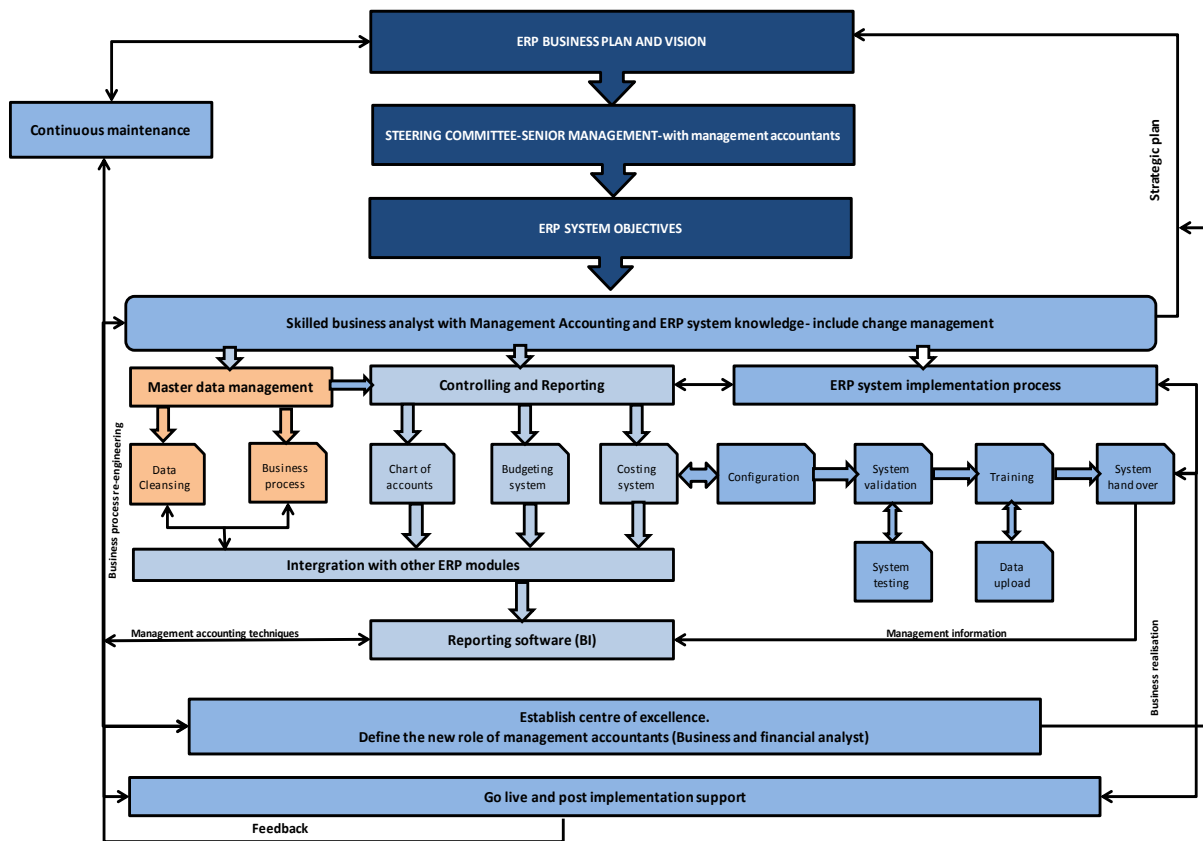
proposed framework incorporated the CSFs highlighted in Chapter 4. It was also important to address the main problems that management accountants experience within the Water Industry, the preliminary study was conducted in Chapter 4 to identify these problems. Eleven problems were identified and incorporated into the proposed ERP system implementation framework.

#### *7.2.8 Research question (RQ6) and objective (RO6)*

The research question to be answered was stated as, “*Can an ERP systems implementation framework be evaluated for Water Industry?*” The research objective to be addressed was, to evaluate an ERP systems implementation framework for the Water Industry. The proposed ERP system implementation framework has to be evaluated to test if it is going to solve the problems that the Water Industry is encountering during and after the implementation of ERP system. The empirical study was conducted using a sample from relevant departments and positions at the Water Industry that have an impact on the proposed ERP system implementation framework.

The eleven main problems in the implementation of ERP system that were identified in the preliminary study were presented in the questionnaire (Annexure 2 - Section B) in the main study. This was to determine if the respondents agreed that these were the main challenges that were to be incorporated in the proposed model. The questionnaire (Annexure 2 – Section C) also included statements and open-ended questions were conducted on the proposed framework that incorporated literature studies (Chapters 2, 3 and 4). The results of the responses from the questionnaires were analysed and evaluated (Chapter 6).

The proposed ERP system implementation framework was improved based on the results and opinions from the respondents. The results from the respondents allowed the researcher to re-evaluate the framework and proposed the improved framework below (Figure 7.1).



**Figure 7.1 Improved ERP system implementation framework**

**Name of framework: Management Accountant ERP Framework**

**Source: Author's own construction**

### 7.3 Recommendations

The empirical results were clear that the proposed ERP system implementation framework can be implemented within the Water Industry as this will solve the problems experienced by management accountants. The researcher proposed several recommendations that must take place to ensure that the improved ERP system implementation framework can be implemented successfully.

- a. It is recommended that the organisation starts to document the ERP system business plan, which will outline the goals and objectives of implementing the ERP system. They should start to measure the milestones of the project against the standards set on the ERP system business plan on a monthly basis. The business plan and vision of the project must be developed before the project can be implemented. This provides management and the



stakeholders with clear direction during the implementation process (Galani et al., 2010).

- b. It is recommended that the organisation must start focusing on establishing the steering committee that will include senior management as part of the team. The steering committee should meet on a monthly basis to discuss strategic issues affecting the ERP system. Top management support is one of the critical success factors of implementing an ERP system. Top management should provide leadership and the resources required to implement the project (Chapter 4- Section 4.3).

The steering committee should have members that have knowledge of business processes. This was identified during the analysis of the open-ended question (Section 6.7). Good representation assists an organisation ensure that business derives good value from implementing an ERP system.

- c. It is recommended that the organisation employs business analysts with both management accounting skills and ERP system knowledge. This assists to ensure that the configuration of the system matches the business processes of the organisation. The management accountants should be involved in the implementation of the ERP system as they are most likely to represent business needs when it comes to reporting both financial and non-financial information (Section 4.7.4).
- d. It is recommended that the organisation should dedicate some of their resources to data clean-up. The cleansing of data should go hand in hand with the business process of mapping and re-engineering. This is to ensure that any information identified by the process is cleansed to ensure that it is ready for migration to the ERP systems.
- e. It is recommended that the organisation acquires BI to build on top of the ERP system to enhance the reporting capabilities of the ERP system. It was identified that ERP systems are good in transactional recording and processing (Section 4.7.6). The FI/CO modules should be configured to

handle ABC to avoid the use of other systems by management accountants. This should be the first priority during the gathering of business requirements. ERP systems should be able to handle the budget of the organisation other than by using a spread-sheet and other software that does not integrate with the ERP system (Section 4.6).

- f. It is recommended that the organisations that implement an ERP system must establish a Centre of Excellence to build their own in-house capacity to support the system (Section 4.7.8). The role of management accountants should be reviewed after the implementation of the ERP system. Management accountants should occupy the role of business analyst. They should have both ERP system knowledge and management accounting knowledge (Granlund, 2011).

#### **7.4 Limitation of study**

The following limitations were identified with this research study:

- The sample size was small due to the small groups in each department that had an influence on ERP system implementation framework;
- Statistical methods, such as the Cronbach Alpha and T test, could not be utilised in this study due to the small populations in each groups so only qualitative analysis could be performed;
- This research study was conducted on one Water Entity in Pretoria.

#### **7.5 Future research**

The following research related issues could be addressed by further research study. The research topics that could be investigated are outlined below.

- Future research could be studied by evaluating this framework in other Water Entities in the Water Industry to obtain a bigger sample size so that quantitative statistical analysis of the framework can be evaluated;
- A detailed research could be conducted on the effectiveness of the framework and the impact that the framework has on improving ERP system implementation;

- A detailed research project could be conducted on the impact that ERP system has on the role of management accountants;
- An in-depth research study could be conducted on the overall effectiveness of the process of implementing the ERP system in the Water Industry by incorporating the proposed ERP system implementation framework.

## **7.6 Summary**

The main objective of the study was to develop an ERP system implementation framework for the Water Industry. The milestone to achieve this included:

- A literature study on the importance of Water Industry and IT solution it uses;
- A literature study on the role of management accountants within the Water Industry;
- A preliminary study was conducted to identify the current problems experienced by management accountants in the Water Industry;
- A literature study was conducted to understand the importance of ERP systems and the impact they have on management accounting practices;
- A development of the ERP system implementation framework for the Water Industry;
- The proposed ERP system implementation framework was presented to the sample in the Water Industry with a questionnaire, evaluating the results and developing the proposed ERP system implementation to an improved proposed ERP system implementation framework.

The study concluded that the ERP system implementation framework to be used by management accountants in the Water Industry can be developed. Recommendations were made to areas where improvements are needed for this framework to be implemented successfully and opportunities for further research were also outlined in this chapter. The study contributed the following items:

- A new ERP system implementation framework was developed
- The case study results and feedback was provided to the Water entities to improve their ERP environment.

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## ANNEXURE 1: PRELIMINARY STUDY COVER PAGE AND QUESTIONNAIRE

### Cover page and questionnaire



10 May 2012

Dear Sir / Madam,

I am an MBA student at the Nelson Mandela Metropolitan University (NMMU) currently completing my final year. As part of my course, research needs to be conducted in the form a treatise to be submitted to fulfil the requirements of the MBA course. The aim of this research is to investigate the main problems experienced by a company after the implementation of ERP systems and to develop an ERP system implementation model to be used within the company.

This questionnaire will be used to collect data for this research. The questionnaire will remain anonymous hence your name will not be recorded therefore ensuring your confidentiality. The questions will be asked on a one-on-one basis therefore you may feel free to ask for clarity at any point.

Thank you for your co-operation.

Yours sincerely,

Norman Mudau

MBA student

Supervisor – Prof Andre Calitz – NMMU Business School

## Preliminary Study Questionnaire.

### Section A - Preliminary Questions

Please write down your own opinion with regard to these sections indicated below.  
Please print when you write, keep your answers short and be clear.

1. Strategic planning is the cornerstone of the successful implementation of the ERP system. In your opinion what are the challenges that management accountants face during the execution of the ERP system implementation strategy?

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2. Which of the following management accounting techniques are used during ERP system implementation and what are the typical benefits and problems, if any, that management accountants experience whilst performing these techniques?

2.1 Implementation of Activity Based Costing (ABC):

2.1.1 Usage	Yes	No
2.1.2 If used, what Benefits		
2.1.3 If used, what Problems		

2.2 Prepare budget using Zero Bases Budgeting (ZBB):

2.2.1 Used?	Yes	No
2.2.2 If used, what Benefits		
2.2.3 If used, what Problems		

2.3 Preparation of internal management reporting on both financial and non-financial information:

2.3.1 Used?	Yes	No
2.3.2 If used, what Benefits		

2.3.3 If used, what Problems	

2.4 Preparation of budgets and pricing:

2.4.1 Used?	Yes	No
2.4.2 If used, what Benefits		
2.3.3 If used, what Problems		

3. What are the problems, if any, which management accountants face after the ERP system implementation with regard to?

3.1 Cost allocation

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3.2 Classification

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3.3 Reporting

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4. What constraints, if any, are there with the ERP system implementation within the management accounting environment?

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5. In your opinion what are the problems, if any, of the management accounting staff after an ERP system is implemented with regard to

5.1 Management accounting structures

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5.2 Competency and training

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6. In your own opinion, what are the problems, if any, that management accountants face when it comes to top management buy in and participation in implementing ERP systems?

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7. In your opinion are there any other challenges with the ERP system implementation at the company that affect the overall role and function of management accountants, which are not covered in the above questions?

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## ANNEXURE 2: MAIN STUDY COVER PAGE AND QUESTIONNAIRE

### Cover page and questionnaire



08 July 2012

Dear Sir / Madam,

I am an MBA student at the Nelson Mandela Metropolitan University (NMMU) currently completing my final year. As part of my course, research needs to be conducted in the form a treatise to be submitted to fulfil the requirements of the MBA course. The aim of this research is to investigate the main problems experienced by company after the implementation of ERP systems and to develop an ERP system implementation model to be used within the company.

A pilot study was performed to identify the main ERP system implementation problems within the company which are stated in Section B. Attached is a proposed ERP system implementation model (Attachment 1) for the company where these problems are addressed and a questionnaire in Section C that will be used to collect data on this model for the research.

The questionnaire will remain anonymous hence your name will not be recorded therefore ensuring your confidentiality. The questions will be asked on a one-on-one basis therefore you may feel free to ask for clarity at any point.

Thank you for your co-operation.

Yours sincerely,

Norman Mudau

MBA student

Supervisor – Prof Andre Calitz – NMMU Business School

Co-Supervisor: Dr Brenda Scholtz – NMMU Business School

## Questionnaires

Please provide the following information regarding your work situation by marking an X in the appropriate box. Sections A, B, C1 and C2 must be completed.

### Section A - Biographical Information

1. What is your current length of service in years within the company?

Less than 5	
5-10	
11-15	
16-20	
More than 20	

2. Which department are you currently in?

Management accounting	
Financial management	
Revenue management	
Financial accounting	
Supply chain	
Assets management	
Information Technology	

3. What is your current position in the company?

Management accountant	
Financial analyst	
Financial manager	
Financial accountant	
Revenue accountant	
Assets accountant	
Project accountant	
Accountant	
SAP specialist	

4. How many years have you spent in your current position?

Less than 5	
5-10	
11-15	
16-20	
More than 20	

## Section B – Preliminary Study Results

Below are the main problems that were identified, in a pilot study, with the implementation of an ERP system in the Water Industry. In your own opinion please indicate whether you Strongly Disagree, Disagree, are Neutral, Agree or Strongly Agree with these statements.

Problem	Main Problems Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
P1	Lack of integration between an ERP system and management accounting techniques	1	2	3	4	5
P2	There are other systems used with separate databases over and above the ERP system	1	2	3	4	5
P3	There is a lack of reporting capabilities in an ERP system	1	2	3	4	5
P4	There is a lack of an ERP strategic plan and top management involvement	1	2	3	4	5
P5	There is a lack of understanding of business processes	1	2	3	4	5
P6	The data is not properly cleansed	1	2	3	4	5
P7	The ERP system is configured according to business requirements without looking at the best practices.	1	2	3	4	5
P8	The role of management accountants is not reviewed after ERP system implementation	1	2	3	4	5
P9	There is a lack of training of management accountants on how to use a new ERP system	1	2	3	4	5
P10	Lack of involvement on ERP system testing	1	2	3	4	5
P11	The ERP system does not meet user requirements	1	2	3	4	5

## Section C1 - Proposed ERP System Implementation Model

On the last page of this questionnaire is a proposed ERP system implementation model for a company in the Water industry (Attachment 1). Please study the model in detail and in your own opinion; please indicate whether you Strongly Disagree, Disagree, are Neutral, Agree or Strongly Agree with the statements that the model proposes.



No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
S1	It is important to integrate an ERP system with management accounting techniques like budgeting. (Problem P1)	1	2	3	4	5
S2	One of the main benefits of implementing an ERP system is to have one central database where the information can be stored (centrally.) (Problem P2)	1	2	3	4	5
S3	ERP systems lack reporting capabilities, therefore specialised software like Business Intelligence (BI) must be implemented to enhance the reporting capabilities of the ERP system. (Problem P3)	1	2	3	4	5
S4	It is important to have a steering committee to develop an ERP system business plan/vision. (Problem P4)	1	2	3	4	5
S5	Having a steering committee will encourage senior management involvement in the implementation of an ERP system. (Problem P4)	1	2	3	4	5
S6	Management accountants have an understanding of business and they should form part of the ERP system implementation team to ensure that businesses processes are correctly documented. (Problem P5,P7)	1	2	3	4	5
S7	The company must implement an ERP system based on best practices to avoid system customisation. (Problem P7)	1	2	3	4	5
S8	Data cleansing forms an integral role in ensuring that the ERP system implementation is a success. (Problem P6)	1	2	3	4	5
S9	The role of management accountants needs to be reviewed after the implementation of an ERP system as the ERP system transfer financial knowledge to non-finance people. (Problem P8)	1	2	3	4	5
S10	The implementation of an ERP system requires that the company establish a centre of excellence. (Problem P8)	1	2	3	4	5
S11	The implementation of an ERP system should include proper training for management accountants. (Problem P9)	1	2	3	4	5
S12	Management accountants should be involved in testing the functionality of the ERP system. (Problem P10)	1	2	3	4	5
S13	The ERP system that best matches user requirements should be selected for implementation. (Problem P11)	1	2	3	4	5
S14	The involvement of management accountants in an ERP system implementation will ensure that the ERP system is fully utilised for management accounting purposes. (Problem P1)	1	2	3	4	5
S15	The expectations of the project should be clearly communicated from the start of the project. (Problem P4)	1	2	3	4	5
S16	The proposed ERP system framework will help to ensure the successful implementation of ERP system. (Combination of all problems)	1	2	3	4	5

## Section C2: Respondents Opinion

In your own words please answer the following questions relating to the ERP system implementation model presented in Attachment 1.

1. What problems do you foresee with implementing this proposed ERP system implementation model in your company?

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2. What improvements can be identified with this proposed ERP system implementation model?

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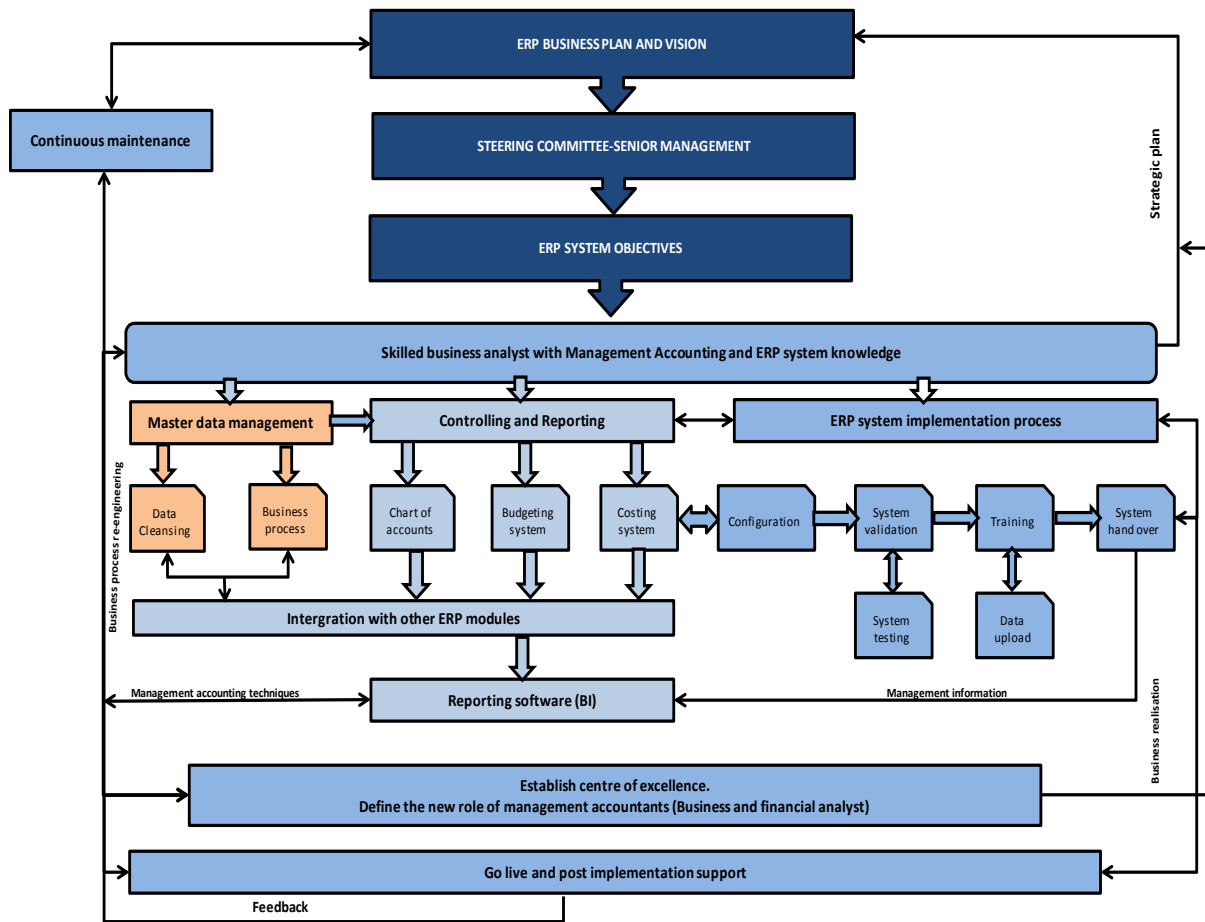
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**Thank you for your cooperation.**

**ATTACHMENT 1**



**Name of framework: Management Accountant ERP Framework**

**Source: Author's own construction**

### ANNEXURE 3: MAIN STUDY OVERALL BIOGRAPHICAL DATA

<b>1. What is your current length of service in years with the company?</b>		
<b>Years</b>	<b>Number of responses</b>	<b>Percentage</b>
Less than 5	25	69%
Between 5-10	8	22%
Between 11-12	3	8%
<b>2. Which department are you currently in?</b>		
<b>Departments</b>	<b>Number of responses</b>	<b>Percentage</b>
Management accounting	12	33%
Supply chain	6	17%
Information technology	2	6%
Assets management	6	17%
Financial accounting	4	11%
Financial management	3	8%
Revenue management	3	8%
<b>3. What is your current position in the company?</b>		
<b>Positions</b>	<b>Number of responses</b>	<b>Percentage</b>
Management accountant	10	28%
Project accountant	1	3%
Supply chain practitioner	6	17%
SAP specialist	3	8%
Assets accountant	6	17%
Financial accountant	4	11%
Financial manager	3	8%
Revenue accountant	3	8%
<b>4. How many years have you spent in your current position?</b>		
<b>Years</b>	<b>Number of responses</b>	<b>Percentage</b>
Less than 5	29	81%
Between 5-10	7	19%

#### ANNEXURE 4: MAIN STUDY OVERALL RESPONSE TO MAIN PROBLEMS

Problem	Main Problems Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
P1	Lack of integration between an ERP system and management accounting techniques	11%	3%	3%	39%	44%
P2	There are other systems with separate databases used over and above an ERP system.	3%	6%	0%	47%	44%
P3	There is lack of reporting capabilities on ERP systems	3%	3%	8%	28%	58%
P4	There is lack of an ERP strategic plan and top management involvement	3%	3%	8%	17%	69%
P5	There is lack of understanding of business process	0%	3%	8%	33%	56%
P6	The data is not properly cleansed	3%	11%	11%	31%	44%
P7	The ERP system is configure according to business requirements without looking at the best practices.	6%	19%	8%	36%	31%
P8	The role of management accountants is not reviewed after ERP system implementation	8%	11%	25%	39%	17%
P9	There is lack of training of management accountants on how to use the new ERP system	17%	28%	11%	39%	6%
P10	Lack of involvement in ERP system testing	28%	36%	8%	22%	6%
P11	The ERP systems do not meet user requirements	28%	42%	11%	8%	11%

**ANNEXURE 5: MAIN STUDY OVERALL RESPONSE TO THE PROPOSED  
ERP SYSTEM FRAMEWORK**

No	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
S1	It is important to integrate ERP system with management accounting techniques like budgeting. (Problem P1)	0%	3%	6%	14%	78%
S2	One of the main benefits of implementing an ERP system is to have one central database where the information can be stored centrally. (Problem P2)	0%	3%	3%	33%	61%
S3	ERP system lacks reporting capabilities therefore specialised software like Business Intelligence (BI) must be implemented to enhance the reporting capabilities of the ERP system. (Problem P3)	0%	8%	6%	31%	56%
S4	It is important to have a steering committee to develop an ERP system business plan/vision. (Problem P4)	3%	3%	0%	28%	67%
S5	Having a steering committee will encourage senior management involvement in the implementation of the ERP system. (Problem P4)	0%	6%	0%	22%	72%
S6	Management accountants have an understanding of business and they should form part of ERP system implementation team to ensure that business processes are correctly documented. (Problem P5,P7)	0%	3%	3%	33%	61%
S7	The company must implement the ERP system based on best practices to avoid system customisation. (Problem P7)	3%	3%	3%	33%	58%
S8	Data cleansing forms an integral role in ensuring that the ERP system implementation is a success. (Problem P6)	0%	0%	3%	36%	61%
S9	The role of management accountants needs to be reviewed after the implementation of an ERP system as the ERP system transfers financial knowledge to non-finance people. (Problem P8)	0%	3%	3%	47%	47%
S10	The implementation of an ERP system requires the company to establish centre of excellence. (Problem P8)	3%	0%	6%	44%	47%
S11	The implementation of an ERP system should include proper training for management accountants. (Problem P9)	0%	0%	8%	36%	56%
S12	Management accountants should be involved in testing the functionality of the ERP system. (Problem P10)	3%	6%	17%	17%	58%
S13	The ERP system that best matches user requirements should be selected for implementation. (Problem P11)	0%	11%	0%	17%	72%
S14	The involvement of management accountants in ERP system will ensure that the ERP system is fully utilised for management accounting purposes. (Problem P1)	3%	11%	3%	31%	53%
S15	The expectation of the project should be clearly communicated from the start of the project. (Problem P4)	8%	3%	3%	33%	53%
S16	The propose ERP system model will help to ensure the successful implementation of ERP system. (Combination of all problems)	8%	0%	0%	31%	61%

**ANNEXURE 6: MAIN STUDY OVERALL RESPONSE TO THE  
RESPONDENTS OPINION ON THE TWO OPEN ENDED QUESTIONS**

<b>What problems do you foresee with implementing this proposed ERP system implementation model in your company?</b>	<b>What improvements can be identified with this proposed ERP system implementation model?</b>
1. Data quality: transferring old data into the new system	1. Cost reduction
2. Lack of focus on change management	2. Easy reporting
3. Slow adoption of change management	3. Improvement of communication with the decision makers
4. Business process re-engineering does not form part of the model	4. A good representation on the steering committee
5. Lack of support and involvement of key stakeholders	5. Improved training
6. Project management is always a challenge	6. Performance evaluation must be incorporated in the model
8. Support cost will be high due to lack of in-house capacity	7. Improvement on the implementation of the ERP system
9. Lack of skills to implement the model	8. Integrating management accounting techniques with the ERP system
10. Communication strategy must be developed	9. Improved data cleansing
11. Documenting business process	10. Better understanding of business requirements
12. Lack of system integration	
13. System customisation to meet users' requirements	