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ADDIS ABABA UNIVERSITY
COLLEGE OF NATURAL SCIENCE
SCHOOL OF INFORMATION SCIENCE

ASSESSMENT OF ERP SOFTWARE UTILIZATION IN ETHIOPIA
CONSTRUCTION DESIGN AND SUPERVISION WORKS
CORPORATION

By
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Addis Ababa
Ethiopia

May 2017

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Degree of Master of Science in Information Science

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Abstract

Enterprise resources planning (ERP)-a software architecture that facilitates the flow of information among the different functions within an enterprise and provides the backbone for an enterprise-wide information system. At the core of this enterprise software there is a central database which draws data from and feeds data into an integrated application that operate on a common computing platform, thus standardizing business processes and data definitions into a unified environment. Therefore, the major objective of this study is to assess the challenges of implementing Enterprise resources planning (EPR) in Ethiopia Water and Energy Design and Supervision Works. As result, the research has a descriptive nature which elaborates the existing phenomenon as it exists. Specifically, for the assessment of ERP implementation and challenges in Water and Energy Design and Supervision Works in this study the Simple random sampling method was applied. Besides, supervisors and officers who are involving in ERP implementation were data source. The data was collected using questionnaires from a sample population and interview was conducted for managers. Accordingly, 120 employees were taken as a sample by using simple random sampling technique and accordingly questionnaires were distributed. The collected data was analyzed using SPSS (Statistical Package for the Social Sciences) version 20.

Consequently, results show that the deployed ERP system is positively perceived and used by the organization. In addition, problems which hinder the practice of the system were identified. As a result, lack of awareness, shortage of training conflicts of interest among departments and poor IT infrastructures are among the major problems.

Hence, the researcher has recommended that the company should re-consider its system utilization, since there are important features not yet utilized. Moreover, the company should also revisit whether in considering the required business requirements through customization, In addition the organization has to implement adequate training and development in order to equip end-users.

Finally, the organization informing the user about ERP in advance provide adequate training, ensure the commitment of senior managers, reduce the level of conflict among department, and build IT infrastructure are among the major solutions that help the organization to address ERP implementation challenge.

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List of Acronyms

BDE	Building and Urban Design Enterprise
BPR	Business Process Reengineering
CSF	.....	Critical Success Factors
ERP	.....	Enterprise Resource Planning
ECDSWC	.....	Ethiopia Construction Design and Supervision Works Corporation
IT	.....	Information Technology
MRP	.....	Material Recourse Planning
PPM	.....	Process Phase Model
SD	.....	Standard Deviation
TCDE	.....	Transport and Construction Design Enterprise
WEDSW	.....	Water and Energy Design and Supervision Works
WWDSE	.....	Water Works Design and Supervision Enterprise

CHAPTER ONE

INTRODUCTION

This chapter deals with background of the study, statement of the problem, objective of the study, significance of the study, scope of the study, limitation of the study, and organization of the thesis.

1.1 Background of the study

Due to the need to control multiple sources of information within a given enterprise, Enterprise Resource Planning (ERP) software has emerged as a major area of interest for many businesses. Originated from manufacturing and production planning systems used in the manufacturing industry, ERP expanded its scope in the 1990's to other "back-office" functions such as human resources, finance and production planning. ERP is a software architecture that facilitates the flow of information among the different functions within an enterprise. Similarly, ERP facilitates information sharing across organizational units. It enables decision-makers to have an enterprise-wide view of the information they need in a timely, reliable and consistent fashion (O'Leary, 2000).

ERP provides the backbone for an enterprise-wide information system. At the core of this enterprise software is a central database which draws data from and feeds data into integrated applications that operate on a common computing platform, thus standardizing business processes and data definitions into a unified environment. With an ERP system, data needs to be entered only once. The system provides consistency and visibility or transparency across the entire enterprise. A primary benefit of ERP is easier access to reliable and integrated information. A related benefit is the elimination of redundant data and the rationalization of processes, which result in substantial cost savings (Parr & Shanks, 2000).

Nowadays most organizations have large complex operations for which manual tracking becomes extremely difficult and some are in a new phase of transforming the way they handle their operations, while some others already have legacy systems which intend to do the job. As a result of its benefits, ERP has become an integral part of business intelligence for organizations by giving managers an integrated view of business process. So, an organization can get the software

from in-house or of the shelf ERP. Both ways of getting the ERP system has their advantage and disadvantage. Of the shelf ERP system is used by customizing the system according to the needs of organizations. But, it does not mean that of the shelf ERP package is flexible. On the other hand, the in-house ERP system is developed from the scratch according to the needs of organizations. In both cases excellent project management is also needed for successful ERP implementation. Hence project teams should have clear guidelines to execute ERP implementation from their project objectives and work plan to their resource allocation plan (Scott & Vessey, 2000).

Based on the promise of tightly-integrated corporate functions, globally optimized decisions and fast and easy access to accurate information, enterprise software has become an essential part of the operations of large businesses in many industries. By 1998, over 20,000 firms around the world spent \$17 billion on enterprise software, following annual growth rates that ranged from 30% to 50%. In addition to direct spending on the software itself, companies often spend a multiple of licensing costs on services related to implementation and maintenance. Companies are beginning to use enterprise software to automate front-office activities such as sales and marketing, call center operations, product configuration, lead-tracking and customer relationship management (Dover, 2012).

Now a-days ERP systems are implemented in most organization in Ethiopia. Water and Energy Design and Supervision Works (WEDSW) is one of the organizations is one of them. It was established by government proclamation in 1998 G.C by the name Water Works Design and Supervision Enterprise (WWDSE). But the organization grow up at corporation level by the name Ethiopia Construction Design and Supervision Works Corporation (ECDSWC) by merging three governmental organization which is WWDSE (Water Works and Design Supervision Enterprise), BDE (Building and Urban Design Enterprise) and TCDE (Transport and Construction Design Enterprise) in 2016 G.C. Therefore, with this regard the name of WWDSE changed to WEDSW starting from March 2016 G.C. The organization established to enhance the effort being made in realizing the potential use of the water resources of the country to improve the socioeconomic development of the society. In this regard, the Enterprise has delivered quality consultancy service to enormous government and private water resources projects with a strong dedication in line with

the International standards and norms. Currently, the Enterprise is the leading and the largest consulting firm in the water sector consultancy business in the country. It gives quality consultancy services to maximize customer's satisfaction. The organization is growing from time to time by doing different project in the country. Because of this the organization resource is increasing. In order to improve its quality services and keep its good performance at a national and international level, the organization is trying to shift from manual system to using the ERP system. While the organization doing the shifting from manual to ERP system, full implementation of the ERP system is not possible. So, this research will assess and try to find out why ERP system is not fully implemented in the organization (i.e. WEDSW).

1.2 Statement of the problem

In this era of competition, ERP systems are getting more and more importance for modern companies and concentration on core competencies is leading business to reduce cost and increase their productivity and improving customer services. By using ERP systems, companies can manage and utilize information efficiently which is the main power for competition. The ERP software can be implemented in-house or by buying the ERP package in organizations, both ways of getting the software have their merits and demerits. Bought ERP system is used by customizing the system according to the needs of organizations. But, it does not mean that bought ERP package is flexible. On the other hand, the in-house ERP system is developed from the scratch according to the needs of organizations. Even though both types of ERPs have promises to benefit companies and require substantial capital investment, there are a number of challenges that companies may encounter when implementing ERP. As stated that ERP implementations commonly have delayed an estimated schedule and overrun an initial budget (Reeves, 2010).

These failures can be explained by the fact that ERP implementation forced companies to follow the principle of 'best practices' in most successful organizations and form appropriate reference models (Zomada & Velkavrh, 2005). According to Helo et al.,(2008), "The major problems of ERP implementation are not technologically related issues such as technological complexity, compatibility, standardization, etc. but mostly organization and human related issues like resistance to change, organizational culture, incompatible business processes, project mismanagement, top management commitment, etc." Enterprise resource planning (ERP) system

has been one of the most popular business management systems, which providing benefits of concurrent capabilities and continuous communication for large organizations. However, not all ERP implementations have been successful. Since ERP implementation affects entire organizations such as process, people, and culture, there are a number of challenges that may be encountered in implementing ERP systems.

Kalbasi (2007) made research with the objective of on assessing an ERP implementation in light of critical success factors and recognizing ERP implementation critical success factors and comparing them to theory using judgmental sampling which is a non-probability sampling technique. In the research functionality, maintained scope, project team, management support, consultants, internal readiness, training, planning and adequate testing are found to be as critical success factor. The method of the research uses judgmental sampling which is a non-probability sampling technique.

The other research made by Aljaz, et al., (2006) is with the objective of identifying and evaluating the critical success factors affecting ERP implementation. The finding of the researchers are critical factor for the success of ERP implementation are allocating the necessary resources by top management, having clear project goals in implementation ERP project, Sharing information within the project team is the most important thing for good communication and there should be time frame for managing effectively ERP project. The method they use for the study was Questionnaire survey method. A postal survey questionnaire was used as the research Instrument.

According Mesfin, et al., (2012) made a research with the aim of exploring CSF for ERP implementation in Ethiopia and how they affect the organizations. On seeking the most important CSF that influences the implementation of an ERP system in Ethiopia. Based on a literature review and a survey study on five organizations, a list of 17 CSFs are identified as important in ERP system implementation in Ethiopia. The result shows that all the 17 CSFs have significant influence on ERP implementation. However, a significant variation is seen on the degree of importance in state organizations and the private sector on some of the factors. They conclude that implementation of ERP systems in organizations is an enormously complex undertaking. It is a high-risk project that needs to be managed and planned properly because it can affect nearly every aspect of organizational performance and functioning.

There are different factors affecting ERP implementation, authors have identified a variety of factors that can be considered as challenge and benefits of ERP implementation in an organization. Organization type, size, and structure have positive outcomes from the acquisitions of ERP. Most of the research deal with the critical success factors related with some organizations, which are implement ERP software. However, the types of factors, either success or challenge may be similar from organizations to organizations but, their level of influence may differ as can be seen from the findings of related review of literatures. All research findings are organization dependent, this implies that ERP implementation practice and the rate of influence of each factor, which is success or challenge, is not equal in different organizations.

The challenges and the success factors of ERP implementations need to be evaluated against the nature of the organization. So, the nature of the work in water sector is complicated not the same as other organization, which deals with business as usual, the water resources assessment needs advanced technology, special expertise and the resource that is different from other usual resource controlled by ERP system. This enterprise is expanding its capacity from time to time as a result the organization needs to go from manual system to automated system to efficiently manage its resource. With this respect the organization come up with new and latest technologies i.e. ERP. So, the organization was trying to implement ERP software designed in-house by private software Developer Company called Cyber Soft. The organizations get in to contract with Cyber Soft before it is merged with the other organizations mentioned in the background section seven years ago. The corporation has planned to apply this system to the other organizations. But the system is not fully implemented by WEDSW even though the system is developed based on the requirement of the organization. This research will try to assess and study why ERP not fully implemented in WEDSW and give the possible solutions for the problems, which the system encountered. So that research may help for the other organization to implement the ERP system developed for WEDSW. It is on this ground that this research work interested and motivated to make research on the implementation of ERP system in organization like WEDSW.

1.3 Research Questions

The study answers the following research questions:

1. What is the current status of Enterprises Resource Planning software in WEDSW?
2. What are the challenges affecting the full implementation of ERP software for WEDSW?
3. What are the possible solutions to address the challenges encountered in the implementation of ERP in WEDSW?

1.4 Research Hypothesis

The implementation of Enterprise Resource Planning (ERP) software at Water and Energy Design and Supervision Works Sector (WEDSW) has brought significant positive impact on the organization's working system.

1.5 Research Objective

1.5.1 General objective

The general objective of the study is to assess the current status and challenges of implementing Enterprise Resources Planning (ERP) in WEDSW and to recommend possible solutions.

1.5.2 Specific objectives

The specific objectives of the study are:

- To describe the current status of ERP implementation in WEDSW.
- To identify the major challenges that hinder the full implementation of ERP in WEDSW.
- To recommend the possible solution to address the problems in implementation of ERP.

1.6 Significant of the study

This study was carried out on the assessment of ERP implementation in the organization (i.e. WEDSW). So, this help for knowing the current status and the challenges concerning ERP implementation. The findings of the study are to provide insight to managers and employees about

the systems functionality. This research could also be used as a reference for further researches in the area and explore major issues related with the ERP system.

1.7 Scope of the study

The main focus of the study is to examine ERP implementation and its challenges in Water and Energy Design and Supervision Works. The data of the study delimited to officers, supervisors and managers. Therefore, any term found in this study should be interpreted in relation to ERP implementation in Water and Energy Design and Supervision Works.

1.8 Limitation of the study

Since the study was conducted along with the routine office works and the shortage of time were the major limitation of the study. Therefore, because of the above-mentioned limitations the study would not claim completeness or exhaustiveness what so ever.

1.9 Organization of the Thesis

This study has five chapters. The first chapter deals with Introduction, Statement of the problem, Objective of the study, Significant of the study, scope of the study and organization of the thesis. The second chapter presents The Review of Related Literature. The third chapter deals with Research Methodology, the fourth chapter deals with data presentation, analysis and interpretation. Finally, the last chapter presents the Summary, Conclusion and Recommendation of the study.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Overview of Enterprise Resource Planning

O’Leary (2000) defined Enterprise Resource Planning (ERP) as a computer-based system designed to place companies’ major activity areas: planning, production and customer service under an umbrella. ERP system is a software package of different modules such as fixed assets management, controlling, financial accounting, manufacturing, human resources, planning and development and so forth. Each module is business process specific. Generally, companies choose one ready-made package available for their industry but it is also common to select the modules that best meet their needs.

Enterprise resources’ planning is full-fledged software that is used to in different organization regardless of the size of the business. Hence this system can be applied in small, medium and large scale business organizations for a better management of the operational activities. Such software can deliver consistent data across all business functions in real time. Real time refers to data and processes that are always current. According to Fiona (2002), Enterprise Resource Planning (ERP) refers to large commercial software packages that promise a seamless integration of information flow throughout an organization by combining various sources of information into single software application and a single database.

Enterprise resource planning systems encompasses modules supporting functional areas such as planning, manufacturing, sales, marketing, distribution, accounting, financial, human resource management, project management, inventory management, service and maintenance, transportation and e-business or I-procurement. The architecture of the software facilitates transparent integration of modules, providing flow of information between all functions within the enterprise in a consistently visible manner. Apart from the ideas mentioned above the major characteristics of ERP systems are: a packaged software system designed for the client environment, the integration between the modules and across entire organization, access to data in real time, data storing and retrieving processes in an enterprise-wide database, and management and analysis functionalities. Moreover, ERP systems are expected to have additional

characteristics such as support for multiple currencies and languages which is critical for multinational companies, and support for specific industries. Hence; companies who are implementing the ERP system are benefiting from the single integrated system by transforming or reengineering their mostly legacy information system. And it is also defined as a method for the effective planning and controlling of all the resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company. ERP systems are configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization (Henry, 2002).

2.2 History of Enterprise Resource Planning

Modern Enterprise Resource Planning (ERP) systems have their roots in Materials Requirement Planning (MRP I) systems, which were introduced in the 1960s. MRP systems are computer-based systems for inventory control and managing production schedules. As data from the factory floor, warehouse, or distribution center began to affect more areas of the company, the need to distribute these data across the entire enterprise demanded that other business area databases interrelate with the MRP system. However, MRP is limited in controlling the flow of components and materials, and does not lend itself to more complete production control and coordination. The next generation of manufacturing software, known as MRP II, was developed to address this short coming and to further integrate business activities into a common framework. MRP II divides the production control problem into a hierarchy based on time scale and product aggregation. It coordinates the manufacturing process, allowing a variety of tasks such as capacity planning, demand management, production scheduling and distribution to be linked together (Bedworth, and Bailey, 1987).

MRP II is primarily a specialized tool designed to serve the needs of the manufacturing function within a company. Its data and processes are not integrated with those in the rest of the enterprise, such as marketing, finance and human resources. ERP entered the scene to facilitate information sharing and integration across these different functions and to operate the enterprise more efficiently and effectively, using a unified data store and consistent processes. Finally, companies such as SAP, Oracle, and others are reaping the rewards of dramatic growth as companies move away from legacy MRP II systems and begin the process of ERP implementation. Their solutions

are more robust than any host-based MRP system to date (Januschkowetz, 2001). The evolution of ERP summarized in figure 1 as follows:

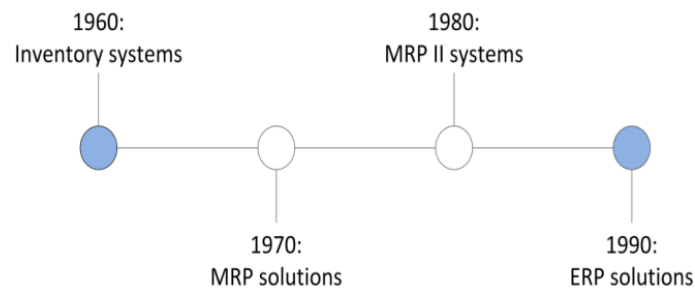


Figure 1 Evolution of ERP source: (Rashid et al, 2002)

2.3 Characteristics of Enterprise Resource Planning

An ERP system can be defined as an adaptable and evaluative commercial package that supports, in real time and in an integrated manner, the management of most if not all of a firm's business processes. One can attempt to better define it by looking at its characteristics. In this regard, an attentive observer of both the research and professional literature will denote quite a number of attributes believed to be possessed by ERP systems.

For a better understanding, O'Leary (2000) has categorized characteristics of ERP system under three dimensions in regards to their nature, namely *technical*, *organizational* and *informational*. The technical dimension regroups characteristics that refer to the capabilities or facilities for applications development offered by ERP systems in comparison to traditional systems. This includes two basic characteristics: flexibility (adaptability) and openness (evolutionary). The organizational dimension refers to the system's deployment in the firm. These are the characteristics that best reflect the impact of an ERP system on the organization, on its structure as well as its practices. This includes integration, completeness (generic function), homogenization, transversally (process-oriented view) and best practices. The informational dimension regroups characteristics that relate to the quality and usefulness of the information provided by the system, namely real-time (update and consultation) and simulation (of actual business processes).

2.4 Type of Enterprise Resource Planning system

According to Reeves, (2010) ERP system can be obtained in two ways: **In-house developed** and **of the shelf ERP** system. In-house ERP system is the process whereby the company uses their own workers (in-house team) to develop or implement an IT system that fits the specific needs of the company. So, this process allows for the creation of a more customized system that can more or less fit exactly the company specification/need. This is because, there is direct contact between the software team and the people that will be using the system and so they can tailor the system in a way that it could incorporate some or most of the wishes of the users. Whereas, of the shelf ERP system is a readymade package that a company buys the ERP software package or system from a vendor which is designed to be used by various other companies and to provide with the same functionalities as any user. When buying of the shelf ERP system, a company is required to pay licensing fees for the software package as well as installation and training for the staff.

Both ERP systems can benefit a company's work in many ways. The advantage of using in-house ERP system is that the company has full ownership of the final product as well as its source code and the knowledge gained while developing it, fits exactly to the business requirements of the company, there is a relationship between the development team and the user base which helps in communication and expectation delivery, and it gives you full control over the system and its functionality. Whereas its disadvantage is long time to be developed and implemented, it can be costly to maintain and improve the system to continuously meet business needs, it requires more IT personnel which in turn leads to high overhead cost, high switching costs: it is more expensive to change to newer technology, and high development and maintenance costs. On the other hand, the merit of using the shelf ERP system is not to take long time to develop, proven existing solution and ready to be used, you are provided with expert support and training, no need for constant maintenance, implements industry best practices, proven track record, and cost effective. Whereas its demerits the company has to rely on the vendor for technical support when issues come up, the software vendor retains the rights to code, and system functionality is determined by the vendor (Reeves, 2010).

2.5 Benefit of Enterprise Resource Planning

What are some of the perceived benefits that lead corporations to commit to the implementation of ERP in their organizations? As indicated by Olliver and Romm (2002), “in common with other types of investment activity the adoption of an ERP system is a purposive intervention by an organization for bringing about a new state of affairs that is judged to be superior to the current state”. As the result of various external and internal forces Ross (1999), articulated that as a business and strategic perspective implementing ERP is seen as way to improve corporation’s effectiveness and efficiency, reduce their operating, personnel, inventory and IT costs, and improve their productivity, business growth, production scheduling, delivery time, customer service, and overall quality. Additionally, make data visibility and timely information to make better business decisions.

In general ERP systems enhance inter-organization communication and collaboration between different functions and locations for the integrated decision making process. Standardization of the processes across the unit’s works in favor of collaboration as it reduces the number of conflicts between the processes. The single database system encourages communication across locations and functional units through sharing the information. With ERP systems companies are using the same database, which can be accessed on-line, in real-time and simultaneously by many users. Since, virtually all users have access to the same information it improves companies planning and control practices.

2.6 Lifecycle of Enterprise Resource Planning implementation

Like any other project, the ERP implementation project also has passed through different phases. There are no clear separating lines between these phases and in many cases, one phase will start before the previous one is completed. But the logical order is followed also, all the phases that we will discuss this session many not be applicable in all cases. In order to better understand the process of ERP adoptions, a number of researchers have developed conceptual ERP life cycle frameworks or process models. Ehie and Madsen (2005) suggested a five-stage ERP implementation process. These are: *-project preparation, business blueprint, realization, final preparation, “Go-Live” and support.*

Project preparation refers to a comprehensive planning phase that forms a project team with leadership roles, sets budget targets, and defines the project objectives and plan. In the business blueprint phase, the current business process is analyzed in detail in order to select an appropriate ERP system. A project team then is trained on functionality and configuration of the selected ERP system. An understanding of the selected ERP system allows a project team to gain insight to reengineering its business processes. In the realization phase, a project team concentrates on implementing an ERP system including modification, development of interfaces, and data conversion. At the same time, each process design is tested in a separate room. In the final preparation phase, the entire process is fully integrated and tested throughout the organization with full data and various scenarios. End users are trained in this phase as well. Finally, in the “go-live” and support phase, the ERP system is constantly stabilized and may have extensions for competitive advantage.

2.7 Enterprise Recourse Planning Implementation Model

Implementation is the methods a company uses to achieve their goals by transforming the way they carry out operations. Implementation insures that the software is not only installed, but also meets operational and strategic goal. A successful installation is no guarantee that the ERP system will achieve company goals over a constant period of time. The success of ERP is based on choose of implementation approach. In addition to this the implementation approach chosen by the organization affect the implementation cost. So, the performance of the firm will get worse before it gets better and firms are expected to counter the staff resistance throughout the stages of ERP implementation (Jose and Joan, 1999). Because of this reason a number of researchers have developed different models for ERP implementations. In2000 Markus, et al suggested a model named enterprise system experience cycle, which has four phases: charter, project, shakedown and onward and upward. In 2000, Parr and Shanks developed a Process Phase Model (PPM) for ERP implementation, which is an extension of Ross and Markus & Tanis models, but integrating CSFs for each implementation stage. In the PPM, an ERP project is divided into three continuous phases such as planning, project and enhancement.

The implementation of an ERP system in an organization is very complex as a result different researchers have developed models and frameworks for the successful completion of an ERP

projects. The proposed theoretical framework comprises strategy, people and organizational critical success factors and attempts to relate them to various implementation stages. The theoretical framework as depicted in figure 2 is represented by three main sets of factors, namely strategy related factors (top management commitment, clear goals focus and scope, legacy systems, and ERP strategy), people related factors (training and education, users involvement, employee's attitude and project team) and organizational related factors (effective project management, process management, change management strategy, IT maturity, computer culture, empowerment, organizational culture, and communication). A theoretical implementation process was identified by Ibrahim (2007) such that it is suggested that there is an explicit linkage between factors and ERP implementation stages (Koch, 2002).

The following figure 2 shows the framework for ERP implementation.

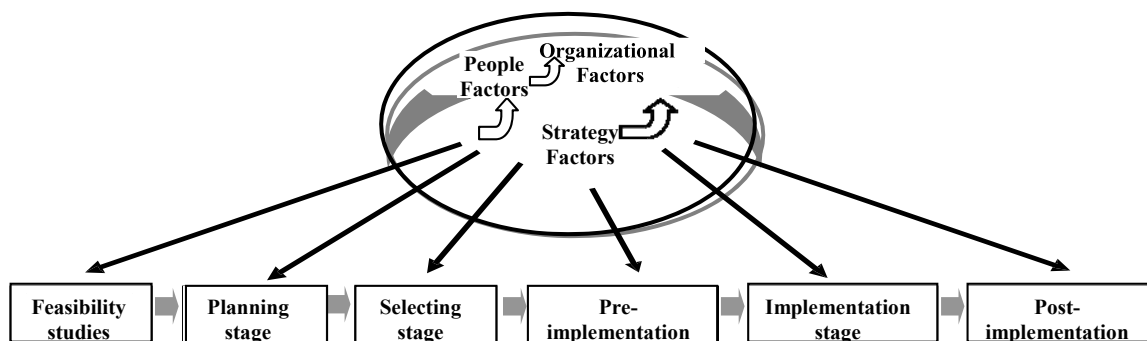


Figure 1 Successful implementation of ERP projects

Failures of ERP implementation can be caused by multiple factors like due to organizational, social, and technical factors. Some serious challenges occurred in the implementation of ERP systems and they may turn the project into a complete failure. These challenges affect the success of ERP project in the implementation stages (including both the implementation and post implementation stage) and needs to be identified at the beginning of the project to avoid potential risks in latter stages. Thus, it would be necessary to assess and analyze the preparedness of an organization before initiating the project. Without proper readiness, the project probably fails or faces intensive challenges. The success of an ERP implementation greatly depends on the state of readiness of the company. In general, before deciding to implement an ERP system, making an assessment have to be done which is not only identifies an organization's current capability to

implement an ERP project, but also identifies weakness areas that must be improved to achieve a better state of readiness for ERP implementation.

2.8 ERP Implementation Failure and Success Factors

On one hand, ERP systems promise to improve organization's key performance indicators such as proficiency, efficiency, profitability, customer satisfaction and other measures of value. On the other hand, ERP systems are highly complex information systems and the implementation of these systems is a difficult and costly process placing tremendous demands on corporate time and resources. Business Process Reengineering (BPR) is often a major component in ERP installations and this requires companies to change the way business has been done, which, in accordance, affects the employees work lives and can create a resistance.

2.8.1 ERP Implementation Failure Factors

In spite all the benefits implementing ERP is a risky undertaking. The truth is that due to the behavioral and management related challenges in the implementation process many ERP projects have been terminated. The reasons being: end-user not being ready, resistance to change, lack of user education and training, high turnover of key personnel, lack of communication and support documentation. In addition, ERP implementation usually requires an extensive level of BPR or transformation as it happen in many organizations. According to O'Leary (2000) all the risks throughout the ERP implementation cycle can be categorized into three main groups:

Technical

Technical risks arise largely from the information processing, for instance, problems with software modifications, system integration, data errors, operating systems, network capabilities etc.

Business

Business risks derive from the models, artifacts and processes that are chosen for the ERP implementation such as insufficient resources, competitor's position in the market, cost and benefit judgments, cost and time overruns, problems with customers and suppliers, drop in company's key performance indicators and similar.

Organizational

Organizational risks occur from the people, organizational structure and environment in which the

system is implemented, for example, lack of end user and personnel training, turnover of key personnel, cultural issues, choosing the right consultant, business process reengineering and so forth.

Technical risks are largely related to the information processing technology and are usually handled by the company professionals and vendors. Business and organizational risks are the most critical and difficult ones to manage.

2.8.2 ERP Implementation Success Factors

ERP Implementation success depends on different factors like people management, organizational issues, change management, process reengineering and training. Gargeya and Brandy (2005) have identified six major critical success factors by using a content analysis model and searching different articles and books.

Factor 1: Worked with Functionality/Maintained Scope

A crucial part of working with the ERP functionality is the ability to streamline operations. When implementing a system, many organizations fail to specify their organizational objectives. Job skills are raised by the requirements of the new, post-implementation company. Idiosyncratic ways of doing business, which were manageable, although most likely inefficient, under the “old system” are no longer tolerated. Companies that do not understand these issues early on will face serious problems (Gargeya and Brandy, 2005).

The ability to implement ERP with minimum customization requires assistance from several other factors, primarily streamlining operations and re-engineering the business – both of which will help the organization to run in a more straightforward manner. Thorough planning is also a close partner, as it is threaded through the plans from scope to budgets (Gargeya and Brady, 2005).

Factor 2: Project team/Management support/Consultants

The ERP team should consist of the best people in the organization. Building a cross-functional team is also critical. The team should have a mix of consultants and internal staffs so the internal staff can develop the necessary technical skills for design and implementation. The team should be given compensation and incentive for successfully implementing the system on time and within the assigned budget. The team should be familiar with the business functions and products so they

know what needs to be done to support major process (Gargeya and Brandy, 2005). A successful implementation is only achievable when high-level executives have a strong commitment to the project. The attitude of senior managers will affect not only the flow of funds and information to the project, but also the subordinate view the project, its future impact upon the company as a whole, and its impact upon the employees as valued and capable individuals. Top management support is needed throughout the implementation. The project must receive approval from top management and align with strategic business goals. This can be achieved by tying management bonuses to project success.

Factor 3: Internal Readiness/Training

The “people element” and training aspect of an ERP implementation have historically received the least amount of attention. The paradox of this is that when this factor is ignored or downplayed, primarily because it does not have the largest quantifiable benefit, expenses are greatly increased in the long run. By treating resource training with little regard and financial support, it is not hard to realize the reality of delay, confusion and financial ruin that may result. Some companies insist on assigning a fixed cost or percentage to the training effort, regardless of need or variable conditions (Gargeya and Brady, 2005). This mistake has certainly been the root cause of many failed implementation attempts. Fortunately, it has also been a source for others to learn from such experiences and avoid repeating the mistake (Chen, 2001).

Factor 4: Deal with Organizational Diversity

Organizations have many cultures. Individual branches of the same organization have their own ways of doing things, and each function/department operates with different procedures and business requirements. Not unexpectedly, the larger, more global companies cite their diversity as an obstacle to success (Gargeya and Brady, 2005). Individual units and groups are often companies of their own right, and do not wish to be assimilated in to one corporate culture. “Re-engineering” of the business is required here, both on the “people” level, and on the operational level. This organizational diversity differs from factor #1 (work with functionality/maintained scope) in that the company changes its culture, not just its processes. In addition to having important strategic implications, enterprise systems also have a direct, and often paradoxical, impact on a company’s organization and culture. On the other hand, by providing universal, real-time access to operating and financial data, the system allow companies to streamline their management structures, creating

flatter, more flexible, and more democratic organizations. On the other hand, they also involve the centralization of control over information and the standardization of process, which are qualities more consistent with hierarchical, command-and-control organizations with uniform cultures (Gargeya and Brady, 2005)

Factor 5: Planning/ Development/Budgeting

Planning a sophisticated ERP project should not be taken lightly or with little forethought. As mentioned before, there are enormous potential costs associated with such an undertaking. In addition to the high costs paid out before the go live date, there can and have been major expenses incurred by companies that were unable to fully develop a comprehensive plan. Planning should be closely identified with maintaining scope during an implementation. Cost overruns and developmental delays are costly, sometimes fatal results of ineffective planning. (Gargeya and Brady, 2005)

Factor 6: Adequate Testing

System testing has proven to be the key element of success for some companies and a direct cause of failure for others (Gargeya and Brady, 2005). Gargeya and Brady, (2005) argue that “after months or years of development, it may be feasible to assume that both team members as well as executive management are tired of dealing with the project and just want it to be completed”. The result of this myopic thinking, however, is that testing is reduced or ignored, and “red flags” are disregarded.

2.9. The challenge in Implementation of ERP in ECDSWC

WWDSE has been trying to implement in-house developed ERP software. So that, the organization gets in to contract with cyber-soft enterprise seven years ago. The developer company i.e. cyber-soft enterprise starting to develop the system by collecting the necessary information at first. Then they prepared requirement analysis document (RAD). The RAD document contains seven modules that they are going to do for the organization. These modules are personnel management, vehicle management and administration, payroll, fixed asset stock and budget control, record keeping and reporting and cost accounting process. In addition to this the document includes a detailed justification on each part of the module that is what the system do in each module. The developer uses their office to develop the system. But whenever they need information necessary to develop

the system they come to the office and get the information they need for their work. The developers follow agile system development method, which is in this type of system method that the requirement is made through all the life cycle of the system development.

At first the system was developed desktop based and the developer deploys and implements the software in to the organization. The system was holds the entire seven modules that are presented in RAD document. There are two type of system users which are daily user and once in a while user. Daily users are those users work their day to day work by the system. While the others are once in a-while users, which uses the system sometimes. Before the system put in operation by the users, training was given and the data migrated to the system, which were recorded in excel. Then after that the system users start to enter the data to the system. At this time there was a lot of comment given to the developer from the users and IT professionals but they took a lot of time to replay and made correction on some of comments, whereas the other comments were not replied. For example, cost module was not working as it is expected. There were no improvements on the system. So, the system was totally failed.

After the developed software was declared not total functional the developer brought a web based system to the organization. Before they implemented this type of system in the organization they create awareness to IT staffs and management of the organization. This web based ERP system was an improved version of the previous system. The system that contain eight modules, which are record management system, procurement and supply management, human resource management system, transport fleet management system, payroll management system, integrated finance management system, system resource management system and system core settings. Awareness on newly developed ERP system was given to IT staff and management of the organization, besides training was given for some of the workers who actually need to operate the system in their day to day activity. The training was on job training on how they are using the system for their day to day activity of their work. However, in some part of the organization still the workers use the manual system for day to day activity. For example, record management system. The other departments or sections are not fully integrated each other by the ERP system. For instance, the data entered for maintenance of vehicle from transport section not shown in garage section.

The other problem is the follow up of the system, which has to be done by IT section. IT section has assigned staffs (its personnel) on each module to undertake day to day follow up. But in most of the cases IT staffs couldn't be able to make follow up the functionality of the system, because the IT staffs are occupied by their routine works. There is no responsible person that is assigned to this project. The project office also not using this system, because there is no infrastructure that connects the project office with the head office.

So, based on the problems mentioned above, the system could not be fully implemented in the organization. Thus, because of the problems encountered in implementing the ERP by WEDSW this research work has been proposed and come up with possible solutions. The other reason is that the corporation is planning to implement this ERP system to its other branches, under the auspicious of corporation. Therefore, the result found from this research is expected to give an important feedback to improve the ERP system service of the organization and of the other branches in the corporation, where the service going to be implemented.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter presents the research methodology. It deals specifically on the research method, data sources, data collection tools, sampling method and size and data presentation and analysis.

3.1 Research Method

The objective of this research is to assess Enterprise Resources Planning (ERP) software of Water and Energy Design and Supervision Works. So, for such kind of research descriptive survey method is better. Descriptive survey used for those studies which are concerned with describing the characteristics of a particular individual or group and it includes surveys and fact-findings enquire of different kinds. On the other hand, descriptive research involves gathering data that describe events and then organizes, tabulates, depicts, and describes the data collection. This research method is used because it often uses visual aids such as graphs and charts to aid the reader in understanding the data distribution (Koul, 2008). Some qualitative information was gathered from the organization by using structured interview. The related data with questionnaire were collected and analyzed.

3.2 Data Collection Tools

In this study, primary and secondary sources of data were used. The primary data was collected from direct users of the organization. The secondary data sources were from performance reports, documents, evaluation etc.

To collect the primary data, the researcher employed questionnaire, structured interview. Questionnaire has been used to collect primary data from the users of the organization. The questionnaires and structured interviews were fully customized from Imran & Asmita, (2012) and Mittal & Singh (2011) to serve the purpose of research that the ERP system of the understudied organization. Questionnaires were used to collect relevant and first-hand information from key informants or respondents. The items of the questionnaires were mainly close-ended questions and accompanied by some open ended ones. The reason why a questionnaire was used is that it is easier

to handle and is simpler for the respondents to answer within a short period of time (Koul, 2008). The questionnaire was consisting five parts, designed to address the basic question of the study. The first part of the questionnaire was designed to obtain general information on personal characteristics of the respondents about gender, age, education, work experience, occupation and modules working. The second parts were designed to obtain information about enterprise resource planning. This part consists of five questions and measures the importance of ERP in the organization. The third part designed to acquire ERP implementation and challenges. It contains two categories that states about enterprises resource planning support business activities and enterprises resource planning challenges in the organization that includes 7 and 9 questions under each category respectively. The fourth part designed to obtain information regarding ERP customization and capacity building that consists of two parts with 4 and 7 questions each that related with the customization of ERP in line with the organization activities and the level of capacity building done the system. The fifth part of the questionnaire states about the importance of ERP's critical success factors.

Structured interview was used to collect data from manager of WEDSW and project manager of Cyber Enterprise. The reason why structured interview was employed is that the procedure to be used is determined in advance as well as to obtain answers for carefully phrased questions (Koul, 2008). In addition, structured interview was used to substantiate the information gathered by the questionnaire. The interview mainly addresses Enterprises Resource Planning (ERP), ERP implementation and challenges, information regarding ERP customization and capacity building and information related to ERP critical success factors.

The secondary data is obtained from the documents that were used to get information from WEDSW magazines, agreement documents between WEDSW and Cyber soft Enterprise, requirement analysis design documents (RAD), system test case documents and comments given by IT professionals and the user of the system and the actual deployed system of WEDSW.

On top of these documents there were reviewed and assessed additional sources of data for understanding about the organization and the ERP system. The organization magazine was assessed for the profile and history of the organization. Besides detailed and focused literature

review is done to understand more about Enterprise Resource Planning concepts and ERP systems technical and business/service framework.

3.3 Sample and Sampling Technique

In most cases, the major purpose of a research undertaking is to discover principles that have a universal application, but studying the whole population to arrive at a generalization would be impractical. Therefore, the researcher needs to take a sample from the population. Sampling is the process of taking smaller portions from a population for observation and analysis (Johnson & Christensen, 2004). Simple random sampling technique was used in this research because it provides an equal and nonzero chance of being selected for each respondent. In order to get access, it is important to have list of employees of the organization. The total numbers of employees recorded by the company are 800. Out of the total population that works in the organization, the target population is 600 which include professional staff and supporting staff. The ERP system is used by the whole employee of the organization. These employees could be active and inactive. The active ones are employees who are using the system in their day to day activity of their work, whereas the inactive employees are using the system once in a while when they needed it. So, sampling technique principle used to select 120 employees from the target population of 600 employees, working in the organization. And the sample of 120 employees includes both types of employees with regards of using ERP system.

To determine the sample size, a previously proven formula (Yamane, 1967) was applied. That is,

$$n = \frac{N}{1 + N(e)^2}$$

Where, n= Sample size=120

N= Target population =600

e= Sampling error =0.082

In this regard, Leedy and Ormrod, (2005) state that in simple random sampling technique, each member of the population has an equal chance of being selected. Besides, Johnson and Christensen, (2004) state that the assumption behind random sampling is that it provides each character in the population has to be represented in the sample systematic sampling technique was applied to select the respondents. To sum up, out of 600 employees 120 employees, 1 WEDSW manager, 1 project manager and 1 IT manager involved in this study. Purposive sampling method

was applied to select interviewees namely WEDSW manager, project manager of the developer and IT managers. This technique would be applied taking into account the individuals have deep knowledge about the matter to be discussed.

3.4 Data presentation and Analysis

After collecting the data through questionnaire and interview, the process of analysis begins. Descriptive analysis technique was used for the demographic factors such as gender, age, education, work experience, occupation and department working. The results of structured interview questions were analyzed qualitatively. Data clearly presented by using tables which expressed in the form of frequency and percentage. Data analysis was performed by using SPSS software version V 20.0. SPSS was selected to analyze the data and ease the data processing and accuracy.

In order to increase the possibility of getting the appropriate answers for this research, different actions were taken to ensure the soundness of this study.

1. Data was collected from reliable sources, from respondents who are the employees of WEDSW.
2. The questionnaires and the structured interview questions, as discussed on section 3.2, were customized to meet the purpose of this research.
3. SPSS software version V 20.0 used to analyze the data and special emphasis was given during data coding.

3.5 Methods of Data Analysis

Different statistical techniques were employed on the basis of the nature of the data collected. In analyzing the quantitative data, respondents were categorized and frequencies were tallied. Percentage and frequency counts were used to analyze the characteristics of the population as it helps to determine the relative standing of the respondents. Moreover, mean scores and standard deviations were used for analyzing the questionnaires with five point Likert scales. In analyzing the data obtained through an interview and open ended items, first summary sheets were prepared and the responses were analyzed. The five point Likert scale was interpreted as 5= Very High/strongly agree, 4= High/agree, 3= Medium/neutral, 2= Low/disagree, and 1= Very

Low/strongly disagree. For the purpose of easy analysis and interpretation, the mean values of each item and dimension were presented in ranges based on Likert scale. Therefore, the mean values ranging from 0.50-1.49 were specified as very low, from 1.50-2.49 as low, from 2.50-3.49 as moderate, from 3.50-4.49 high, and from 4.50-5.49 very high. Standard Deviation (SD) provides an indication of how far the individual responses to a question vary or deviate from the mean. SD tells the researcher how spreads out the responses and it is believed that SD the range of 0.05- 1.5 shows that the response is evenly distributed (Freund, 2001). Based on this assumption SD will be presented to show how long the response deviates from the mean.

3.6 Hypothesis Testing

A statistical hypothesis test is a method of making decisions using data, whether from a controlled experiment or an observational study (not controlled). In statistics, a result is called statistically significant if it is unlikely to have occurred by chance alone, according to a pre-determined threshold probability, the significance level. For this research the hypothesis was tested using t-test. T-test used to compare differences in mean scores of continuous level, normally distributed data. There are different types of t-test, which are one-sample t-test, independent sample t-test, and paired sample t-test. Among these types of t-test types in this research one-sample t-test have been employed to test the hypothesis. One-sample t-test is one of the type of t-test, which used to compare the mean of a single sample that work on only with a one mean score (Howell, 1997). The reason of selecting one-sample t-test for this research is that it used for analysis single sample.

The one-sample t-test work in four different approach that is testing a sample against pre-defined value, testing a sample against an expected value, testing a sample against common sense or expectations and testing the results of a replicated experiment (Howell, 1997). So, this research used testing a sample against an expected value, which uses the laws of chance. In this study, “Is the mean scores from the survey about significant of ERP systems are equal”? The research question developed and conducted for testing of hypothesis is performed by assigning null and alternate hypothesis. The purpose of this testing is to measure and analyze the impact and significance of ERP implementation in the organization.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

The data were discussed in three parts: the background of respondents, respondents' response to questionnaires and interviews in addition to this hypothesis testing. The total number of questionnaires distributed was 120, of which 92 % (110) were filled and returned. So the analysis was made based on 110 responded questionnaires.

4.1 Demographic characteristics of the respondents

Descriptive analysis is used to look at the data collected and to describe the demographic characteristics. It is used to describe the demographic factors for more clarification. It is mainly important to make some general observations about the data gathered for general or demographics questions. The demographics factors used in this research were sex, age group, and departments of the organization as well as the various levels of education of respondents, experience groups and position of different employee of the organization. So, it is expressed in the following session independently.

Table 1 Characteristic of Respondents by Sex, Age and Educational Status

Demographic respondents Information	Classification	Number	Percentage
Sex	Male	80	73
	Female	30	27
	Total	110	100
Age	Below 20	-	-
	21-25	20	18
	26-30	30	27
	31-35	25	23
	36-40	20	18
	41 and above	15	14
	Total	110	100
Educational Status	Diploma	50	46
	BA/BSC	40	36
	Masters & Above	10	9
	Others	10	9
	Total	110	100

Based on the collected data, 80 (73%) of the respondents were male while only 30 (27%) were female. Concerning age status, 27% of the employees are between the age of 26 and 30, while 18% were at the age of between 21 and 25 and the age between 36 and 40. The other 23% are between 31 and 35. Furthermore, 14% of the respondents were at the age of 41 and above. There is no worker below the age of 20. From the age category of employees, the young generation (i.e. age range of 21 to 35) are aware of the ERP system.

Regarding educational level of employees of the organization, 46% of the employees are diploma holders and the other 36% of the employees are first degree holder, whereas the remaining 9% is covered by specialization at a master’s degree level and above and other level (like certification). Therefore, majority of the employees have at least diploma and first degree holders. As a result, respondents can easily understand the questions and have enough knowledge about the subject matter of the research.

Table 2 Respondents by work experience, department, position

Respondents	Classification	Number	Percent
Work experience	≤ 5 years	10	9
	6 – 10	20	18
	11 – 15	40	36
	16 – 20	25	23
	21 & above	15	14
	Total	110	100
ERP Module	Record management information system	10	9
	Procurement and supply management	20	18
	Human resource management system	25	22
	Transport fleet management system	5	5
	Payroll management system	5	5
	Integrated Finance Management System	35	31
	System resource management system	5	5

Respondents	Classification	Number	Percent
	System Core Settings	5	5
	Total	110	100
Position	Officer	100	91
	Supervisor	10	9
	Total	110	100

As it is shown in Table2 above, (9 %), (18%), (36%), (23%) and (14%) of the respondents served the organization below 5 years, 6-10 years, 11-15 years, 16-20 years and above 21 years; respectively. Most of the respondents have passed through the different stages of ERP software implementations practice held in the organization. They have vital knowledge and experience about the challenges as well as the status of the ERP software. As a result, it would be clear that the probability of getting diverse, firsthand and reliable information is high.

Regarding departments of the respondents, the majority (31%) of the respondents belong to the department of integrated finance management system. And 22% and 18% of the respondents were in the department of human resource system and procurement and supply chain management respectively. Furthermore, 5% of the respondents were in the department of transport fleet management system, Payroll management system, System resource management system and System Core Settings. On the other hand, 9% of the respondents are in the department of Record management information system. The challenges and current status of sub-systems may vary from departments to departments. Hence considering diverse departments create an opportunity for collecting vital and detail information about ERP software implemented in the organization. Concerning the position of the respondents in the organization, the majority (91%) of the respondents were officers while 9% of the respondents were supervisors. This shows that the greater part of the respondent in this study were experts working on Enterprise Resource Planning (ERP) of the organization.

4.2 Respondents’ response to questionnaires

a. The practice of ERP implementation

Table 3 Perception about Enterprise Resources Planning (ERP)

No.	Items	Always		Sometimes		Never	
		No	%	No	%	No	%
1	How often do you use the ERP software related with your work?	60	55	20	18	30	27
		High		Medium		Low	
		No	%	No	%	No	%
2	The level of employees’ positive attitude toward ERP?	20	18	80	73	10	9
3	The readiness of the employees toward ERP	30	27	50	46	30	27
4	The participation of employees in ERP development	10	9	20	18	80	73

As it is shown in Table 3, the respondents were asked their perception about ERP. Accordingly, the majority (55%) of the respondents said that they always use ERP software in their daily work. While, 18% of the respondents are used ERP sometimes, 27 % of the respondents never used ERP in their daily activity in the organization. This clearly shows that still there are some employees in the organization who did not use the ERP in their daily chores.

Similarly, in item 2 of the same table the respondents were asked their attitude about ERP. Accordingly, the majority of the respondents (73%) said that they do perceive the aspects of ERP moderately. However, 18% and 9% of the respondents stated that they do have high and low attitude about ERP. In item 3 in the same table about the readiness of the employees toward the execution of ERP, the majority of the respondents (46%) said that their readiness shows that moderate and the other 27% said that their readiness is low and high each respectively.

In item 4 of the same table, the respondents also asked their level of participation during ERP development. As per the data collected, the majority of the respondents (73%) said that their participation was low. However, 18% and 9 % of the respondents said that their participation during ERP development was high and medium respectively.

From the above table it could be understood that through the response of the workers in the organization, they have good attitude and readiness using the ERP system. On the other hand, the

workers did not thoroughly involve in the development process of ERP that is requirement gathering phase. This would in turn have a great impact for the successful implementation of ERP.

b. ERP implementation at WEDSW

Table 4 ERP implementation at WEDSW

No	Item	Responses		
		No	Mean	SD
1	ERP implementation makes the working process fully automated	110	2.32	1.15
2	The organization can obtain the expected benefits from ERP execution	110	3.48	1.07
3	The system has supporting the transformational activity held in the organization	110	3.59	1.24
4	ERP implementation contribute highly in achieving organization mission	110	3.75	1.09
5	ERP implementation is the better solution in satisfying organization need and utilization of organization resources.	110	3.64	1.11
6	The organization apply and utilize all features of ERP	110	2.36	1.23
7	There are some functional areas still use both manual and automated working system	110	3.36	1.23

From the data in Table 4 item1, the mean score of respondents was 2.32. This indicates that the majority of the respondents believed that the role of ERP implementation in fully automating the work process in the organization is low. Regarding the question of whether the organization can obtain the expected benefits from ERP execution or not, the majority of respondents were found neutral as the mean score was 3.48. Concerning item 3 in Table 4, the mean score of the respondents was 3.59, indicating the majority’s belief that the system has highly supported the transformational activity of the organization. Similarly, based on the computed mean scores 3.64, the majority of the respondents indicated that ERP implementation is the better solution in satisfying organizational need and utilization of organization resources. The mean score 2.36 for item 6 of the same table shows that the application and utilization of all features of ERP in the organization is low. Moreover, the fact that the majority of respondents being neutral as indicated in item 7 with a mean score 3.36, shows that there are some functional areas that still use both manual and automated working systems. Similarly, interviewed managers witnessed the utilization

of both manual and automation working system in the organization. From this it would be clear that ERP is not in full scale implementation and the organization has not utilized all the ERP features, leading to a failure to attain the desired transformational activity of the organization. Data gathered through interviews to managers showed that ERP has contributed to the transformational activity of the organization. Generally, if the organization utilizes all the features of ERP, it would help the organization to fully operationalize the system. On the other hand, it can be inferred that the full scale automation process may slow down if the user in requirement phase does not involve.

c. ERP implementation challenges

Table 5 Response on Challenges of ERP implementation

No	Item	Responses		
		No	Mean	SD
1	Lack of senior manager commitment	110	3.50	1.16
2	Insufficient training of end-users	110	3.56	1.17
3	Failure to get user support	110	3.36	1.23
4	Attempts to build bridges to legacy system	110	3.45	1.24
5	Conflicts between user departments	110	3.50	1.20
6	Composition of project team members	110	3.50	1.16
7	Failure to redesign business process	110	3.59	1.24
8	Misunderstanding of change requirements	110	3.36	1.23
9	Limitation of adequate infrastructure	110	3.75	1.09

Taking the respective 3.50 and 3.56 mean scores of item 1 and item 2 from Table 5, lack of commitment by top managers and insufficient training of end-users were found out to be major challenge in fully implementing the ERP system. Similarly, in item 3 of the same Table, the mean score of the respondents was 3.36, implying that the majority of the respondents moderately believed that failure to get user support as a challenge of ERP in the organization.

The 3.45 mean score in item 4, of Table 5 shows that attempts to build bridges to legacy system was moderately challenging the ERP. In items 5 and 6, the mean scores of the respondents were 3.50 each indicating conflicts between user departments and composition of project team members as challenges highly affecting the ERP implementation in organization. Failure to redesign

business process is highly challenging for ERP implementation as depicted by 3.59 mean score in item 7 of the same table.

The 3.36 and 3.75 mean scores for items 8, and 9 indicated that misunderstanding of change requirements and limitation of adequate infrastructure as moderately and highly challenging the ERP system respectively.

The summary of data collected from the questionnaires above, the majority of respondents said that lack of commitment by the top management; conflicts between user departments, composition of project team members and limitation of adequate infrastructure were the main challenges for implementation of ERP.

d. The customization of ERP implementation for WEDSW

Table 6 ERP customization

No	Item	Responses		
		No	Mean	SD
1	The system is fully customized in line with the organization policy.	110	3.36	1.23
2	The organization business requirement is fully considered and integrated.	110	2.41	1.24
3	ERP customization has been done considering the long term strategic objective of the organization.	110	2.32	1.15
4	Additional feature obtained from the system beyond the predetermined requirements.	110	2.50	1.20

The mean score 3.36 in item 1 of Table 6 clearly depicts that the system is fully customized in line with the organization policy as it was rated moderate. The full consideration and integration of business requirement in the ERP turned out to be low with the mean score being 2.41. Similarly, the respondents rated the alignment of the ERP customization to the long term strategic objective of the organization as low because the mean score to this is 2.32. In item 4 of table 6, the mean score of the respondents 2.50, showing that additional feature obtained from the system beyond the predetermined requirements is neutral.

As stated above we can conclude that even though the system was developed in line with the organization policy (referring table 3), there were misunderstandings in business requirement because some of the employee were not involved in the requirement phase. On the other hand, the system did not consider the long term strategic objective of the organization into account.

e. Capacity building for ERP implementation

Table 7 Response on ERP Capacity Building

No	Item	Responses		
		No	Mean	SD
1	Sufficient training gap assessment is conducted	110	2.48	1.20
2	Training was given exhaustively for all users	110	2.32	1.14
3	The training given on the system was adequate and useful	110	2.24	1.13
4	Post training observation conducted	110	2.50	1.20
5	The results of the training provided assessed	110	2.25	1.27

Regarding item 1 in Table 7, the mean score of the respondents was 2.48. The mean scores of the respondents clearly depicts that the organization conduct sufficient training assessment to identify existing gaps. Concerning exhaustive trainings given for all users, the mean score was 2.32 indicating that the majority of the respondents believed that the exclusivity of the training for all users was low. Similarly, the respondents were asked to rate whether training given on the system was adequate and useful. Accordingly, the mean score 2.24 shows training given on the system was adequate and useful is low. With regard to item 4, and 5 in Table 7 the mean scores of the respondents were 2.50 and 2.25 respectively. This shows that the majority of the respondents believed that conducting post training observation and training results assessment were moderate and low in the organization respectively.

In general, even though there were training gaps assessment conducted, no training was given exclusively and adequately for employees of WEDSW. So, this may affect the success of ERP implementation in the organization. And therefore the employee must be equipped with detail training in order to have know-how about the system they are working on it.

f. Critical Success Factors for ERP implementation

Table 8 Response on Critical Success Factors of ERP implementation

No	Item	Responses		
		No	Mean	SD
1	Conformity of ERP with the organizational functionality	110	3.36	1.23
2	Top management and project team leaders' understanding of ERP	110	3.58	1.18
3	Internal readiness	110	2.84	1.18
4	Deal with organizational diversity	110	3.50	1.20
5	Planning/development/budgeting	110	3.59	1.24
6	Change management	110	3.50	1.20
7	Interdepartmental cooperation and coordination	110	3.50	1.16
8	User involvement and participation	110	3.35	1.36
9	Good infrastructure	110	3.36	1.23

Conformity of ERP with the organizational functionality as indicated in item 1 in Table 8, shows that respondents were neutral for critical success factor for ERP implementation, the mean score being 3.36. Similarly, the majority of the respondents, the mean score being 3.58, believed that top management and project team leaders understanding of ERP highly affected the success of ERP implementation. The 2.84 mean score for internal readiness, shows that it is moderate for critical success factor for ERP implementation in the organization. With regard to item 4, 5 and 6 in the same Table, the mean scores of the respondents are 3.50, 3.59 and 3.50. These show that the majority of the respondents believed that dealing with organizational diversity, Planning/development/budgeting and change management highly influence the success of ERP implementation in the organization.

Respondents believe that interdepartmental cooperation and coordination is highly critical factor for ERP implementation as the mean score for this was 3.50. This indicates that the majority of the respondents believed that the extent in which 3.35 and 3.36 mean scores in items 8 and 9 in the same Table, show that the majority of the respondents are neutral regarding the criticality of user involvement and participation and good infrastructure as success factors for ERP implementation in the organization.

4.3 Interview Result

The interviewers answered that there are various benefits of ERP software in the organization. It is used to collect, manage and distribute information across functional boundaries. Additionally, it helps to increase quality of service and reduced time-to-service so that, it can help to improve the service that the organization gives. The result identified that though ERP software requires a large amount of investment, if they are properly managed and implemented, the return on investment is high and in addition to this the organization may get numerous benefits as a result.

On the other hand, there are many challenges that were pointed out by the interviewers of the survey. The respondents said that the main challenges in implementing ERP software are poor requirement gathering processes, lack of top management involvements, insufficient training for users of the system and failure to get user support. As the findings point out that, a number of challenges would occur during the implementation of ERP software. The success of ERP depends on avoiding or controlling those obstacles that appear during the implementation of ERP systems. As a result, it is necessary to apply critical success factors and eliminate those challenges attached to ERP during the implementation of ERP system.

- **Impact of strategy Factors in the implementation process**

According to the interviews, even though the Top management provided the necessary financial resource for successful implementation of ERP, their involvement and support in the project was not significant. The ERP implementation practice of WEDSW has been surrounded by a number of problems including absence of clear goals, focus and scope of the project, top management commitment and training. Moreover, there was no a clear strategy and direction to follow. Besides, the business processes or the legacy system of the organization were not clearly displayed before ERP system is started, the implementation approach was not a step-by-step, the majority of employees were not well trained, which makes the implementation process to take more time and money. There was structural and business process of the legacy system changed after the system is implemented. Therefore, the amounts of technical and organizational changes were high.

- **The impacts of People Factors on the implementation process**

According to the responses, after the requirement gathering step is over the software developer company Cyber Soft Enterprise was design the system and deploys each module of the system. The system was deployed in the organization. The system users' involvements were not that much in the progress of the ERP system. Because of this their participation and involvement in either the requirement collection phase or in defining the company information system needs, the system development and implementation process was insignificant. During the implementation process, no specific project team (implementation team) has been announced by the client who is responsible for managing and controlling the progress of the system. After the implementation process was deployed, though a number of comments have been forwarded from the users of the system, whether the comments are vital or not, they all were sending to the designers of the system directly and the deployed system was updated using the incoming comments. But not all the comments are corrected. Coming to training and education, Cyber soft has given some training for the system users, but it is not a formal training. On the other hand, not all employees get the training about the system and IT staff did not get training on the software development language.

- **Impacts of Organizational factors**

Project management unit and project manager is vital for the successful implementation of ERP system in the organization. The interviewers' response that even if the controlling of the system given to the IT section, there is no project manager which handle the ERP implementation throughout the progress of the implementation, no recognized and accountable project manager. Hence the project lacks a planned project management unit that was taken a responsibility and the implementation plan was not clearly defined accordingly. On the other hand, change in management strategy has good impact on the implementation of ERP that is due to this strategy the facility could come into reality. Moreover, the IT maturity of the organization has a great impact on the success of ERP implementation but the organization did not reach IT maturity like good IT infrastructure, using of computer as a server not good and soon. In addition, employees of the organization were not empowered, involved, participated and trained to have knowledge on how the ERP project is going and to communicate and give their feedback on the progress of the

system. All these factors have their own great impact on the successful implementation of the ERP system.

4.4 Hypotheses Testing

The hypothesis test was to evaluate the differences in the mean scores, which is calculated from the result of survey conducted among 110 respondents. In this study it is chosen to focus in this question on one of the qualitative aspects developed. The survey instrument, Likert type scale used for the survey.

4.4.1 T – Test

The test statistic in the t-test is known as the t-statistic. The t-test looks at the t-statistic, t-distribution and degrees of freedom to determine a p value (probability) that can be used to determine whether the population means differ. The t-test is one of a number of hypothesis tests. When analyzing data, it needs to be decided whether a sample mean is different from a hypothesized population mean (Howell, 1997). In order to accomplish this measurement data, calculated mean and standard deviation of a sample, and hypothesized mean are needed (Table 9).

For this testing, the hypothesized mean is selected to be 4. The reason is from the survey questionnaire Likert scale measure 4 represents the respondents is “agree” with the level of implementation success. The proposed hypothesis to perform T-Test is,

$$H_0: \mu < 4$$

$$H_a: \mu \geq 4$$

The T – Test was conducted for each sample and the SPSS results are shown in the following table:

Table 9 One sample statistics for hypothesis testing

	N	Mean	Std. Deviation	Std. Error Mean
-ERP implementation makes the working process fully automated	110	2.32	1.149	.110
-The organization can obtain the expected benefit from ERP execution	110	3.48	1.056	.101
-ERP implementation contribute a high achievement in organization mission	110	3.75	1.094	.104
-There are some functional areas still use both manual & automated	110	3.36	1.232	.117
-ERP implementation is better solution in satisfying organization need and utilization of organization resource	110	3.64	1.115	.106

Table 10 T-test results

	Test Value = 4					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-ERP implementation makes the working process fully automated	-15.354	109	.000	-1.682	-1.90	-1.46
-The organization can obtain the expected benefit from ERP execution	-5.148	109	.000	-.518	-.72	-.32
-ERP implementation contribute a high achievement in organization mission	-2.354	109	.020	-.245	-.45	-.04
-There are some functional areas still use both manual & automated	-5.417	109	.000	-.636	-.87	-.40
-ERP implementation is better solution in satisfying organization need and utilization of organization resource	-3.421	109	.001	-.364	-.57	-.15

From the above results, it can be observed that in all levels of ERP modules the null hypothesis is rejected. On one sample test table all the t value is negative, for all alpha 2-tailed significant level i.e. less than 0.05, so it could be concluded that the mean score is less than 4 for all factors that is at 95% confidence interval.

4.4.2 Interpretation of statistical testing

For the t-test, as in all hypotheses testing, the computations are done assuming the null hypothesis is true. And also the p – value for all the factors such as ERP implementation makes the working process fully automated, the organization can obtain the expected benefit from ERP execution, ERP implementation contribute a high achievement in organization mission, there are some functional areas still use both manual & automated and ERP implementation is better solution in satisfying organization need and utilization of organization resource is negligible, the alternate hypothesis can be rejected. At the same time null hypothesis can be accepted for all the factor can be accepted since the test (table 10) value is lower than the statistical value. By interpreting the t–test results, the ranking of the levels must be in the order of ERP implementation contributes a high achievement in organization mission, ERP implementation is better solution in satisfying organization need and utilization of organization resource is negligible, the organization can obtain the expected benefit from ERP execution, there is some functional areas still use both manual & automated and ERP implementation makes the working process fully automated.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The major purpose of this study was to assess ERP implementation and challenges encountered in Water and Energy Design and Supervision Works Sector office. To achieve the purpose of this study, the following questions were raised.

1. What is the current status of Enterprises Resource Planning software in WEDSW?
2. What are the challenges affecting the full implementation of ERP software for WEDSW?
3. What are the possible solutions to address the challenges encountered in the implementation of ERP in WEDSW?

Descriptive survey method was applied to conduct the study. To collect the primary data, the researcher employed questionnaire, structured interview and observation. Questionnaire has been used to collect primary data from direct and indirect users of the organization. Questionnaires were used to collect relevant and first-hand information from key informants or respondents. The items of the questionnaires were mainly close-ended questions and accompanied by some open ended ones. From the 800 employees working in the organization, the target population is 600 employees. From 600 employees 120 were selected by using simple random sampling technique.

Findings

- Regarding to the implementation of ERP the respondents showed their agreement that having the average values of 2.32 and 2.36 respectively that ERP implementation in the organization did not make the working process fully automated and the application and utilization of all feature of ERP in the organization is at low level. However, the majority of the respondents, their mean score is 3.64 agreed that the system has supporting the transformational activity held in the organization at high level.
- Regarding the challenges of ERP implementation limitation of adequate infrastructure (mean score of 3.75), misunderstanding of change requirements (mean score of 3.66), failure to redesign business process (mean score of 3.59) and insufficient training of end-users (mean score of 3.56)

were among the major implementation challenges that affect highly execution of ERP in the organization.

- Concerning the ERP customization, the respondents replied that organization business requirement is fully considered and integrated (mean score of 2.41), ERP customization has been done considering the long term strategic objective of the organization (mean score of 2.32), and additional feature obtained from the system beyond the predetermined requirements (mean score of 2.45) this shows that ERP customization in the organization found at low level.
- Even though there were training gap assessment is conducted, training was not given exclusively and adequately for employees of WEDSWS. So, this may affect the success of ERP implementation in the organization. And therefore the employee must be equipped with detail training in order to have know-how about the system they are working on it.
- Concerning the critical success factors of ERP implementation, interdepartmental cooperation and coordination (mean score of 3.50), deal with organizational diversity (mean score of 3.50), Change management (mean score of 3.50), planning/development/budgeting (mean score of 3.59) and Top management and project team leaders commitment on ERP implementation (mean score of 3.58) were among the major critical success factors for ERP implementation with high degree.

5.2 Conclusion

Based on the findings of the study, the following conclusions were drawn:

- The finding revealed as majority of the respondents believed that the deployed ERP system did not help the company to fully automate the back office working area and the company is not getting the expecting benefits from the system as well.
- There are some functional areas that are utilizing both manual as well as the automated ERP system based working methods. On top of this, majority of the employees also believe that the existence of both working methods is highly affecting the efficiency of the organization. This may be because the time consuming and energy taking nature of the manual working methods.
- The organization efficiency has been hampered due to not utilizing the entire feature of the

system even if the system license has been fully procured. This means that, the organization is not able to utilize all the features of the system due to different factors, but the major reason for this underutilization could be lack of expertise on the area.

- The system has been customized in line with the process and policy. And this also contributes a lot for the mix-up utilization of both the manual intervention of a manual working process while the system is already there. However, some of the customization activities have not been performed considering the long term strategic objective of the company.
- There is no enough training intervention to capacitate employees on the system. Therefore, even though the organization has awareness on the role training for employees on the newly introduced IT solution valuable effort has not been exerted in this regard.
- Lack of awareness, lack of readiness, shortage of training, lack of senior manager commitment, conflicts of interest among departments, Failure to redesign business process, absence of User involvement and participation, poor IT infrastructures are among the major problems that affect the effective implementation of ERP in the organization. So, this being challenge for ERP implementation for the organization.
- Even though there are some shortcomings in the process of ERP implementation in the organization, there are some positives achievement observed due to the implementation of enterprises resource planning. Hence, based on the data collected, analyzed and interpreted, it is fair to conclude that ERP implementation in the organization has significant positive impact on organizational working system.
- From the analysis of the research hypothesis implementation of ERP in the organization proved to provide better service and can improve the working system of the organization.

5.3 Recommendations

Based on the findings and conclusion, the following recommendations were drawn:

- To realize all the benefits expected from the system, the organization has to exert all its effort to utilize all the features of the system from the already procured license, so that the intervention of manual working methods can be highly minimized and efficiency of employees and organization in general can be enhanced accordingly.

- From the customization point of view, on top of the standard feature of the system all the required company rules and regulation and countries regulatory procedures need to be integrated in the system through change request (customization), otherwise some operational activities will be handled through system interface and the other will require manual intervention and this will lead to inefficiency. In addition the organization need to assess all the requirements defined and point out which requirement is already integrated and which one is not yet incorporated, then the company has to work on how the remaining business requirements can be integrated.
- Since the major purpose of Enterprise resource planning (ERP) system implementation is to reinforce the efforts and performance of employees towards the achievement of organizations goals and objectives, the organization has to do a lot by delivering the required training programs for both end-user as well as super users to bring the required level of skills on the system. To do so, a competency assessment has to be implemented to examine the required skill level and the actual system functionality, so that the right training for the right target group can be delivered for the better utilization of the system.

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APPENDICES

APPENDIX A: QUESTIONNAIRES

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

Questionnaire to be filled by the employee of the Water and Energy Design and Supervision Works

Dear Respondents

The main purpose of this study is to assess Enterprise Resources Planning (ERP) software of water and energy design and supervision works. The results of this study will be used for academic purpose only. Therefore, your genuine response to the questions is vital for the quality and successful completion of the study. The accuracy of the information you provide highly determine the reliability of the study.

Thank you in advance for your unreserved cooperation!

PART I: Background Information

Direction: Please place an “X” mark on the BOX provided against the item

1. Sex

Male Female

2. Age Group

Below 20 21-25 26-30
31 – 35 36-40 41 and above

3. Educational Status

Below Diploma Diploma

BA/BSC MA/MSc

PhD

Other please specify _____

4. Work Experience

Less than and 5 6 – 10
11 – 15 16 – 20
21 and above

5. Which module are you working?

Record management information system
Procurement and supply management
Human resource management system
Transport fleet management system
Payroll management system
Integrated Finance Management System
System resource management system
System Core Settings

6. The position you hold in the organization

Staff Supervisor

Part II: Issues Related Enterprise Resources Planning (ERP)

1. Do you feel that ERP has been helpful for your work?
Yes No
2. How often do you use the ERP software related with your work?
 Sometimes Always Never
3. How you comfortable working on ERP?
 High Medium Low
4. How is your initiation on working ERP for your work?
 High Medium Low
5. The participation of employees in ERP development.
 High Medium Low

Part III: Issues Related Enterprise Resources Planning (ERP) Implementation & Challenges

A. The following are items related to how enterprises resource planning support business activities in your organization. The five alternatives and their values are indicated as follows:

1= Strongly Disagree 2=Disagree 3= Neutral 4= Agree 5= Strongly Agree

No.	Items	1	2	3	4	5
1	ERP implementation makes the working process fully automated					
2	The organization can obtained the expected benefit from ERP execution.					
3	The system has been supporting the transformational activity held in the organization					
4	ERP implementations contribute a high achievement in organization mission.					
5	ERP implementation is the better solution in satisfying organization need and utilization of organization resources.					
6	The organization apply and utilize all features of ERP					
7	There are some functional areas still use both manual and automated working system					

B. The following are items related to enterprises resource planning challenges in your organization. Please indicate the extent of your agreement with each statement by putting a tick mark. The five alternatives and their values are indicated as follows:

1= Strongly Disagree 2 =Disagree3 = Neutral4 = Agree5 = Strongly Agree

No.	Items	1	2	3	4	5
1	Lack of top management commitment and allocation of budget					
2	Insufficient training for users of the system					
3	Failure to get user support					
4	Attempts to build bridges to legacy system					
5	Conflicts between user departments					
6	Composition of project team members					
7	Failure to redesign business process					
8	Misunderstanding of change requirements					
9	Limitation of adequate infrastructure					

Part IV: Issues Related Enterprise Resources Planning (ERP) customization and Capacity Building

A. The following are items related customization the ERP in line with the organization activities. Please indicate the extent of your agreement with each statement by putting a tick mark. The five alternatives and their values are indicated as follows:

1= Strongly Disagree 2 =Disagree3 = Neutral4 = Agree5 = Strongly Agree

No.	Items	1	2	3	4	5
1	The system is fully customized in line with the organization policy					
2	The organization business requirement is fully considered and integrated					
3	ERP customization has been done considering the long term strategic objective of the organization					
4	Additional feature obtained from the system beyond the predetermined requirements					

B. The following are items related to the level of capacity building done the system. Please indicate the extent of your agreement with each statement by putting a tick mark. The five alternatives and their values are indicated as follows:

1= Strongly Disagree 2 =Disagree3 = Neutral4 = Agree5 = Strongly Agree

No.	Items	1	2	3	4	5
1	Sufficient training gap assessment is conducted					
2	Training was given exhaustively for all users					
3	The training given on the system was adequate and useful					
4	Post training observation conducted					
5	The results of the training provided assessed					

Do you think ERP successfully running in the organization?

- A) Yes
- B) No

If your answer for the above question is “yes” please indicate the critical success factors outlined in part V here under

Part V: Issues Related to the Importance of Critical Success Factors

A. The following are items related to the importance of critical success factors. Please indicate the extent of your agreement with each statement by putting a tick mark. The five alternatives and their values are indicated as follows:

1= Very Low 2 =Low3 = Medium 4 = High 5 = Very High

Items	1	2	3	4	5
Conformity of ERP with the organizational functionality					
Top management and project team leaders understanding of ERP					
Internal readiness or training					
Deal with organizational diversity					
Planning/ development/budgeting					
Change management					
Inter departmental cooperation and coordination					
User involvement and participation					
Good infrastructure					

If there is any other issue/ problem that you observed in relation to ERP implementation and its utilization, and please write down here.

Please mention some major possible solutions that help to address ERP implementation Challenges in your organization

Thank you again for your time and cooperation

APPENDIX B: INTERVIEW QUESTIONS

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

Interview questions for manager of WEDSWS and project manager of Cyber Enterprise

The main purpose of this study is to assess Enterprise Resources Planning (ERP) software of water and energy design and supervision work sector. The results of this study will be used for academic purpose only. Therefore, your genuine response to the questions is vital for the quality and successful completion of the study.

1. Background Information

1.1 Age

1.2 Sex

1.3 Qualification

1.4. Current position in the organization

1.5 Work experience

2. Do you believe that all the requirement of the enterprise is included clearly at the requirement gathering phase?
3. Do you believe that the project achieve its intended purpose?
4. Do you believe that user and responsible managers was highly involved during the implementation of the project and take their responsibilities effectively?
5. What was the Impact of the following strategy Factors in the ERP implementation process?
 - Clear goals, focus and Scope
 - Top management commitment
 - ERP Strategy
 - Legacy systems management
6. What was the Impact of the following people Factors in the ERP implementation process?
 - User participation

- Training
- Employees attitude
- Project team

7. What is the Impact of the following organizational Factors in the ERP implementation process?

- Process management
- Change management strategy
- IT maturity
- Computer culture
- Effective project Management

Appendix D: Declaration

I declare that the thesis is my original work and has not been presented for a degree in any other before.

Date