ASSESSMENT OF ERP SYSTEM IMPLEMENTATION PROCESS: THE CASE OF SAP IMPLEMENTATION PROJECT IN A PRIVATE SECTOR.

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APPROVAL SHEET

This MA thesis entitled with **"Assessment of ERP System Implementation Process: The Case of SAP Implementation Project in a Private Sector"** has been approved by the following examiners in partial fulfillment of the requirement for the degree of Master of Art in project management.

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STATEMENT OF DECLARATION

I, the undersigned, declare that this research paper entitled with **"Assessment of ERP System Implementation Process: The Case of SAP Implementation Project in a Private Sector"** is a result of my own investigation, except all sources of materials used for the study have been duly acknowledged. I conducted the research on my own, with the help and advice of my research advisor. Other sources have been recognized with citations that lead to more resources.

Samrawit Tesfaye		
Name	**Signature**	**Date**

STATEMENT OF CERTIFICATION

This is to certify that this project work, with **"Assessment of ERP System Implementation Process: The Case of SAP Implementation Project in a Private Sector"** undertaken by Samrawit Tesfaye for the partial fulfillment of Master of Project Management at Addis Ababa University. I have read this research project prepared under my direction and recommended that it be accepted as fulfilling the research requirement.

Teklegiorgis Assefa (Asst. Prof.)		
Name	**Signature**	**Date**

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Acronyms and Abbreviations

ASAP……Accelerated System Application and Product
ABAP……Advance Business Application Programming
BDC……...Batch Data Communication
BPO's……Business process owners
CSF's…….Critical Success Factors
DEV……Development System
ERP…….……Enterprise resource planning
FICO.....Financial and Control Accounting
HR.....…...Human Resource Management
IMG. ..……..SAP Implementation Guide
IS …… ……Information System
LSMW……..Legacy System Migration Workbench
MM……..……Material Management
PROD……..Production System
QAS…….Quality System
RICEF……..Reports, Interfaces, Conversions, Enhancements, and Forms
SAP……..……System Application and products
SLD……..……Software Development Life Cycles
SD…… ……...Sales and Distribution
SaaS…… ……Software as a Service
UAT…… ……User Acceptance Test

Dedication

I would like to dedicate this research project to my loved ones, for whom I am eternally grateful. Especially, to my amazing mom “Etete” who have been my inspiration through this journey. Thank you for nurturing me with your love and affection. You are the most important factor in my life's success. Thank you for being an inspiration to me.

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Abstract

Nowadays most organizations are seeking for a centralized and integrated system to manage their business functions, to improve internal business processes, to improve the company's performance, to improve interactions between internal employs and external organization and to reduce IT and labor costs. Implementing Enterprise Resource Planning (ERP) systems can provide all of the above mentioned benefits by integrating the functions of core business processes like finance, HR, supply chain and inventory management in a single system. There are various types of ERP Systems in the market, such as SAP, Oracle, Microsoft Dynamics, etc. Although this systems have a great advantage the implementation process is complex so it requires an effective and efficient plan. The main objective of this research was to evaluate an implementation process of SAP ERP system. The research aims to find out whether this implementation methodology was effective in achieving its goal. And the specific objective of the research was to identify activities in each implementation phase, to identify challenges in each implementation phase and to identify which phase was the most challenging one and suggest recommendations to prevent or overcome those challenges. The study employed a qualitative approach, a full scope implementation project was choose as a case study, data from the entire process was gathered through observation and document review and semi structured interviews were done. Content analysis and triangulation where used for document analysis. The finding showed that the vendor used ASAP Methodologies, an effective and efficient methodology which was used to implement SAP implementation projects and is divided into 5 vital phases: project preparation, business blueprint, realization, final preparation and go live. The activities in each implementation phase and potential challenges that could cause project time and cost delay were discussed. The researcher concluded that the methodology was effective but the challenges should be considered for any other implementation projects. The researcher recommended to assess or evaluate more implantation project for better understanding.

Key Words: ERP, SAP, ASAP, Implementation

Chapter 1 : Introduction

1.1 Background of the Study

Running a successful business calls for proper management of financial and organizational data which is reliable and accurate. Information Systems (IS) provide required information to managers and supervisors at different levels to assist them in carrying out their organizing, planning, controlling, and decision-making functions. Industrial enterprises have been determined to implement Information Systems since the emergence of the first computer. Most business firms consider such systems very essential to manage and run their business today. Information Systems integrates technology, people and processes involved with information. Information Systems are common systems which deal with the interaction of people and technology as part of a series of value-adding activities for acquiring, transforming, and distributing information that can be used for better decision making, to increase organizational performance, and ultimately increase firm profitability. To support and integrate several functional areas of a business a computerized Information System or ERP systems are used (Jessup, Valacich, & Wade, 2006)). An information system, including ERP systems, is user-interfaced and designed to provide information useful to support strategy, operations, management analysis, and decision-making functions in an organization.

Enterprise Resource Planning (ERP) System is a computerized Information System(IS) that allows information to flow freely within an organization and it combine information and processes into a single system with a centralized database that addresses how businesses gather, store, view, summarize, interpret, and use data by integrating different components through the technical integration of software, hardware, and business processes. Instead of using separate systems to manage different sectors of an organization, an integrated system such as ERP is usually a part of the bigger management information system that is at the lead of simplifying routine operations, providing managers with analytical information and tools to facilitate critical internal business processes. ERP systems are a business management software that is used by most firms to collect, store, manage and interpret data from a variety of business activities. Implementing such systems would help the company by providing accurate and reliable data that can be accessed in real time with no data redundancy (Leon, 2007). ERP Systems are designed to manage and integrate the functions of core business processes like finance, HR, supply chain and inventory management in a single system. There are various types of ERP Systems in the market, such as SAP, Oracle, Microsoft Dynamics, BaaN, Peoplesoft, QAD etc. An organization can choose and implement among the different kinds of ERP Systems that are available which best suits its needs.

Even though implementing such ERP systems help companies transform their business and discover prospects they never knew were possible, the implementation process has been known to be much more difficult than the development of a computer application

supporting a single business function. ERP System implementation is a large complex project which require large group of resource. ERP implementation causes significant changes in organizational strategies and results in significant improvements in corporate practices, yielding large returns on investment. Unsurprisingly, many of these implementations fail to achieve the goals set out in the beginning. Previous studies has shown 75% ERP projects are classified as failure (Mohammad Ali Kohansal, 2019). Which implies an effective and well-organized implementation process is needed to implement such complex projects. Most business firms look for a methodology that can ensure the efficiency of the project implementation process. For any kind of project the project manager and project team have one shared goal that is meeting project objective by carry out the work of the project. Every project whether it's successful or not has a beginning, a middle period during which activities move the project toward completion, and an ending. A standard project typically has the following four major phase's initiation, planning, implementation, and closure, which represent the path a project takes from the beginning to its end and are generally referred to as the project life cycle. More than 40% of large software projects fail (Parr and Shanks, 2000) and according to (Boston Consulting Group, 2000) 67% of enterprise application initiatives could be considered negative or unsuccessful. The implementation (project) phase of an ERP system's lifecycle begins once the system and implementing partner have been selected, and concludes when the system has been "go-lived" (Lech, 2013).

1.2 Statement of the Problem

ERP software is a set of customized applications that enables enterprises to automate and control their most critical processes. Whether the organization is large or small, implementing ERP system will provide real-time information and data, improve collaboration, allows to increase productivity, improved reporting capabilities, 360-degree view of business operations, effortless integration between all core processes, improve customer service and decrease operating costs. In order to minimize redundancy, increase efficiency, productivity, and performance, ERP software has emerged as a key enabler of system integration in organizations. Even though implementing ERP systems have many advantages, the implementation process is hard and complex. Sometime developing in house system based on customer's requirement is better than this implementations. ERP implementation is not like other IT project, it is not an easy task (Sambamurthy & Kirsch, 2000).

According to Malik (2009), it is different because it contains business process reengineering and optimization. And Ghosh (2002), agrees with the idea like Malik managing ERP projects is not like managing small IT systems. The old IT infrastructures and business process will be replaced brand new process. The ERP implementation process encompasses all facets of the project, including designing the initial business case and project planning, configuring and integrating packaged software, and subsequent business process changes (Shanks, 2000). According to, (Davenport, 1998) 90% of ERP implementations end up late or over budget and also according to Wang and Chen (2006),

more than 90% of ERP implementations have been delayed and required additional budget amounts due to numerous changes in the original plan. Lack of experience with large and complex IT projects and developing a poor implementation phase were also few of the reasons mentioned. This is the problem with most implantation projects in Ethiopia, the project took more time and cost than it was planned for to meet the project scope.

Despite the fact that ERP software has been widely used, the issues are being faced by a wide range of sectors around the world. During and after implementation, there are still challenges to be overcome, concerns are increasing and many of these projects were challenging, time-consuming, and over-budget, also abandoned before completion, and failed to meet their business objectives even a year later (Somers and Nelson, 2004). According to (Huang and Chang, 2004) lack of effective project management methodology was one of the risk factors of ERP system implantation projects.

ERP system is an overly done topic in most research papers in Ethiopia, however, very little is mentioned about ERP project planning methodologies. Most of the research papers revolved around CSF's of ERP system implementation, for example, according to (Daniel, 2018) the top CSF's in CBE were top management support and commitment, Project planning and strategy, Project management and leadership, Team composition, dedication and retention, Business process change and less customization and Change management and communication. Another study in Mugher And Derba Cement Industries mentioned that top management support, users training and education, effective project management, user involvement, suitability of software and hardware communication and data accuracy creates great challenge for the success of an ERP implementation were stated as critical success factors of ERP system implementation (Kibebework, 2015). Managerial-related factors (change management), and people-related factors (ERP team and composition) were found to be the critical success factor for successful Microsoft Dynamics NAV ERP implementation in the chartering phase (Derbew, 2020). And also according to (NEBIYOU, 2018) another research done on CSF's of the implementation process in CBE were top management commitment & support, effective project management, project team work and composition, communication to integrate legacy system, training and education, consultant selection and relationship, system's customization and integration and BPR. A detail analysis about the implantation process is limited and needs further researches.

1.3 Research Question

The research will address the following questions:

- Which ERP implementation methodology was used?
- What were the activities performed in each implementation phase?
- What were the challenges in each implementation phase?
- Which ERP implementation phases caused the most project delay and cost overrun?

1.4 Research Objective

1.4.1 General Objective

The general objective of the research was to assess the implementation phases of SAP ERP system implementation project.

1.4.2 Specific Objective

The specific objectives of the study were:

- To identify the implementation methodology used
- To identify activities and task in each implementation phase
- To identify challenges in each implementation phase
- To identify out of the five phase which one encounter challenges that can affect the project time and cost.

1.5 Significance of the Study

The research aims to identify project life cycle of implementing SAP ERP systems in a private organization in Ethiopia. The researcher believes this research was beneficiary for both the implementer (vendor) and for the adopting (customer) organizations. For the implementer, this assessment will help them evaluate theirs implementation method, identifying the major challenges and taking measure for better implementation for the coming projects. It can help the organizational improve its implementation methods to increase its success rate, reduce its costs and increasing organizational and employee satisfaction. Implementing and delivering the ERP system within budget, time and scope will gain customer satisfaction and help the company manage its resource efficiently. And for the adopting firm this assessment will help improve it approach for the next phase, which is upgrade to the latest version. The research also had other significance such as to share knowledge and experience about SAP ERP system implementation, to assist any organization who wants to implement the ERP system since it was developed based on best practice implementation, to serve as a foundation for future research in the field, allowing researchers to examine major issues related to system implementation and design significant milestones as a starting point, as well as making it accessible for academic use Any other researchers and individual who want to start a carrier in SAP or that are interested in the area of the subject may find the paper interesting.

1.6 Limitations of the Study

The research had the following limitations:

- Due to the pandemic some of the consultants were not okay with face to face interviews.
- The data analysis method used for this research was content analysis which require time.
- The research consider only one implementation project since most projects require one or more years to implement.

1.7 Organization of the Study

This research was divided into five chapters. In chapter one introduction, problem statements, research questions, general & specific objectives, significance of the study, and limitations of the study were discussed, it includes the gaps identified in the field, based on those gaps research questions and objectives developed and who will benefit from this research were discussed. In chapter two previous studies about ERP systems, SAP and project life cycle were discussed, and based on those studies a conceptual frame work was developed. The third chapter deals with the research design, target group and sampling techniques, data collection, and analytical techniques it states the methodology used to for data collection and analysis. In chapter four the research findings were discussed. Finally, based on the research findings the research was summarized and concluded in chapter five, it also include recommendations for future research.

Chapter 2 : Literature Review

2.1 Introduction

There has been researches, literatures, and studies conducted about ERP systems. This chapter discuss relevant books, journal articles, and other sources related to the research. It have two sections, the first section focuses on ERP system overview and SAP systems. The second section discuss the conceptual frame work of the study.

2.2 Theoretical Review

2.2.1 Enterprise Resource Planning (ERP) Systems Overview

According to (David, 2019), Information Systems (IS) are defined as systems that integrate technology, people and processes involved in information by interconnecting components to work together to collect, process, store, and circulate information to support decision making, coordination, control, analysis, and visualization in an organization. An information system, including ERP systems, is user-interfaced and designed to provide information useful to support strategy, operations, management analysis, and decision-making functions in an organization. Today, ERP systems are critical for managing thousands of businesses of all sizes and in all industries.

Enterprise Resource Planning (ERP) Systems refers to a type of business software that organizations use to manage day-to-day business activities such as planning, purchasing inventory, sales, marketing, finance, human resources, and more. ERP systems helps companies manage and integrate the important parts of their businesses by integrating all of the processes needed to run their business with a single system. ERP is a framework with a configurable software package that facilitates integrating transaction processes that cover several business areas by consolidating all business operations into a single system setting (Tsyen, Idrus & Kalsom, 2016). ERP is an enterprise-wide information system that coordinates and controls all business processes in the organization. It also helps an organization incorporate all of its primary business processes in order to improve productivity and maintain a competitive advantage (Tenkorang & Helo, 2011). According to (Lineke, 2014), ERP is defined as a computer applications that are used by businesses firms in a wide range of sectors to promote data integration and best-practice processes. Data integration refers to the fact that data is only entered once and then made available for use in the enterprise.

As noted by (Goeun, 2013), and (Linda, 2003) ERP is the method of combining all of an organization's business operations and procedures in order to achieve numerous benefits. To begin with, a single point of data entry reduces data redundancy while also saving employees time when entering data, lowering labor and overhead costs. Second, centralizing information, decision-making, and control improves operational and productivity efficiency, as well as cooperation between agencies, divisions, regions, and even countries. Since ERP systems offer a tightly integrated solution to an organization's information system needs, they are currently in high demand from both manufacturing and

service organizations (Nafjan & Mudimign, 2005). ERP enables professionals to handle various aspects of their business in a single framework that integrates the entire business process and provides a broad enterprise view of critical corporate data.

ERP is also known as a business management system that consists of integrated sets of comprehensive software that, when properly implemented, can be used to manage and integrate all of an organization's business functions (Nafjan & Mudimign, 2005). A comprehensive view of important organizational data through the whole organization. Financial and cost accounting, sales and distribution, materials control, human resource, production planning and computer integrated manufacturing, supply chain, and customer information are typically included in these packages. This definition also cited in (Singla, 2008), which implies ERP systems encompass a wide range of items that help with day-to-day activities and decision-making of an organization. ERP attempts to automate processes from supply chain management, inventory tracking, manufacturing scheduling and distribution, sales service, customer relationship management, financial and cost accounting in many sectors and functional areas. Enterprise Resource Planning (ERP) software, in general, is software that helps to consolidate all divisions and functions within an organization into a single computer system that can satisfy all of those departments' specific needs by providing accurate and reliable data that can be accessed in real time with no data redundancy.

The evolution of ERP

The evolution of ERP systems closely followed the advancement in the field of computer hardware and software systems (Rashid, Hossain & Patrick, 2002). Most companies planned, developed, and introduced centralized computing systems during the 1960s, often automating their inventory management systems with inventory control packages (IC) which was a legacy systems that used COBOL, ALGOL, and FORTRAN as programming languages. And in the 1970s, material requirements planning (MRP) systems were introduced, which primarily included planning the product or requirements in accordance with the master production schedule.

The late 1980s and early 1990s marked the beginning of the first ERP systems. In the 1980s, new software systems known as Manufacturing Resource Planning (MRP II) were implemented, focusing on optimizing manufacturing processes by synchronizing materials with production requirements. Shop floor and distribution management, project management, finance, human resource, and engineering were all included in MRP II (Rashid, Hossain & Patrick, 2002). ERP systems first emerged with the ability to coordinate and integrate enterprise-wide inter-functional activities. During this era ERP systems incorporate business processes such as production, distribution, accounting, financial, human resource management, project management, inventory management, operation and maintenance, and transportation, and provide usability, visibility, and

continuity across the enterprise, based on the technical foundations of MRP and MRP II (Hershey & O'Leary, 2000).

ERP vendors introduced more modules and functions as "add-ons" to the core modules during the 1990s, giving rise to "extended ERPs." Advanced planning and scheduling (APS), as well as e-business solutions like customer relationship management (CRM) and supply chain management, are among the ERP extensions available (Rashid, Hossain & Patrick, 2002). The MRP and MRP II systems, which would go on to become the basis for all future ERP systems, were born and grew as a result of the rapid growth of computing power. The program became infinitely expandable with the addition of modules and add-ons, covering nearly every operation. They were mostly aimed at the largest and most complex corporations at the time. To introduce the new systems, they needed widespread acceptance and consultants. Companies had to fully re-engineer their internal business processes in certain cases in order to better execute them. The ERP systems of the time were not nearly as feature-rich as those available today, despite being completely functional and enterprise-ready. Although some early systems supported plug-ins, the number of plug-ins available was much smaller. Scheduling, customer relationship management, and supply chain management were among the first extensions (Jacobe, 2014).

Enterprise networks have evolved into an essential component of almost every large company today. Extensions, add-ons, and customization solutions are more abundant than ever before for companies. A lot of data is stored and accessed in the cloud. Companies have access to data from anywhere, at any moment, and in much greater quantities. ERP systems often provide data-driven analysis and solutions for every process or agency. Current ERP systems are as broad and intuitive as the organizations they serve, detecting contradictions and making recommendations.

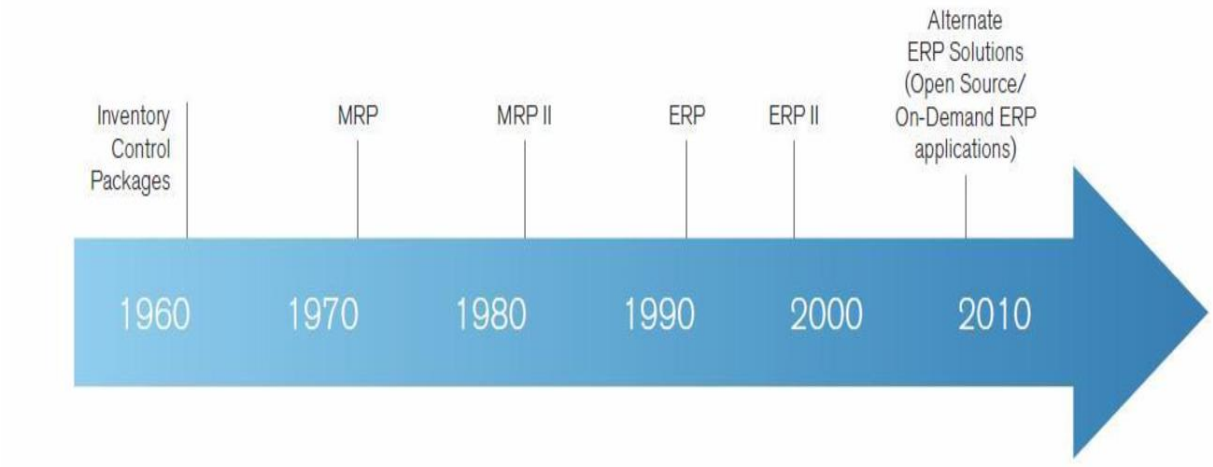

Figure 2.1 - Evolution of ERP (Source: Jacobe, 2014)

Types of ERP System

There are three major types of ERP systems, each with its own set of deployment options. The most common types of ERP systems include: On premise, cloud-based and hybrid software. On-Premise ERP software is installed and maintained in a physical office space within an enterprise, and is hosted on the company's own computers and servers for complete control, maintenance, and possession of the entire system once installed. Cloud-based ERP software **(**Software as a Service (SaaS)) is a web-based solution that allows an enterprise to access and store data on any computer with an internet connection, normally through the purchase of a subscription. The software vendor provides ongoing support, upgrades, training, and customizable customizations. “Hybrid” ERP software is to deploy cloud-based and on-premise ERP device solutions in tandem. Providers provide different combinations of hosting and deployment services. These models will give ERP users the freedom to switch between delivery models or integrate features that aren't available in their current implementation. Various ERP vendors support a variety of deployment models. Combinations of options, known as "hybrid" deployment, can include a mix of hosting and deployment services. These models will give ERP users the freedom to switch between delivery models or integrate features that aren't available in their current implementation.

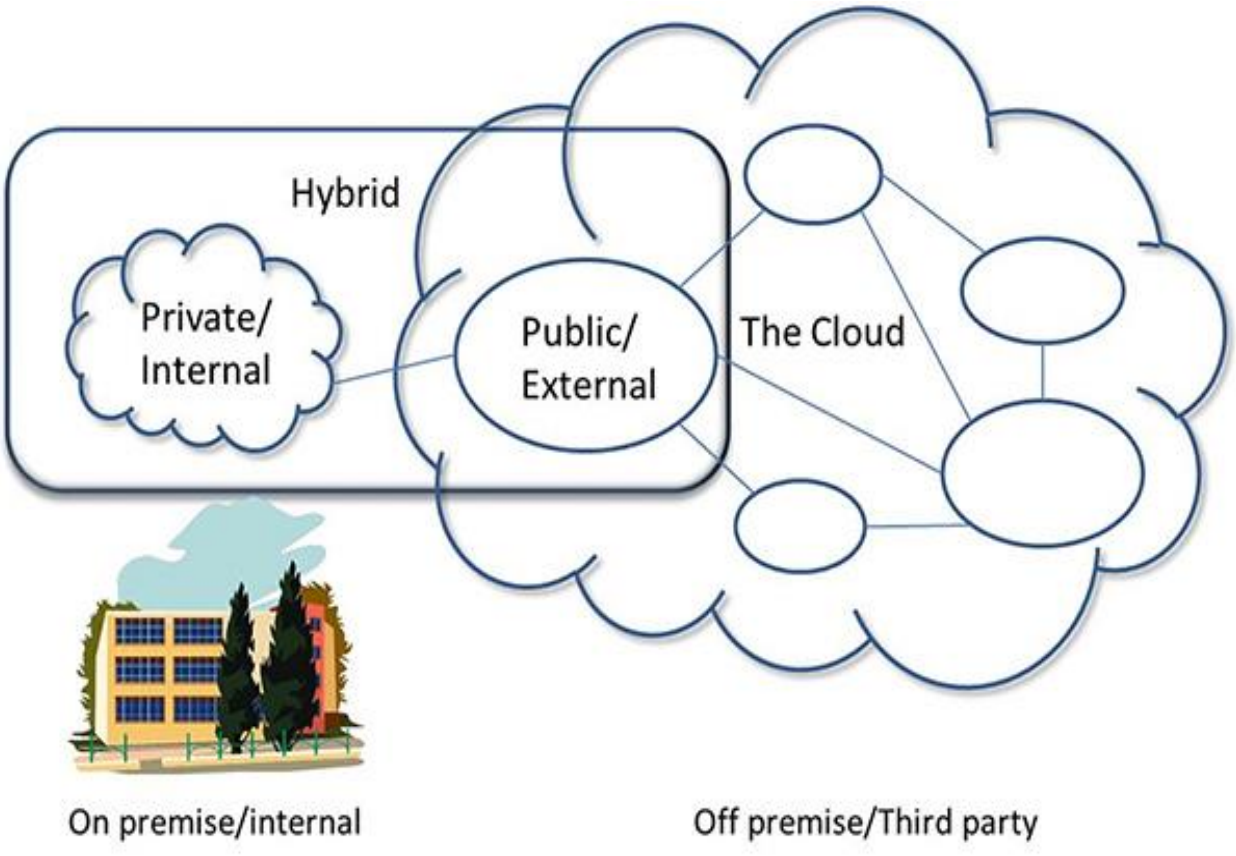

Figure 2.2 - Type of ERP System (Source: https://www.industrios.com/news/read/top-5-reasons-hybrid-erp)

Reason for ERP System Implementation

Companies at the forefront of innovation are seeking to implement ERP systems now days. Integration of financial information, Integration of customer order information, Standardization of and the speeding up of manufacturing processes, Reduction of inventory level, and Standardization of Human Resource information are among the five reasons implementing an ERP system. Although ERP implementation may be costly and time consuming, the benefits are worth the investment. Operating a business in a rapidly changing and highly competitive environment is a primary purpose of implementing an ERP system. An organization may expect to gain significant benefits from careful preparation and selection of the best ERP system, including drastic improvements in responsiveness, efficiency, on-time shipments and revenues, reductions in lead times, procurement costs, quality, and inventories. A research conducted by (Bernhard, 2014), found top management demand, improving productivity/efficiency, improving customer service/support, reducing operational costs, partner pressure, merger/acquisition, access to global markets, customer pressure, competitive threats, reducing labor costs and technology upgrade were among the major foundations to implement ERP in organizations.

Issues to Consideration before Implementing ERP Systems

Different parameters should be considered before implementing any project. Since ERP is also a project, there are some important concerns that managers must consider before deciding to incorporate all of the company's business functions. According to (Linda, 2003), before integrating business functions, managers must consider a number of important factors that will help them determine whether or not an ERP integration is the best option for their company, these important issues include:

Issues	Considerations
Fundamental Issued	❖ Managers must first analyze the organization's vision and organizational goals to understand the fundamental (essential) problem of system integration. In addition, determine if the company is financially and economically prepared to invest in ERP. ❖ Management must determine how to deal with the main implementation and business issues. ERP is clearly not appropriate for businesses that are witnessing rapid growth and transition in an uncertain setting, are changing corporate management and culture, or are planning a merger or liquidation in the immediate future. ❖ Finally, in order to incorporate the ERP framework with e-business applications, businesses must take advantage of potential networking and computing technologies.

Issues	Considerations
People Related Issues	❖ According to Linda and other writers, active top management support and dedication are critical to the system's full implementation success. ❖ Employees are often wary of change, so to increase the likelihood of a successful ERP implementation and minimize users' resistance to change, end users, especially those with extensive knowledge of the operation, must be involved in all stages of the implementation process.
The Organizational Change Process	❖ Organizations are required to fundamentally reengineer their core business processes, revamping outdated business models, redefining work roles, and restructuring the company. ❖ Consider change in the organizational process during ERP implementation.

Table 2.1 - Consideration before implementing ERP systems (Source: Linda, 2003)

Advantage and Disadvantage of Implementing ERP System

The main goal of enterprise resource planning, or ERP, is to integrate all departments and functions of an organization into a single structure using a shared database, resulting in only one correct collection of data (Greengard, 2003). Access to timely data is one of the challenges that businesses face. This is critical when making practical business decisions. Frequently, information about an organization can be found in many databases. Data in ERP systems is found in one common database. For instance, warehouse supervisor enters data into the system by using the warehousing module, that information is observable across the enterprise (Caralli, Richard, Stevens, James, Willke, Bradford, Wilson & William, 2004). It is easy to conclude that ERP implementation has many advantages based on the benefits that ERP systems provide to businesses (Sayegh, 2010). The benefits and business value of ERP system include: cost savings and improved return on investment (roi) efficiency, improve business insight, manage regulatory compliance, mitigate and reduce risk (reduce human errors, and free up employee time and resources), enhance collaboration and coordination to improve job efficiency, scalability and optimize customer and partner management.

ERP allows for role-based access, in which each user's level of access is determined by his or her information needs. (Tasevska, 2013), (Ali & Hasan, 2013), (Greengard, 2003) and (Sharma, 2014) agree that apart from the numerous benefits they provide to businesses, ERP systems have few drawbacks. Here are a few of them: time for real benefits to occur since the implementation take from 12 to 18 months, the need to re-engineer the process to conform to the ERP vendor's best practices will result in a competitive advantage being lost, many people believe that implementing ERP to a particular company's processes is complicated and expensive, for all of the system's partners, the switching costs after implementation are extremely high, ERP systems generate a boundary less organization, which can cause issues with accountability, duty lines, and employee morale and

departments may be apprehensive about exchanging internal data, which reduces the integration's benefits.

2.2.2 SAP ERP System

Introduction to SAP

SAP which stands for Systems Applications and Products in Data Processing was developed by German company SAP SE. in 1972. It was founded by former IBM software engineers Wellenreuther, Hopp, Hector, Plattner, and Tschira. It has been a leader in business applications since the launch of its first ERP system. SAP headquartered is located in Walldorf, Germany with annual review of $ 27.34 billion in year 2020. It has more than +400,000 customers in over 180 countries, +21,000 SAP partner companies globally and employ 102,400 people at locations in more than 140 countries in the European, Middle East, and Africa (EMEA); Americas; and Asia Pacific Japan (APJ) regions. SAP Cloud has 200m+ subscribers in their cloud user base and 100+ innovation and development centers around the world (SAP, 2019).

Today, SAP is the market leader in enterprise application software, helping companies of all sizes and in all industries run at their best. At list 77% of the world's transaction revenue touches an SAP system. It is the world's largest independent software manufacturer and SAP Systems end-to-end suite of applications and services enables its customers to operate profitably, adapt continuously, and make a difference. SAP has a high degree of collaboration between its various applications, ensuring data integrity across the system. SAP's global growth strategy focuses on dispersing development around the globe in strategic markets. SAP operates across a global network that spans Bulgaria, Canada, China, Germany, Hungary, India, Israel, and the United States (SAP, 2019).

ERP solutions from SAP give business firms access to tools designed to simplify their business processes and gain an advantage over their competitors. This is accomplished by integrated financial management, supply chain management, and customer relationship management (CRM) tools. The majority of SAP ERP software is flexible, allowing you to tailor the kit to your specific requirements. Regardless of the size of the business, SAP has a worldwide partners that can help business firms buy, build, implement, service, support and run the SAP solution that best fits their unique needs. For small and midsize (SME) businesses that have concerns working with such a large company, SAP provides local partners that can help you face-to-face and handle local regulations (SAP, 2019).

SAP Product Evolution

Since the beginning of enterprise computing, SAP have been rebuilding the business application whenever major technology shifts have occurred. According to (SAP, 2017) the company launched its first commercial product which was not considered as the first major release in the year 1973 and was based on the tier system like the one-tier system (R/1, where R stands for real-time). In 1979, SAP invents a standard business software based on mainframe technology. R/2 integrate major business functions in real-time and

handles multi- country and multi-currency implementations. In 1992, with the rise of personal computers the introduction of client/server architecture (a three-tier architecture approach, R/3) was introduce. New graphic interface to improve end user experience and split processing across three layers (client, application and database). In 2004, customers demand better integration between their business application and the Web so SAP develops a new application platform called SAP NetWeaver. The application run on a common platform, and customer and partners can build and integrate existing application easily using widely adopted Web standards. SAP R/3 was replaced with SAP ERP. In 2015, rewrite of the complete Business suit was required due to advancement in hardware architecture bringing massive computing power at low cost, so the firm developed a new Business suit called SAP S/4HANA which stands for SAP Business Suite 4 SAP HANA.

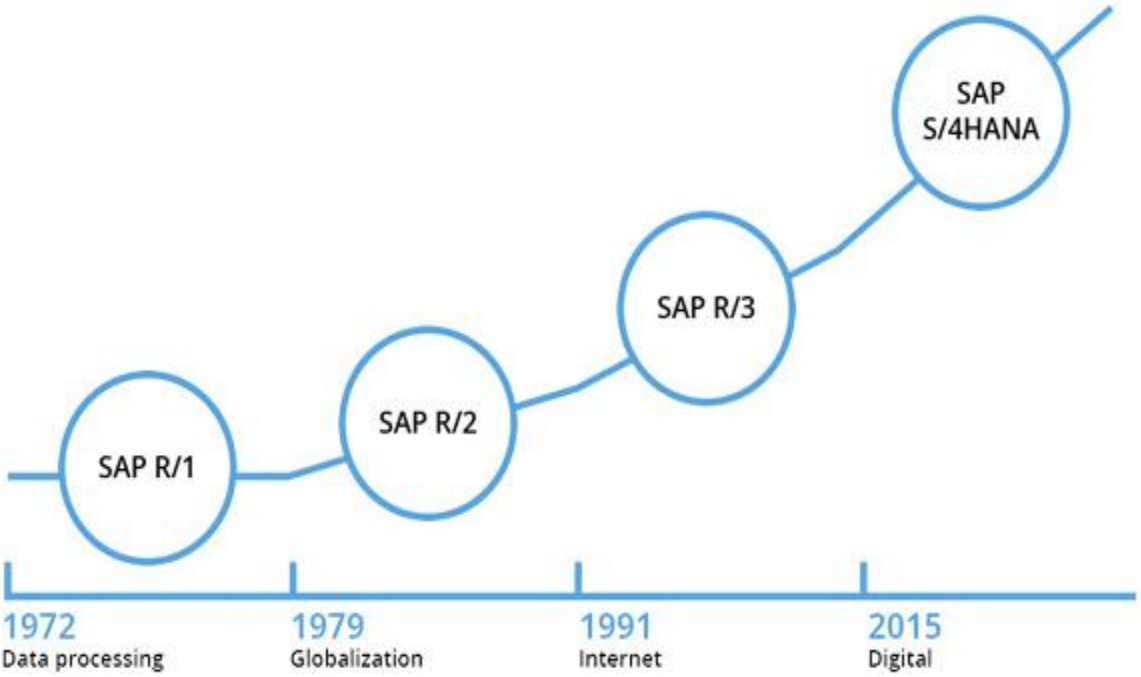

Figure 2.3 - SAP Product Evolution (Source: (SAP, 2017)

SAP System Architecture

To handle system complexity and provide scalability and versatility, ERP system architecture is structured in layers or tiers. ERP systems are based on a relational database. Organizations can collect data once and then make it available for use in the company, by all relevant users, by using a relational database and process design (Daniel, 2006). ERP system mostly runs on a three-tiered client/server system with three layers of logic. With SAP R/3, SAP ushers in a new generation of enterprise software from mainframe computing (client-server architecture) to the three-tier architecture of database, application, and user interface. SAP System Architecture is made up of three layers: Presentation layer, Application Layer & Database Layer. Any actions taken on the presentation layer are forwarded to the application layer for processing. The application layer then retrieves any related data from the database layer, processes it, and presents it through the presentation layer.

Presentation Layer	When you log into SAP system, you'll see this screen. This is the newly created presentation layer. The SAP GUI Software components make sure that the SAP device user interface is displayed and that the user's activities are sent to the application server for processing.
Application Layer	The application layer is where all of the work is completed for you. This is where all of the acts are processed. Depending on the specifications and processing needs of each organization, this software component can have one or more than one. The application server is responsible for a variety of SAP system services. The application server's processes are carried out through work processes. This is defined at the start of the SAP system. The work processes are components that are able to execute an application. One thing to note here is that each work process is registered as a user in the database system for the entire runtime of the SAP system.
Database Layer	Each SAP System Architecture will have a central database that will hold all of the data. Anything that needs to be stored, such as customer records, services, and just about everything else, is kept at this stage.

Table 2.2 - Three -Tier Client/Server Architecture (Source: http:/www.SapTrainingHQ.com)

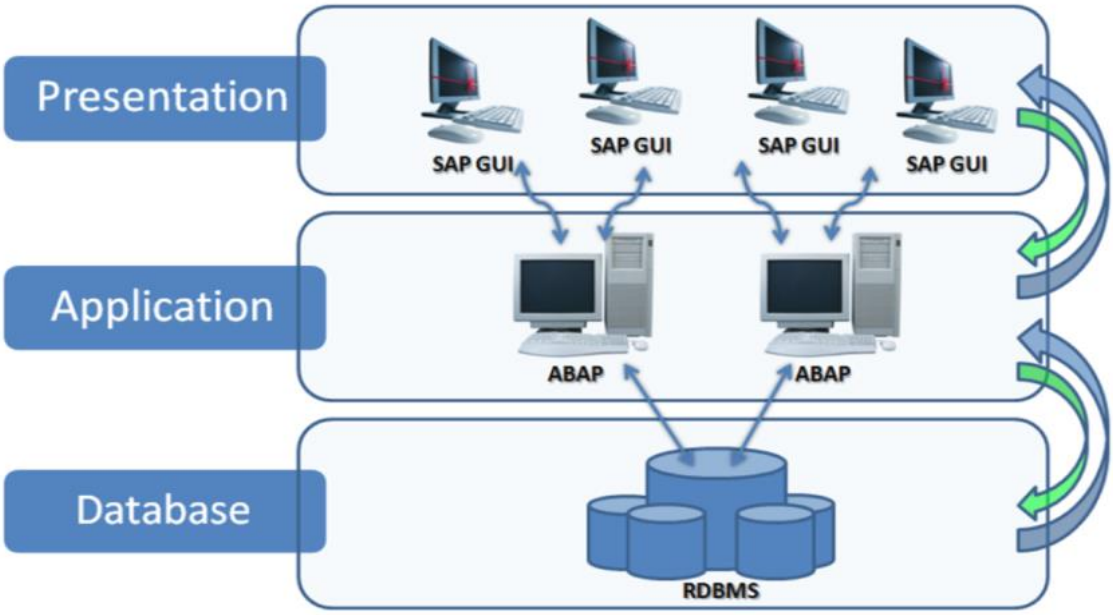

Figure 2.4 - Three-Tier Client/Server Architecture (Source: http:/www.SapTrainingHQ.com)

SAP Modules

SAP solutions provide a variety of technical and functional modules that support the execution of key business processes, such as:

Technical Modules	Functional Modules
❖ ABAP ❖ BASIS ❖ BI/BW ❖ NET WEAVER	❖ Financial Accounting (FI) ❖ Financial Supply Chain Management (FSCM) ❖ Controlling (CO) ❖ Materials Management (MM) ❖ Sales and Distribution (SD) ❖ Logistics Execution (LE) ❖ Production Planning (PP) ❖ Quality Management (QM) ❖ Plant Maintenance (PM) ❖ Project System (PS) ❖ Human Resources (HR)

Table 2.3 - SAP Modules (Source: https://www.ukbitsolutions.com/sap/sap-modules)

Figure 2.5 - SAP Modules (Source: https://www.ukbitsolutions.com/sap/sap-modules)

What makes SAP Stand out from other ERP Systems?

PeopleSoft, Oracle, HP Microsoft, and others are examples of common ERP applications. Out of this ERP system choices, SAP has become the choice of many business sectors, and it is anticipated that this trend will continue in the coming years. There are number of

reasons that shows SAP is different from other ERP software system. Some of which include: it is a global solution which is suitable for any size of business (perfect for any business), it does not provide any redundant functionality, constant development in SAP, it provides shorter implementation time and fastest financial payback, as compared to other ERP systems SAP needs fewer customization, industry best practices, presence of clearly defined roadmaps, industry specific, scalability of software solutions, low-risk method, developments in SAP across industry limitations, ecosystem benefit and SAP is perfect for any business.

2.2.3 Implementation Process

There has been previous study and literature on ERP systems all over the world and from various countries' perspectives. Despite the fact that the implementation process of the ERP system lifecycle is the most researched, there are few papers that detail the implementation and the activities conducted during it (Eden, Sedera and Tan, 2014). According to (Jessup , 2006), an ERP system is a computerized information system (IS) that supports and integrates various business functions such as planning, manufacturing, purchasing, sales, human resources (HR), and finance. An ERP system can become an integral part of a company's activities, tactical movement, and strategic planning (Chen, Law, & Yang, 2009). The process of configuring technological, operational, and financial resources to provide an effective operating system is known as ERP implementation (Fleck, 1994). Esteves and Pastor (2001) defined ERP systems as "software packages composed of several modules, such as human resources, sales, finance and production, providing cross-organization integration of data through embedded business processes". They have also categorized ERP life-cycle framework which consist six phases: Adoption decision, Acquisition, Implementation, Use and maintenance, Evolution and retirement. Information system implementation is a continuous process that involves everything from the initial idea to the feasibility report, systems analysis and design, programming, preparation, conversion, installation, and review of the system (Lucas, 1981). This definition states when the implementation process starts, when it ends and what comes in between.

ERP system implementation is more of matching the organizational business process with the ERP system business process rather than developing ERP system like in other software developments. The implantation methodology may differ depending on the vendor who is implementing it, time the firm have to implement it and budget allocated to the implementation process. There is no agreed-upon model for ERP system implementation but as per previous literature that show most implementation process have a linear view (Heidi, 2019). This section will briefly discus previous studies about different implementation processes.

An implementation model by (Bancroft, Seip and Sprengel, 1998), has five phases, which begins with the planning phase, during which the steering committee is formed, project team members are chosen, and a project plan is created. The second implementation phase was the "As is" phase, which involves modeling and analysis of current business processes. The third implementation phase was the "To be" phase which involves collaborative design

and prototyping with the users. The fourth implantation phase was the "Construction and testing" phase implies the configuration of the software, building and testing interfaces, system and user testing. The last implementation phase was the "Actual implementation" phase covers building networks, installing desktops and managing user training and support. This model covers the phases from the establishment of a project until a delivery of the system is made by focusing on the project activities necessary to develop and deploy the technical ERP system, but it did not include system use and system improvements.

Figure 2.6 - Implementation Model by (Bancroft, 1998)

An implementation model by (Ross and Vitale, 2000) has five stages which were: ERP design (the approach), implementation (the dive), stabilization (resurfacing), continuous improvement (swimming) and transformation. Here the term implementation was used to describe the entire process including all five steps and to describe the particular implementation phase between the Design and Stabilization phase. The authors noted that the new system implied new processes. As a result, since the new system and procedures were strongly interdependent, they could not be implemented (i.e., deployed) independently. The authors discovered empirical evidence of underperformance in the stabilization phase, which occurred shortly after deployment, when the firm, its procedures, and data had to adapt to new conditions. The model by (Ross and Vitale, 2000) did not discuss the role of top managers, steering committee or project managers during the ERP system implementation process.

Figure 2.7 - Implementation Model by (Ross and Vitale, 2000)

An implementation model by (Marcus and Tanis, 2000) has four phases: Project chartering, the Project (configuration and rollout), Shakedown and Onward and upward. According to the authors the chartering phase which include vendors, consultants, company executives, and IT specialists as a key players although the precise constellation of players may vary, is a phase that comprises decisions leading up to the funding of an enterprise system. Some key activities in this phase include building a business case, selecting a software package (though this decision may be deferred until the project phase), identifying a project manager, and approving a budget and schedule. The outcome of this phase may be a decision to proceed or not to proceed with the ERP system Implementation. The second phase is "the project phase" where covers activities intended to get the system up and running in one or more organizational units. Project manager, project team members, internal IT specialists, vendors, and consultants are key players in this phase. Some key activities in this phase included: software configuration, system integration, testing, data conversion, training, and rollout. The two possible outcomes of this implantation phase are the rollout of an enterprise system to one or more units or terminated the project due to cost or schedule overruns or severe technical problems. The third implementation phase was

"shakedown phase" which starts with "going live" and continues until "normal operation" has been achieved. In this phase, the consulting team may continue its involvement or may pass control to operational managers and end users and whatever technical support it can muster. Activities such as bug fixing and rework, system performance tuning, retraining, and staffing up to handle temporary inefficiencies as relating to the shakedown phase are performed here. The finally implantation phase is the onward and upward phase which continued from normal operation until the system is replaced with an upgrade or a different system. Operational managers, end users, and IT support personnel (internal or external) are key players in this phase. For some activities such as upgrades vendor personnel and consultants may also be involved. Some activities of this phase include, continuous business improvement, additional user skill building, and post implementation benefit assessment. If there is any investment benefits, it will be realized in this phase. (Marcus and Tanis, 2000) implantation model was later applied by a number of researchers investigating ERP system implementations (Kumar, Maheshwari, & Kumar, 2002; Nah, Lau, & Kuang, 2001).

Figure 2.8 - Implementations Model by (Marcus and Tanis, 2000)

Even though the implementation methodology an organization use may depend up on the vendors the select to implement the ERP system, most ERP system implantations can be characterized as having six stages: initiation, adoption, adaptation, acceptance, reutilization, and infusion (Randolph and Robert, 1990).

Figure 2.9 - Phases in ERP System Implementation ((Cooper, 1990)

According to (Harshit, 2020), in order to implement an ERP systems, you can take one of the three approaches: parallel, phased, and big bang. The parallel approach: implementing a new ERP system while running legacy systems in parallel. If a critical error come up in the new system the legacy system can be reviewed, this minimizes implementation risks. Running two systems at the same time introduces technological challenges, such as data synchronization problems. Since you'll be depending on implementation as well as IT experts in the process, it raises the cost of implementation. In phased approach: implementation is planned sequentially, with each phase implementing the ERP system for one or more business processes. You can plan these phases by business department, location, manufacturing facility, and more. This approach takes more time to implement than the big bang method, but it provides a higher degree of safety because errors, if any, won't be impacting all business operations. It also puts less pressure on the implementation team, as there are fewer things to worry about during each phase. The big bang approach: an ERP software is installed once for the whole enterprise. This means that the system will

be implemented through all business functions on the go-live date (i.e. manufacturing, processes, distribution, marketing and finance). This approach requires a lot of planning and the pressure to get things done right is high, as any error can potentially affect all business.

For any kind of project the project manager and project team have one shared goal that is meeting project objective by carry out the work of the project. Every project whether it's successful or not has a beginning, a middle period during which activities move the project toward completion, and an ending. A standard project typically has the following four major phase's initiation, planning, implementation, and closure, which represent the path a project takes from the beginning to its end and are generally referred to as the project life cycle (Adrienne, 2012).

Figure 2.10 - Phases in ERP System Implementation (Adrienne, 2012)

2.3 Conceptual Frame Work

A conceptual framework is a set of broad ideas and concepts drawn from various fields of study that are used to organize a subsequent presentation (Reichel and Ramey, 1987).

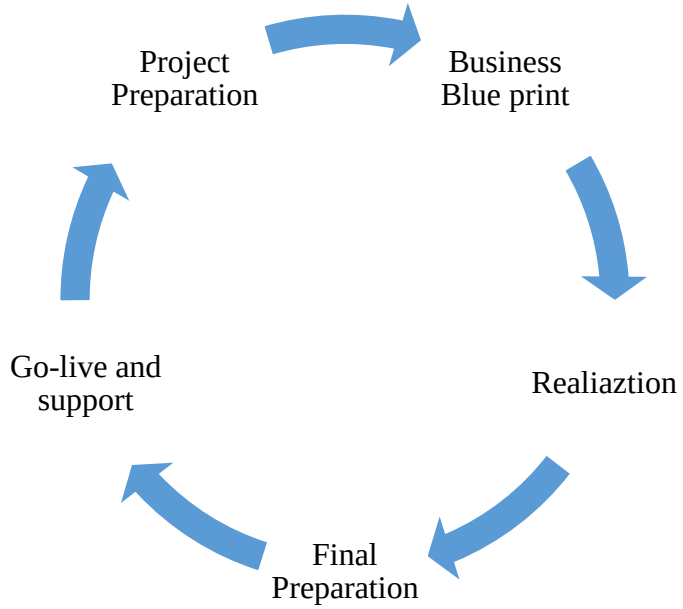

Figure 2.11 Conceptual Frame work

Chapter 3 : Research Methodology

3.1 Introduction

The research method is an essential component of any study since it supports researchers in determining how to achieve the stated goal, what data to collect, and how to collect and analyze the data in order to address the target problems. As a result, careful effort must be given to selecting appropriate methods that will produce the desired results. A research methodology is a method for collecting and analyzing data that is systematic and organized (Collis and Hussey, 2003). The procedural context within which the research is performed is referred to as research methodology (Bryman and Emma, 2007). It refers to a problem-solving strategy that can be used in the research process and can be formally described as an organizational context within which facts are positioned so that their significance can be better understood.

This chapter explains how the research was carried out and the research methods that were applied for this study. In this section the research method implemented for this study is discussed in detail. Issues related to the research approach and design, population and sampling techniques, data type and source, data collection and analysis methods, trustworthiness of the data gathered and ethical considerations of the research are sequentially discussed. Their relevance to this research is examined in detail in order to support the relevant choices made.

3.2 Research Design and Approach

3.2.1 Research Design

Research design is a plan that is developed to answer a research questions effectively. It is a conceptual structure within which research is conducted and it is the overall framework, or outline, or structure of the research. The research design used in performing the study is determined by the nature of the topic under review. There are different dimensions based on which research design is selected; first by the purpose of the analysis it represents it is categorized as exploration, descriptive, explanation, prediction, evaluation and history. Secondly depending on the controlling methods of the research design it is categorized as experimental, quasi experimental and non-experimental/observation. And a research design can also be categorized based on the time it took to collect data, depending upon the environment it is carried in and based on the depth of the research. It can also be classified as applied vs. fundamental and conceptual vs. empirical.

The purpose of this research was to explore and investigate an ERP System implementation project by taking a single implementation project and also to describe the implementation methodology used, implementation phases involved, activities performed in each implementation phase and identifying the challenges both the vendor and client faced during the implementation process, it is both Exploratory and Descriptive Researches. Its determining, uncovering and exploring nature makes it an exploratory research and its gathering, describing and summarizing information makes it descriptive research.

Exploratory research is described as investigation into a problem that is not well defined. And descriptive research is a research that is concerned with describing the characteristics of a particular individual or of group. The purpose of the research is to gather information regarding ERP system implementation, briefly describe and summarize information.

3.2.2 Research Approach

Research Approach is a plan and procedure for conducting research that includes anything from general assumptions to detailed data collecting, analysis, and interpretation procedures. It contains the blue print for data collection, measurement and analysis. It include different tools, techniques, procedures or processes for gathering or reviewing data or information. There are three types of research approaches qualitative, quantitative or mixed approach. Qualitative research is described as a research technique that emphasizes words rather than quantification and it uses techniques such as detailed interviews, observation and document analysis. Quantitative approach stressed the gathering of numerical data; it took influences from those data and used statistics to solve problems and it involved a statistical analysis of data collect from survey questionnaires. Mixed approach describes research techniques by mixing quantitative and qualitative approaches.

This research uses a qualitative approach to answer research question by observing a particular organization's ERP system implementation process. Due to the complex and time taking nature of such process, it was not possible to follow the implementation processes in more than one organization. A qualitative descriptive approach is used when an uncomplicated description is desired that focuses on the details of what, where, when, and why of an event or experience. Therefore, the research focuses on identifying the phases in full ERP system implementation by taking SAP ERP system implementation in a private owned company as a case study.

3.3 Target Population, Sampling and Sampling Technique

3.3.1 Target Population

The entire community of people or artifacts to which the researcher apply for is referred as the target population for a survey. The research will consider those individuals that were involved in the SAP ERP system implementation process. Project team members include: top management, stakeholders, project managers (from both sides: vendor & client), functional & technical consultants, BPO's (Business process owner's) and other individuals that were involved in the implementation process. The total number of participants in the project was 78.

3.3.2 Sampling and Sampling Technique

Sampling is a technique that allows researchers to gather information about a population from the findings of a subset of the population rather than trying to look at every single individual. It is a process of selecting units or individuals from a population to be included in a research. There are two types of sampling design probability sampling and non-

probability sampling. In probability sampling, every unit in the population have equal chance of being selected whereas, in non-probability sampling every unit in the population have unequal or zero chance of being selected. Probability sampling techniques include: simple random sampling, systematic sampling, stratified random sampling, cluster sampling and multistage sampling. And a non-probability sampling techniques include: deliberate/purposive sampling, shopping mall intercept sampling, sequential sampling, quota sampling, snowball sampling, panel sampling and conventional sampling. The type of sampling technique to use is determined by the research area, research methodology, and the researcher's preferences.

Among the 78 participant's that were involved in the implementation process only 27 individuals were purposively selected as a sample size for this study. This individuals were purposefully selected based on their ability to explain the process clearly since they are experts who have years of experience in implementing SAP ERP system in 3 or more implementation projects and have an advanced or intermediate skills. Experience of the project team members mainly functional and technical consultants that where involved in one or more full implementation project and their skill matrix were considered as a parameter to define the sample size of this study. Such kind of sampling technique is called purposive sampling technique. It is a sampling technique which intentional select informants based on their ability to explain a specific theme, concept, or phenomenon. It allows researchers to choose study participants based on their own judgment, taking into account the research needs and criteria.

3.4 Data Type and Source

3.4.1 Data Type

Data can be either qualitative or quantitative. Qualitative data is a non-numeric data which is possible to observe and record. It is a data that may be organized categorically based on the features and features of an object or a phenomena. Observations, one-on-one interviews, focus groups, record keeping, case study and other methods are used to acquire this type of information. Collecting such type of data require in-depth analysis and research. It is investigative and mostly open-ended, allowing individuals to express themselves completely. Quantitative data is defined as the value of data expressed in counts or numbers, with each data set having a distinct numerical value. Any quantifiable information that may be used for mathematical calculations and statistical analysis in order to make real-life decisions is considered data. Survey and interview used to acquire this type of information. In this research qualitative data type was collected.

3.4.2 Data Source

There are two types of data primary and secondary data. Primary data are those that are acquired for the first time and hence are unique in nature. It is original and reliable data. Secondary data refers to information that has previously been acquired and processed by someone else. It is obtained from published or unpublished source. It's not original data

and less reliable than primary source. In this research both primary and secondary data collection methods were used. For primary data collection case study, observation, and interview was used and for the secondary source of data document analysis was used.

3.5 Data Collection Methods

Effective data collection will determine the ability to meet the research objectives and answer to the research questions. In order to acquire the required data in the available time period and also the accessibility to the field site a careful consideration and planning of data collection is required. Usefulness of a research design, its ability to answer research question and its ability to achieve research aim is dependent on the original data that was collected. To obtaining the required data in the available time period and also the accessibility to the field site depends on consideration and planning of data collection method (John A., Hafiz T., Robert R. and David W., 2007). The aim is to collect qualitative data that might answer the research question from various perspectives.

3.5.1 Case Study

A case study requires numerous sources of data and often employs a combination of data collection techniques (Eisenhardt, 1989). A case study is an in-depth investigation into current and historical issues that affect one or more units of organization. It is a method which is often used in business research and is especially beneficial for analyzing organizations. But it can also be narrow in scope and very difficult. A single case study design or many case studies can be used. For many case studies a more comparable approach is possible, asking the same question in all organization which is referred to us as benchmarking (John A., Hafiz T., Robert R. and David W., 2007). Those investigating operations management and looking for the "best practice" frequently employ case studies. Case studies are more about uniqueness, understanding, and particularization than they are about generalization. They are field-oriented and realistic. They inquire as to "How?" and "Why?" Moreover, as the research proceeds, the research questions may change. Both qualitative and quantitative research can be included in case studies. In this research the case study includes qualitative research, a full scope SAP implementation project was taken as a case and the implementation cycle, activities in each implementation phase and challenges in each implementation phase were discussed.

3.5.2 Observation

Like what they say seeing is believing, with a proper method for making the observation direct observations is a simple, quick and effective means of gathering data. Observation is a way for gathering systematic information or data that employs subjective approaches. The five major sense organs, sight, smell, touch, taste, and hearing, are all addressed in this manner. Characteristics, not measures or numbers, are the focus of qualitative observation. This is an important element in data collection. Most important findings in research have been accidental and captured from observations of the failures of other data collection methods. In this study every activity through the entire implementation process was captured and noted. As one of the consultants in the implementation process I had the

chance to observe step by step procedures and activates of the implementation process. The entire implementation process was observed from its kickoff up to its final stage. All the activities and tasks performed were observed. Weekly meetings, status meetings and group discussions including any other activities were noted. The approach was participate observation which made becoming part of the organization and observe the behavior of colleagues easy and an important data collection tool for the research.

3.5.3 Interview

An interview is a dialogue in which information is gathered. An interviewee and an interviewer are involved in a research interview. The interviewer manages the interaction and asks questions, while the interviewee responds to the questions. Interviews might take place in person (face-2-face), over the phone or using electronic means such as Skype Google meet etc. There are three types of research interviews: structured, semi-structured and unstructured. Structured interviews are those interviews that vocally administered questionnaires, in which a set of prepared questions is asked with little or no variation and no opportunity for follow-up questions to responses that require more detail. They are quick and easy to administer but allow only limited participates to be involved and also of little use if 'depth' is required. Unstructured interviews are those interviews that are performed with little or no organization at all. They are time-consuming (sometimes lasting several hours) and difficult to manage and engage in because there are no pre-determined interview questions to help you decide what to talk about (which many participants find confusing and unhelpful). They are used when in depth analysis is required to study unfamiliar event. Semi-structured interviews provide a set of essential questions that help outline the areas to be investigated, but they also allow the interviewer or interviewee to deviate to investigate an idea or response in greater depth.

This research used semi-structured interviews that took place in person and through telephones for few respondents. The interview was held at the implementer office. It was a flexibility approaches, especially when compared to organized interviews, enables for the discovery or development of material that is essential to participants but may not have been considered relevant by the researcher. The purpose of administering this interviews was to explore the views, experiences, beliefs and/or motivations of individuals that are well experienced in the implementation of ERP system specifically, SAP. Data gathered from this methods provide a deep understanding of the entire process. The interview questions were designed as open-ended, neutral and understandable to ask questions that are likely to yield as much information as possible. Respondents were informed before the interview took place to give some idea of what to expect and to increase the likelihood of honesty. Most of the data collected from the interviews was qualitative, but the number of male and female consultants and their years of experience were quantitative data’s.

3.5.4 Document Analysis

Exploring and analyzing already existing reliable documents and similar sources of information as the data source was also used. Going through material that were part of the implementation process to collect relevant data that can be used in the research. Project charter, business blue print, configuration and KDS documents, end user training manuals and any other document related to the full implementation process was reviewed and explored. Data that was available on trusted source on the internet have also been reviewed.

3.6 Data Analysis

Data analysis a process that consists a unique numerous decisions and discrete tasks for a particular research. The analysis involves the application of different statistical techniques. Data analysis method depending on the type of data collected. In this research a qualitative data analysis method will be used. Qualitative analysis is the analysis of qualitative data such as text form the interviews and observation. This analysis heavily depends on the researcher's analytic and integrative skill and personal knowledge in the area. The researcher should have a creative and investigative mindset (John A., Hafiz T., Robert R. and David W., 2007). There are different types of qualitative data analysis: content analysis, narrative analysis, discourse analysis, thematic analysis, ground theory (GT) and interpretive phenomenological analysis (IPA).

In this research content analysis was used. Content analysis used to estimate patterns with in a content/text. This analysis was specific and goal oriented. Large amount of text was grouped to codes and this codes were summarize into categories. The frequency of key phrases or words is counted and analyzed. The content of the respondents' comments was describe systematically and the various meanings expressed in the material recorded were classify. A great effort have been put to deeply understand what the respondents have said and to find 'typical' answers in their responses. The data analysis process started with the data collection method. Notes were taken in each interview which were later reviewed and summarized. What was observed was also noted and confirmed with document analysis. The main concern in the content of note was the implementation methodology which was categorized into each implementation phases. After categorizing read through the materials and, within each context unit, assign each statement to one of the categories. Present the categories and a representative set of statements under each one and draw conclusion.

Data triangulation was another technique used to analysis collected data. In qualitative research, data triangulation refers to the utilization of various methods or data sources to build a thorough understanding of phenomena (Patton, 1999). This technique is also used to test validity through the merging of information from different sources. Data was collected from different source by using different methods. The goal of triangulation is to capture several dimensions of the same phenomenon, evidence data from case study of the full scope implementation process, data gathered through interviews and from secondary source will be captured to assess SAP ERP system implementation process.

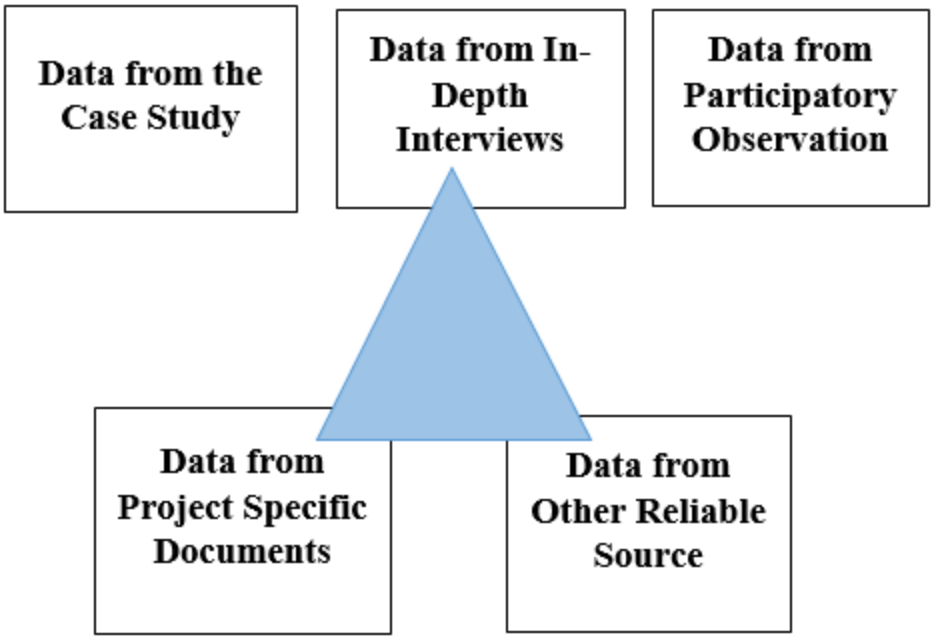

Figure 3.1 - Data Triangulation

3.7 Reliability and Validity

From the qualitative researchers' viewpoints, minimizing bias and raise the researcher's truthfulness of a thesis about a social phenomenon, have an impact on the validity and reliability of a research using triangulation (Denzin, 1978). Reliability and validity are defined as trustworthiness, rigor, and quality. They describe the accuracy with which a method, approach, or test measures something. Validity is concerned with a measure's precision, while reliability is concerned with its consistency.

3.7.1 Reliability

The term "reliability" refers to the instrument's ability to produce consistent results over several trials. It determines whether the findings provided are consistent over time and under different circumstances. When the research is performed under the same conditions, the amount to which the results can be replicated. It can be assessed through comparing findings across time, amongst observers, and between sections of the test, to ensure that the results are consistent. Although the term "reliability" refers to a concept that is used to examine or evaluate quantitative research, it is most commonly applied to all types of research. If we consider testing to be a method of eliciting information, the most crucial test of any qualitative study is its quality. The quality of this research was measured through content analysis and data triangulation methods, it was observed for most SAP ERP implementation projects the same methodology was used.

3.7.2 Validity

Validity refers to the degree to which the outcomes accurately reflect what they are designed to reflect. Can be assessed by comparing the results to existing theories and other

metrics of the same notion, you can see how well they match up. The factual accuracy of the account as reported by the researcher is referred to as descriptive validity (Johnson, 1997). Interpretive validity refers to the qualitative researcher's ability to accurately convey the participants' interpretations of the research topic. This indicates that the researcher has a good understanding of how the participants think and can present their perspectives on many topics. It refers to the extent to which the researcher accurately understands and portrays the research participants' perspectives, thoughts, objectives, and experiences in the study report (Johnson, 1997). Method triangulation was used to check descriptive validity. Notes from observation the entire process, interview with consultants that have previous experience and reviewing the implementation guide in SAP textbooks provided by the vendor made the study accurate. To increase the interpretive validity of the research participants feedback and data analysis which was cheeked and verified were used.

3.8 Ethical Considerations

The research was conducted in accordance with the organization's policies on intellectual property rights. Accessing any of the organization's sensitive records may be unethical. As a result, the organization's code of ethics would take into account without risking the study's results. It was unethical to ask the consultants to do the interview while they were on the job so a more appropriate time was chosen based on the permission and willingness of the participant.

Chapter 4 : Result and Discussion

4.1 Introduction

In this chapter the findings from data collection in relation to the SAP implementation project were discussed. The research instrument used was case study, observation and semi-structured interview administered by the researcher. The respondent's data has been analyzed according to the objectives of the research which were establishing the phase in the implementation process and the activities performed in each phase. Quantitative observation method was used to measure demographic data of the respondents and content analysis and triangulation were used to analysis the phase in the implementation process.

4.2 Demographic Data

According to the demographic data collected from the open ended questions in the interview, most of the consultants that where assigned to the project were male. Out of the 27 project team members who were interviewed, 18 were male and the remaining 9 were female respondents. Respondents were asked to indicate their age group and most of the respondents were in between 33 and 40 years of age. 16 of the respondents were in between 33 and 40 years of age, 6 of the respondents were in between 26 and 32 years of age, 3 of the respondents were greater than or equal to 41 years old and 2 of the remaining respondents were in between 20 and 25 years of age. Respondents were asked about their level of education and the academic qualification of the respondents' shows that majority of the employees hold their degree. Out of the 27 respondents 18 were degree holders and the remaining 9 were master's holders. Respondents were asked about the number of years they have been working in the organization or in this specific field and most of the employees worked for the past 5 to 9 years. Out of the 27 respondents 14 had 5 -9 years of service year, 6 of them had 1 – 4 years of experience and 7 of the remaining respondents have services year which is greater than 10 year. Respondents were asked about their job title and the specific department they work for and most of the project team was composed of functional and technical consultants. Out of 27 respondents, there were 19 functional consultants, 6 technical consultant and 2 project managers. Out of the 19 functional consultants 8 were from FICO, 4 from MM, 4 from HR and 3 were from SD. Out of the 6 technical consultants there were 2 BDC Experts, 2 BASIS, 1 Role and Authorization Expert and 1 ABAP. Respondents were asked about their level of skill in using, configuring and accessing the ERP system and out of the 27, 19 have advance skills and the remaining 8 have intermediate skills. Demographic data was summarized in table below,

Gender			Male	Female	Total
Age	20 -25		2	0	2
	26 – 32		3	3	6
	33 – 40		11	5	16
	Above 41		2	1	3
Education	Certificate		0	0	0
	Diploma		0	0	0
	Degree		12	6	18
	Masters		6	3	9
	PHD		0	0	0
Service Year	Less than a year		0	0	0
	1 - 4 Years		4	2	6
	5 - 9 Years		8	6	14
	> = 10 Years		6	1	7
Job Title and Department	Project Manger	Project Manger	2	0	2
	Functional Consultant	FICO	4	4	8
		MM	3	1	4
		SD	2	1	3
		HR	3	1	4
	Technical Consultants	ABAP	1		1
		Role & Authorization		1	1
		BDC Expert	1	1	2
		BASIS	2		2
Skill Matrix	Beginner		0	0	0
	Intermediate		3	5	8
	Advanced		15	4	19

Table 4.1 - Demographic Data

4.3 Qualitative Analysis

4.3.1 Implementation Methodology Used

Luna Export Slaughter House PLC is a family owned private limited company which was established in 2003 and is located in Addis Ababa, Ethiopia. The company employs more than 200 workers with a variety of qualifications and experiences related specifically to livestock, meat processing and international business. The company believes that its long-term success depends on its clients, suppliers, employees, and the communities they work with. This vision motivates it to always strive to work together to create win-win partnerships. The company's product lines include Luna export slaughterhouse, Ezana winery, Fresh corner retail outlets, Fresh kitchen, Luna drilling and Caterkomat.

It’s is mainly working in meat and meat products business sectors, which was established to supply fresh chilled meat, mainly goat and sheep meat, to the Middle East and African countries. Meat proceeding plant which is located in Modjo produce export standard meat and is FSSC22000 and ISO22000 qualified for food safety management and ISO14001 certified for environmental management. Fresh corner retail outlets are another business segment that offer a wide variety of fresh grocery products at affordable prices in more than eleven branches located in Addis Ababa. The products are carefully sourced either from their own farms or from trusted suppliers. Products that pass quality check will be packed and transported to stores. It fresh since it requires few hours to transport and place farm products in store. Fresh corner kitchen is one of its other business segment that offer customers with a variety of unique, simple, tasty and quick meals and snacks at affordable prices. This sector work hard to continuously provide customers with ready to eat food for both everyday eating as well as for special events at home. Fresh corner retail outlet supports by providing fresh, clean, traceable, and quality products. Its Ezana vineyard & winery product line was established in 2010, and is located in Quha, on the outskirts of Mekelle on 100 hectares of land, which is situated on 2,200 meters above sea level. It is located in the semi-arid and magnificent hills of Ethiopia's Tigray region, a place known for its breathtaking hills and highlands as well as its old civilization. From his base in Axum, Tigray, King Ezana, the 4th century ruler of Axum's kingdom, controlled the entire Red Sea route. The winery of high quality Ethiopian wine is proudly built on this tradition. Luna drilling sector provide drilling service to its customers and also caterkomate import spare parts and other goods for its customers (Luna Export Slaughter House PLC., 2003).

Luna Export Slaughter House PLC used to have different information system in all of its business segments. There was no single integrated platform that could generate a reliable and real time data without any data redundancy. Lack of real time data made using the firm’s resource wisely very hard. So the firm decide to implement an ERP system that is single integrated platform, a standardize process that provide data integrity, reliability and validity, helps to adapt international best practice, improve management control, improve resource management, improve integration between process, improve data accessibility, increase company growth and make decision making process easy. Choosing the right kind of ERP system and choosing the right partner to implement it is the most important factor to determine the project success or failure. Implementing such large system requires significant time and effort, so project manager who are part of such projects require an effective and efficient methodology. After search and analyzing different ERP software, the firm decides to implement SAP which is one of the leading ERP systems across the globe that help organizations have control over their business process. The firm considered what are the hardware and software requirements of such system, where will it take place (location), what is expected from the project, issues related to budget, who will help with the implementation journey (vendor), etc. These pre-project activities help the firm build its business case, understand the scope of the SAP Best Practices, review the standard-

delivered content and identify any potential items that aren't included in the scope of Best Practices and choose an implementation partners to help with the implementation journey.

Fairfax Technologies LLC was chosen as the implementation partners. Fairfax Technologies LLC is an information technology and service company which was found in 2010. Its main specialties include technology services, consulting services, business process outsourcing, and education center. It's an innovative company with a vision of leveraging advanced technology to deliver world-class process improvements and organizational transformation to its clients. It has significant experience as system integrators and implementers, especially since it is the leading SAP partner in Eastern Africa and have implemented the complete suite of SAP's products by deploying SAP certified professionals. Furthermore, Fairfax Technologies has the only SAP certified Education Center in East Africa. This has allowed its clients in Africa to build capacity efficiently and in a cost-effective manner. The firm also have a proven track record implementing products from other partners including Oracle as well as banking industry applications of various other internationally recognized technology companies (Fairfax Technologies LLC, 2010). After selecting the implementation partners the project scope, budget, and schedule were defined in the pre project implementation phase.

Like all other vendors who implemented SAP ERP system, Fairfax Technologies LLC use an implementation methodology which is a set of processes that define the methods to fully implement the ERP software in an organization. The implementation processes include a set of generic steps that were based on industry professionals' best practice. This standard implementation methodology was called Accelerated SAP (ASAP Methodology). ASAP simplify the implementation process by providing templates, tools, accelerators and methods that contains useful information's to assist project team members in the implantation process. The implementation process of ASAP methodology includes five different phases which will begin as soon as the installation of all the hardware requirements were completed. The results of the case study were broken down by this five project phases: Project preparation, business blue print, realization, final preparation and go-live and support:

Phase 1 - Project Preparation

Project preparation phase, was the stage where initial planning and preparation for the project was done. The goal was to prepare the project's environment from formal and organizational perspectives so that the work in the subsequent phases would be performed in a structured way. Most of the work in this phase was done by the project manager of the consulting or implementing firm, with some input from the project manager of the client. Information and resource retrieval begins at this stage and all the necessary components were assembled here. The main deliverable to this phase were project plan, project organization structure, and project procedure and system architecture design included in the project charter document.

The Project Plan was developed based on the data retrieved from the contract document, the project scope and budget were reviewed, the structure of tasks /subtask and functions of all the project phases were defined, deliverables for each phase were defined, project milestones that denotes the start and finish of the project and completion of major phase of work were defined and based on the general schedule from the contract document a detailed project schedule was created. The Project Organizational Structure includes defined roles and responsibilities of the project team and project team members were identified and assigned to their respective roles.

The Project Procedures includes communication means, frequency and communication path, documentation procedures and templates, risk management plan that includes procedures such as identification, reporting, mitigation, and escalation of risks to avoid or minimize their impact was developed, change management plan that include procedures such as identification, reporting, approval, and escalation of change was developed, management plan for open items (tasks and subtasks that where not complete) that include procedures such as identification, reporting, management, and escalation of open items was defined and status reporting mechanism that state frequency, logistics (physical meeting or teleconference), and reporting document templates were lied out.

In System Architecture Design, technical specifications such as On-premise, Cloud or Hybrid were finalized and system landscape which consists of three systems: Development System also called sandbox (DEV) which is installed to be used for prototyping and for system configuration and customization during the project. It should be available at the end of the project preparation phase, Quality Assurance (QAS) which is used for testing and Production System (PROD) which is used for daily operations was ready. This phase ended with a project kick-off meeting where project teams meet together and were briefed regarding the priorities of the project the project's goals, deliverables, scope, and schedule which were identified by the decision-makers and key stakeholders.

This phase was smooth since the top management were involved when ever needed and they agreed with the project goal and objective and the technical infrastructure was ready on time. However, the project managers and the key stakeholders didn't consider the complexity of the adoption firm's requirements, the plan was unattainable. The more customization there is the longer it will take to meet customer requirements.

Phase 2 - Business Blue Print

In the Blue Print Phase, valuable information about Luna's business processes that were important for implementation was extracted. Most of the work in this phase was done by the consultants. They gathered detailed knowledge regarding the business processes and information requirements of the adopting organization.

The main source of information were workshops with the BPO's and core users from Luna. Blueprints in the form of questionnaires were designed to uncover and test the AS-IS business process. And analysis of existing documentations of the system, reports and printouts were also another method for information gathering. Based on this designs the client's TO-BE business processes and business specifications were defined in the business blueprint document. For those business process where the standard functionality of the system doesn't support, gaps are identified and customization solutions were developed. Based on the information gathered and proposed to be process the business blueprint document was created for each of the functional areas. The adopting company's requirement were translated into SAP language. This document briefly describes the way in which Luna's company structure would be reflected in SAP. It was a base for the actual system configuration in the subsequent project phases. The blue print document includes:

- A brief description of the business process involved and how these processes would be executed in SAP using the standard functionality.
- High-level description of the system customizations: RICEF a terminology used in SAP, which stands for (Reports, Interfaces, Conversions, Enhancements, and Forms)

In the blue print phase, the current business process of Luna was determined and mapped with standard system functionalities and gaps between the two will be identified. Here the consultants in the consulting firm took a lot of time to clearly understand the current business process and they visited sites and observe the entire operation for better understanding. Status updates meeting were made with the project owners. This phase took longer than the intended time since the firm's requirement where complex and many customizations to the standard system was needed to satisfy the client. The blue print document was the deliverable in this phase. The entire system configuration was based on this document. At this stage system environment to define organization structure was ready and status meetings were conducted.

The challenges in this phase were business requirements of the client was beyond the standard functionality of the ERP application and customer resistance to business process re-engineering. The complexity of this AS-IS business solution made the completion of this stage hard. It took long to grasp all of their business process but all the activities were understood by the functional and technical consultants.

Phase 3 – Realization

In the realization phases, the consultants started configuring the system based on the specifications of the business blueprint. Configuration refers to adjusting the system based on the requirements of an adopting organization. The system methodology was provided in two work packages, baseline configuration and final configuration (fine tuning). In the baseline configuration (major scope), initial configuration by SAP consulting team was done based on the details presented in the blueprint document. With the SAP team predefined business process were transformed into cycles of business flows, such as

procure to pay, plan to produce and order to cash etc. which serve as an independent unit that enable the client test specific parts of the business process. During the fine-tuning configuration (remaining scope), the remaining configuration which were not done in the baseline configuration were completed. Fine tuning the remaining process to satisfy both the business and process demands. After configuration a unit testing script was written and configured solution was tested by consultant (Module specific process). SAP consulting team used SAP implementation guide (IMG) which assist the configuration in a step by step manner. IMG is an executable program in SAP, that is intended for guiding the users through the implementation process from general settings, affecting all companies and all functional areas, to the detailed ones, specific for a given functional area of the company (or part of the company) i.e. Top-down basis. Configuring the system requires specific knowledge and experience so it was done by professional consultants (Senior Consultants). It started with setting up the company structure, defining it and connected to each other. For example, an operating segment fresh corner was created and the connected to profit and cost centers.

Customization refers to tailoring the ERP system based on company's individual requirements to meet its needs. Customization for the identified gaps was defined and programed in this stage. First, technical blueprint which includes the detail requirement gathering and technical design and specification documents for each element that required programming was prepared and actual programming was executed, and the unit test scripts and unit testing RICEF and programs were done. The works that needed customization were developing industry specific work flow for the slaughterhouse business unit, integration between the software they use for their fresh corner shops and SAP, developing reports and forms (printouts) etc. No modifications of the standard code were made but new programs were developed based on the customer requirements.

The master data types such as GL accounts, vendor, customer, material, asset, staff etc. were defined, together with their steering(navigation) parameters and their field statuses (hidden, required, optional and display). This is followed by the configuration of the transactions, which reflect the business processes in the system. The field statuses for each screen can also be adjusted. After master data types were identified, data migration templates and programs were also prepared in this phase. Master data from legacy system to SAP system were mapped using these templates. These templates were prepared as Excel files, which were later filled with real data from the legacy systems. There are data migration programs such as LSMW allowed for the automatic input of the data from the Excel files to SAP. Role and authorization was supposed to be identified here. User training and configuration document were prepared. Like it was discuses before the customization caused delay since the business process was complex and it needed further analysis.

Phase 4 – Testing and Final Preparation

The purpose of this stage was to complete the final preparation for go live. At the beginning of this phase production start plan was developed, which is a document that state a sequence of actions, both in the legacy systems and in the new system, which ensured a smooth transition to the new IT environment. The exact date of freezing the legacy system so that closing balances and open items from these systems were transferred to the new system via the data migration templates and programs were specified here.

Major activities included in this document were testing, end user training, system management, cutover activities and resolving open issues. The functional consultants were briefed about the standard and non-standard situations to consider during the blue print phase, and based on those and also by considering negative scenarios (incorrect transactions and their corrections), test scenarios which are used to do the modular and integration testing were created. The tests were carried out in four phases by using this scenarios:

- Unit testing by functional consultants only: each consultant tested the ERP solution in each the functional areas (modules) separately.
- Integration testing by functional consultants only: end to end business process such as procure to pay and order to cash were tested.
- Unit testing by BPO's with the assistant of the functional consultants was tested the ERP solution in each the functional areas (modules) separately.
- Integration testing by BPO's with the assistant of the functional consultant's the end to end business process such as procure to pay and order to cash were tested. This was also called user acceptance test (UAT) and after completing the client will sign UAT document.

After the BPO's finish and confirm testing the system. They were responsible to give end user training with the assistants of the consultants. The general testing activities lasted more than they were scheduled for because the client filled to give the requirements for all business scenarios and the consultants failed to deliver some of the customization work related to the development of interfaces and printouts. The test of these items continued until the go live phase. All of the configuration and finalized customization where moved to the production system, which was then fine-tuned to be ready for the "go-live". Data migration was performed for master data, first it was uploaded to the quality system, then the client checked and confirmed then it was uploaded to the production system. The same procedure was performed for opening balances and any other transaction data uploads. Data migration process for transaction data was not that smooth, it caused the longest delay in the project because it was inconsistent, unreliable and out of structure. Data cleansing was a problem with some of the master data in FICO, MM, SD and HR and also the major problem was in transaction data cleansing this data affected the schedules and even the go live date was changed, but finally the project team has identified a solution for it and was migrated to SAP. But after upload cleaning and adjusting this data took almost a year. The client failed to deliver a master data as per the desired quality. The data from legacy system had to be moved to the excel file (data migration template) that where provided by the consultants, checked for consistency then migrate to the new system. BPO's and key users trained the end-users. User authorization were identified, defined and tested and assigned

to users to them so that each user had access only to the system functions he/she was authorized to execute. This was the phase which encounter the most challenges other than all the remaining stages. Here the testing begins and integration start which was the cause for different all conflicts between project team members. The tensions are higher than any other phases.

Phase 5 - Go Live and Support

The go live phase is where the project moves from pre-production to live production operation. After this stage the client started to use the system for daily operations. AS from the cut over date every operation in each business segment stopped using all legacy system except matrix for their daily operations. Since the system was new and its operations seemed complicated at first most of the end users where not happy. Help of the consultants was need most of the time. Minor errors were found and were collected as soon as possible. The first 2 or 3 months were very difficult and for the end users and they required constant assist from the consultants. In order to provide long term end user support, support organization was set up. The functional consultants kept an eye on the operation to verify if everything was going smoothly or not. To improve the overall system performance system transactions are monitored.

The major challenge for the first few weeks after go live was the problem in users' adoptability ERP systems are expected to trigger major changes in way of doing business across the organization. It is expected to fully automate the internal processes and support functions based on its strong features. Therefore users were required to initiate and follow up specific transaction online using the system, a new business paradigm which expects users to shift to paperless transaction, thus has become a challenge. And inadequate system knowledge at the start of the project was another challenge in this phase, the consulting firm had to build expertise through training, more reading and practice. Network interruption and system performance were also problems in the few days after go live.

4.3.2 Activities in Each Implementation Phase

According to the case study, observation, interview and document analysis activities in each implementation phase were,

Phase	Tasks	Sub- Tasks	Deliverables
Project Preparation Phase	Project Plan Definition	❖ Project scope and objectives was defined	Project Charter & System Environment Ready To Start The Project
		❖ Project phases and their descriptions was defined	
		❖ Expected deliverables for each phase were defined	
		❖ The project milestones were defined	

Phase	Tasks	Sub- Tasks	Deliverables
		❖ A detailed project schedule was defined	
	Project Organizational Structure Definition	❖ Project roles and responsibilities were defined	
		❖ Project team members were identified and assigned to their respective roles	
	Project Procedures	❖ A communication document was developed	
		❖ Documentations templates were developed	
		❖ Risk management plan was set	
		❖ Change management method was set	
		❖ Management plan for open items was set	
		❖ Status reporting mechanism was set	
	System Architecture Design	❖ Technical specifications were selected	
		❖ Development system landscape was all set up	
	Kickoff Meeting		
	Sign off		
Blue Print Phase	AS-IS Process	❖ The End-to-End current business processes were identified	Blue print Document
		❖ Process integration points were identified	
	The SAP ERP processes were mapped to the AS-IS business processes.		
	To-Be Processes	❖ Define End-to-End future Business processes	
	Gaps between AS-IS & TO-BE process were identified		
	Propose Gap Solution	❖ List of RICEF with high-level description were developed	
	Sign off		
Realiz ation Phase	Configure Solution	❖ For those process that were supported by the standard system, the system was configured	Confi gurati on and custo mizati

Phase	Tasks	Sub- Tasks	Deliverables
		❖ Test scripts were developed for the identified processes	
	Define Identified Gaps	❖ Technical specifications and design was developed for the gaps that were analyzed	
		Test scripts were developed for the identified gaps	
	Data Conversion	Fields in ERP Solution are defined(required, optional, hide and display)	
		ERP fields are mapped to legacy system fields	
		Legacy fields were convert to ERP fields	
		Data cleansing methods were defined	
	Data Migration Program	❖ Programs were developed for data migration	
		❖ The programs were tested	
Final Preparation	System Testing	❖ According to the possible business scenarios which were defined in the test scripts unit testing by consultants	System ready for go live
		❖ Integration testing by consultants	
		❖ Data conversion tools were tested	
		❖ Data migration programs were tested	
	UAT Testing	❖ Unit testing by BPO'S	
		❖ Integration testing by BPO'S	
		❖ Revise the test script if there are additional scenarios	
		❖ UAT document signoff	
	Training	❖ Test scripts were prepared as per end user role	
		❖ Training document per module were prepared	
		❖ BPO's train end users the business process	
		❖ BPO's train end users the ERP system	
	Role And Authorization	❖ End user roles & responsibilities were defined	
		❖ Authorization was defined for the identified roles	

Phase	Tasks	Sub- Tasks	Deliverables
		❖ Authorization was tested by consultants	
		❖ Authorization was tested by BPO's	
	Data Migration	❖ Master data cleansing for upload	
		❖ Upload clear master data	
		❖ Uploaded master data was confirmed by the users	
		❖ Transactional data cleansing for upload	
		❖ Upload clear transactional data	
		❖ Uploaded transactional data was confirmed by the users	
	Sign off		
Go Live And Support	Cutover	❖ System performance was optimized	Normally operating System
		❖ Production support was set up	
		❖ Consultants closely monitor system operations	
		❖ Go live	

Table 4.2 - Activities in each implementation phase

4.3.3 Challenges in Each Implementation Phase

According to the case study, observation, interview and document analysis the challenges in each implementation phase were,

Phase	Challenge
Project Preparation	❖ The project managers and the key stakeholders didn't consider the complexity of the adoption firm's requirements, the schedule plan was unattainable. The more customization there is the longer it took to meet customer requirements
Business blue print	❖ Business requirements of the client was beyond the standard functionality of the ERP application, most of the business process required work around solutions ❖ Customer resistance to business process re-engineering ❖ Lack of clear business requirement
Realization	❖ Customization took longer than expected ❖ For some change requests functional specification document were not created ❖ Role and authorization was supposed to be created at this phase but it go extended to the next phase
Final Preparation	❖ Since the project schedule was approaching to its end, tensions was higher than any other phases, this tension caused conflict between project teams arise and created a negative work environment ❖ Trainings took longer than expected ❖ BPO's changed their requirements ❖ Master and transactional data that was provided by the client were not as per the templates or sample provided by the consultants ❖ Due to the unreliable data provided the data cleansing procedure took longer ❖ The BPO's didn't test roles and authorization on time
Go live	❖ Lack of business readiness ❖ The operational environment was unavailability for data migration

Table 4.3 - Challenges in each implementation phase

4.3.4 Implementation Phases That Caused Project Delay

According to the case study, observation and interview the final preparation phase caused project delay. This phase was the most challenging of them all what went wrong in the previous phase got reflected on this phase. Most of the task and procedures planned for this phase were postponed.

Chapter 5 : Summary, Conclusion and Recommendation

5.1 Introduction

In this chapter the summarized data findings of the research were discussed. It also contains valuable conclusion and recommendation based on the finding of the research. It is organized as a short study results, conclusions drawn based on those results and key recommendations and ideas to be considered on future research.

5.2 Summary

The implantation method used by the implementer company (Fairfax Technologies LLC) was ASAP methodology, which is an effective and efficient method created based on best practice experience to implement SAP ERP systems. The process include 5 implantation phases: project preparation, business blue print, realization, testing and final preparation and go live and support.

- The project preparation phase was where project goal and objectivities were defined, project team is selected and task and sub task are identified for the entire process. The project managers and top management are the key players in this phase. The main deliverable to this phase was the project charter and the phase ended with kickoff meeting. The challenges in this phase was the schedule plan for the project was unattainable since most of their business processes couldn't be covered with the standard system.
- The second implementation phase was the business blue print, here the AS-IS process of the adopting firm was be evaluated. After understanding the overall work flow the consults differentiate business process that are supported by the standard system and those which need customization to satisfy customer's needs. The TO-Be process was developed including the gap analysis documents. The key players in this phase were consultants, BPO's and key users. The challenges in this phase were business process complexity and resistance to business reengineering. The main deliverable from this phase were the blue print document.
- The third implementation phase was the realization, here for the business process which can be entertained by the standard functionality of the system configuration as per the blue print document will be done. For the rest of business process customization had initiated. The key players in this phase were the functional and technical consultants and the BPO's. Data migration tools were defined. And role and authorization where defined. The challenges in this phase was customization took longer.
- The forth implementation phase was the final preparation phase, testing the system started here first the consultants develop business scenarios and test individual modules and then integration testing with the other modules. Few error were encountered but it was tested and confirmed by the consultants. And the BPO's and key users were given high level training and they tested each module specific and integration procedures. Scenarios that were not included in the test were updated and tested. And the consultants start to migrate data it to quality system. Most of the data was inconsistent and wasn't with the intended quality. Cleansing

this data took a lot of time. Roles and authorization were not tested and approved by the key users. Most customized programs were not ready to test. The transaction data was not based on the template distributed. And as the deadline for this phase got closer there was tension between team members which created uncomfortable environment. Among all the implementation phases this was the most challenging one and caused project delay.

- The last implementation phase was go live and support, where the project moves from pre-production to live production operation. After this stage the client started to use the system for daily operations. As from the cut over date every operation in each business segment stopped using all legacy system except matrix for their daily operations.

5.3 Conclusion

The research conclude SAP ERP system projects were implemented using ASAP methodology which was developed on best practice. ASAP stands for accelerated SAP and it provide procedures for an effective implementation. It contains 5 implementation phases. The initial phase is project preparation were the plan for the entire project will be set, the second phase was business blue print, it very important phase since the complete project depends on this phase. As the name states it's the blueprint for the project. The third phase is realization the system will be configured as per the blue print document, the fourth phase is final preparation which depends on how good the previous phases are and finally there is go live phase, system optimization and support are done. Based on the analysis the potential challenges to consider for any other implementation projects are:

- Project management methodology effectiveness, senior management involvement and agreeable project goal and objective for phase 1.
- Well experience consultants that have high problem solving skills and have in-depth knowledge of the functionality of the ERP system, lack of clear business requirement, unexperienced functional mangers and BPO's to demonstrate the AS-IS process and resistance to change and business reengineering for phase 2
- Configuration time took longer than expected, lack of coding skills to map the data, improperly method of defined data, lack of experienced consultants for configuring the system and customer change business requirement for realization
- Lack of adequate user training, lack of understanding of the business processes and requirements, resistance to change, lack of end user commitment and ineffective communication with users, conflicts, discovering that current system configured functionalities failed to meet business requirements, allowing scope creep due to sudden changes, he tendency to carry on testing beyond its specified and end user lack of understanding the ERP application from phase 4
- Lack of business readiness, a complete set of data for migration might be unavailability, data migration programs that were created and tested might fail and the operational environment is unavailability for data migration from phase 5

5.4 Recommendation

As it was discussed earlier, the objective of this research was to assess the implementation phase of an ERP system implementation i.e. SAP ERP system, depending on the finding, the followings areas are recommend for further studies:

- In project preparation phase the project manager didn't consider the complexity of the adoption firm's requirements, the plan was not attainable. So, for the next projects to come the firm needs to assess and consider the complexity of the project because the more customization there is the longer it will take to meet those requirements.
- Master data templates should be distributed earlier and checked constantly for any amendment, this process took longer than it should due to the unreliable and inconsistent data provided by the adoption firm, so for any other projects in order to make the data cleansing process smooth it should begin earlier.
- In the final preparation phase the most challenging thing was conflict between consultants and any other project teams. This had a negative impact on the project environment, so the project manager should lay out a plan that can avoid those misunderstandings and develop a strategy or conflict resolution plan to solve them on time. This could also be another area for further research, conflict resolution methods in ERP system implantation methods.
- Since this study is a single case, researches of multiple case studies with higher sample size can give a general picture.
- This study only focused on the implementation process. The pre implementation and after go live also should be analyzed. Impact of ERP on organizational performance after the ERP system implantation should also be considered.

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APPENDIX A: RESEARCH INTERVIEW QUESTIONS

I. Close Ended Interview Question To Collect Demographic Information

1.1 Gender

☐ Male ☐ Female

1.2 Age Group

☐ 20 -25 ☐ 26 -30 ☐ 31 – 40 ☐ Above 40

1.3 Education Status

☐ Certificate ☐ Diploma ☐ BA/BSC ☐ Masters ☐ PHD

1.4 Service Year (Working Experience)

☐ Less than a year ☐ 1-5 Years ☐ 6-15 Years ☐ More than 15 Years

1.5 Job Title

☐ Project Manager ☐ Functional Consultant ☐ Technical Consultant

1.6 Department

☐ Finance ☐ Human Resource ☐ Procuremen ☐ Sales & Distribution

☐ Other Departments _____

1.7 Skill matrix to rate your SAP ERP System related skills?

☐ Beginner ☐ Intermediate ☐ Advance

II. Open Ended Interview Questions

1. How many implementation project were you part of?
2. As per your experience how many phase does the implementation process have?
3. Briefly explain each of the implementation phases?
4. What were the activities performed in each implementation phase?
5. What was the responsibility of the consultant and customer in each phase?
6. What were the major challenges that made implantation process difficult?
7. Do you think the customer delivered all the required data on time and with the right quality?
8. Do you think all the customer requirements gather satisfied?
9. Do you think every project team member had done their best to acquire those requirements?
10. What could have been done to make the implementation process more efficient?