STUDY OF FACTORS IMPACTING THE COMPLETION OF ERP SYSTEMS IMPLEMENTATION WITHIN A PLANNED TIMELINE

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DECLARATION

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ABSTRACT

Enterprise Resource Planning (ERP) systems are among the most important IT-enabled business innovations during the recent past. A critical issue concerning the implementers and managers of ERP systems is the completion of implementation ERP projects within the planned timeline. The research presented in this study has as its focus the analysis of the factors which impact the completion of ERP systems implementation within the planned timeline in the company named EnterpriZe as a case study.

Based on an extensive literature review, five factors have been identified as the most critical factors which impact the completion of ERP implementation. These five factors; Clear objectives and scope of work, top management support, realistic project plan and estimates, the aptitude of project manager, and team collaboration have been considered as independent variables when developing the conceptual framework and the hypotheses of the study. To evaluate and determine the most significant factors impacting project timeline delays, a survey was distributed among employees of EnterpriZe. Thereafter, Pearson correlation coefficient analysis has been conducted for gathered primary data. The analysis revealed that all five factors have a positive relationship with the completion of ERP implementation within the planned timeline that was used as the dependent variable.

Further, to recommend an effective guideline towards project completion within planned timeline the study was continued to see how well EnterpriZe can do the same process by adapting to the proposed guideline. Based on the facts which were revealed from the data analysis, recommendations have been made which can be used as a guideline for project managers and management to complete an ERP systems implementation on time, on budget and with agreed scope of work.

Keywords: Enterprise Resource Planning (ERP), Implementation life cycle, Key Success Factors (KSF)

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LIST OF ABBREVIATIONS

ERP - Enterprise Resource Planning

PPM - Project Phase Model

WBS - Work Breakdown Structure

BPR - Business Process Reengineering

KSF - Key Success Factors

HR - Human Resource

CAC - Cronbach’s Alpha Coefficient

1. INTRODUCTION

1.1.Background

Enterprise Resource Planning (ERP) systems are one of the most important IT-enabled business innovation during the past decade. ERP systems allow continuous integration of information flows and business processes across functional areas within an organization. They support information sharing along with a company value chain and help to achieve operating efficiency. ERP solutions offer a workflow engine to generate automated workflows according to business rules and approval matrices where information and documents can be directed to operational users for transaction handling, and to managers and directors for review and approval.

While ERP systems have been recognized as useful to many businesses and recommended by vendors and consultants as systems that incorporate good business practice, ERP systems have often been found to fail to be effective. One of the widely discussed topics in this context is the completion of implementation ERP projects within the planned timeline. This research is to analyze the factors which impact the completion of ERP implementation within the planned timeline.

Case Study

EnterpriZe is an ERP solutions provider and implementation organization which provides solutions by understanding the customer need. The solutions of EnterpriZe have a comprehensive range of functionality that covers the length and breadth of the organizational spectrum and pays attention to the greatest detail. These solutions help the enterprise to eliminate process inefficiency and save both valuable time and money by delivering best business practices along with analytical financial reporting.

EnterpriZe ERP solution is a result of over 7 years comprehensive industry study and the work, done with its clients to achieve their business objectives by supporting operational and strategic decision making. EnterpriZe has deployed its solution with organizations in highly competitive industries in various parts of the world.

When providing ERP solutions, it is essential that the project team adapt to the industry and organization which they are working with. EnterpriZe team quickly acclimatize themselves to the ground situation of the enterprise with which they work, to obtain crystal clear requirements of how the solution should be implemented in a manner that is a perfect fit for the organization. EnterpriZe consultants consider the nuts and bolts of the business and ensure that there are no loose ends when implementing the solution.

The key competitive advantage of EnterpriZe ERP is, it is possible to do all application configurations within a minimal timeframe to deliver the solution to meet customer expectations. The availability of wide range of configurable features in its solution is one of the key factors that enable EnterpriZe to achieve fast paced implementations.

1.1.1. Motivation

Previous studies (Somer & Nelson (2004); Hasibuan & Dantes (2012)) have shown that there is a strong relationship between specific critical and the completion of implementation on time.

Therefore, the research presented in this study was focused to analyze the factors which impact the completion of ERP implementation within the planned timeline in the EnterpriZe as a case study. Further, to recommend an effective guideline towards project completion within planned timeline and how well EnterpriZe can do the same process by adapting to the proposed guideline is also presented in this study.

1.1.2. Research Scope

The relationship between the product quality and process capability and maturity has been recognizing as a major issue in the success of ERP projects implementation. Due to the delay in each phase, it is being identified that whole ERP projects implementation process will get delayed and implementation team will not be able to complete the ERP projects implementation within the planned timeline.

As the research work presented in this thesis is focused on software development organization named EnterpriZe, it was conducted as case study research. Therefore, the population was taken to be all the employees of EnterpriZe. Currently, EnterpriZe has 94 employees in total including Human Resource, Finance and Admin personnel who are not directly involved with ERP implementation projects. Hence, the population was taken as 90 employees. The sample size was calculated by considering a confidence level of 95% and a margin of error as 5 for a population of 90 and this resulted in a sample size of 73 employees.

1.2.Problem Statement

The data from recent projects of EnterpriZe giving the planned completion timeline and actual completion timeline have been taken in to consideration for this case study. Table 1.1 shows the information about some of EnterpriZe project timelines.

Table 1.1 – EnterpriZe Recent Project Time Plans

Project	Client	Planned Completion Date	Actual Completion Date
Cloud Based ERP Implementation	Paint Manufacturing Organization	1-Apr 2014	1-Jan 2016

Cloud Based ERP Implementation	Computer Equipment Reseller	1-Nov 2015	1-Nov 2015
Cloud Based ERP Implementation	Pharmaceuticals Distributor	1-Aug 2014	1-Apr 2015
Cloud Based ERP Implementation	Packaging Materials Manufacturing Organization	1-Apr 2015	1-Aug 2015
Cloud Based ERP Implementation	Finance and Asset Management Organization	1-Dec 2015	1-Aug 2016
Cloud Based ERP Implementation	Roofing Tiles Manufacturing Organization	1-Apr 2016	Planned for 1-July 2017
Cloud Based ERP Implementation	Security Systems Distributor	1-Apr 2016	1-Apr 2016
Cloud Based ERP Implementation	Wine and Liquor Distributor	1-Apr 2017	1-Aug- 2017
Cloud Based ERP Implementation	Group of Companies 1. Toys Reseller 2. Software Anti-virus distributor 3. Cyber Security systems Distributor 4. Security Systems Distributor	1-Apr 2017	2 Companies on 1-Aug 2017 1 company on 15- Sep 2017 Last one on 1st Nov 2017

It has been observed that the objectives and scope of work of many projects handled by EnterpriZe have not been clearly defined and documented. The scope of work and requirements can change often during the project life cycle. It is possible for team members even to be not aware of the system features that project/projects will deliver and what customer expects. Further, it has been found that though all stakeholders have approved the scope of work, still they do not have a clear idea about it.

EnterpriZe top management directly involves to each project and give their full support and commitment to it. Top management is always aware of the latest update on the project status. It was found that top management is not willing to allocate additional resources when required since it will directly affect the project budget and profit.

It has been revealed that project managers are struggling to generate reliable estimates of effort, cost, and project duration, to identify techniques to be used to assess the risks that can have an impact on project success. However, expertise advice and past similar projects experience are not considered to prepare the project plan. Buffer time is included in the project plan, still is not enough to keep the project on track in unforeseen situations.

Typically, during resource allocation, most of the effort is focused on finding the right resources other than finding the right project manager. However, an inadequately trained and/or inexperienced project manager can lead a project to a failure. At EnterpriZe project managers get picked based on availability, not necessarily on skill set.

Projects are lead to failure because project team did not get enough support from their team members. Each member is focusing on individual wellbeing rather than working towards a common goal. Employees are not motivated and they have not satisfied what they do.

Based on above observations, following research question has been build based on the above problem statement.

Research Question

What factors have an impact on the completion of ERP systems implementation and how do those factors impact the completion of ERP systems implementation within the planned timeline?

1.2.1. Research Objectives

The long-term goal of this study is to recommend an effective guideline for ERP projects implementation vendors towards the ERP projects completion within the planned timeline. The objective of the current study is to provide a comprehensive review of literatures and industry practices in relation to ERP systems implementation projects and outline a conceptual framework. Particularly, the study has the following sub-objectives:

- To identify the factors which impact to delay the project completion within the planned timeline.
- To evaluate most significant factors what have an impact on project timeline delays.
- To recommend an effective guideline towards project completion within the planned timeline.

1.2.2. Research Significance

The significance of this research is, it will recommend an effective guideline for ERP systems implementation vendors towards the project completion within the planned timeline by minimizing the impact of identified significant factors. Since this study will identify the factors that delay the completion of ERP systems implementation from an ERP vendor perspective, the study will help ERP systems vendors to avoid the delays and complete the projects as planned which many researchers were not able to explore.

1.3. Thesis Outline

Introduction chapter discusses the research background, an overview of the case study organization, motivation, research scope, problem specification and objective which are expected to be met the end of the research.

Literature Review discusses the comprehensive analysis of previous researches which has been conducted to analyze the critical factors impacting for ERP implementation success.

Research Methodology discusses the methods and research approach to develop a conceptual framework and hypothesis as well as the approach to collect the data from a selected sample from the population.

Data Analysis section analyses the collected data using statistical models and to come up with conclusions based on relationships between independent and dependent variables.

Finally, Recommendation and Conclusion section discusses the results of data analysis while providing an effective guideline towards project completion within the planned timeline. It will also suggest directions for further research.

2. LITERATURE REVIEW

2.1 Overview

The arrival of ERP systems is one of the most significant IT-enabled business innovations in recent past. According to Beatty & Williams (2006) though organizations allocate a considerable amount of financial and other resources to ERP implementations they still come across several unexpected system implementation challenges. Further, it has been identified that many ERP projects are delivered late and over budget with costs that were on average 25% over their original budgeted amount. Therefore, the literature survey presented in this chapter is intended to identify factors which impact the completion of ERP implementation within the planned timeline.

2.2 ERP Systems Implementation Life Cycle

According to Hasibuan & Dantes (2012), ERP systems implementation is more on process change instead of technology change itself. However, there are different versions of implementation life cycles that researchers have defined based on their research findings. Table 2.1 shows literature summary of ERP implementation life cycle.

Table 2.1: Implementation Life Cycle Literature Summary

Literature Source	Implementation Stages
Esteves & Pastor (1999)	• Adoption Stage • Acquisition Stage • Implementation Stage • Use & Maintenance Stage • Evolution Stage • Retirement Stage
Markus & Tanis (2000)	• Chartering Stage • Project Stage • Shakedown Stage • Onward & Upward Stage
Parr & Shanks (2003)	• Planning Stage • Project Stage • Enhancement Stage
Somer & Nelson (2004)	• Initiation Stage • Adoption Stage • Adaptation Stage • Acceptance Stage

	• Routinization Stage • Infusion Stage
Peslak, Subramanian & Clayton (2007)	• Planning Stage • Transition Stage • Performance Stage • Enhancement Stage
Capaldo and Rippa (2009)	• Pre-implementation • Implementation • Post-implementation
Hasibuan and Dantes (2012)	• Project Preparation • Technology Selection • Project Formulation • Implementation/development • Deployment

As shown in Table 2.1, it has been found that ERP implementation life cycle in most of the researches has developed based on the client-side implementation processes. Since this study is to identify the factors that delay the completion of ERP implementation for an ERP vendor, the model proposed by Parr & Shanks (2003) is recognized as a suitable model for detailed analysis.

Parr & Shanks's Project Phase Model (PPM) model consists of three stages, Planning Stage, Project Stage, and Enhancement Stage. The focus of the model is on the project implementation and the factors which impact successful outcome at each of the phases of the implementation. Further, the PPM is concerned with the concept of project 'success' which simply means bringing the project in on time and within budget.

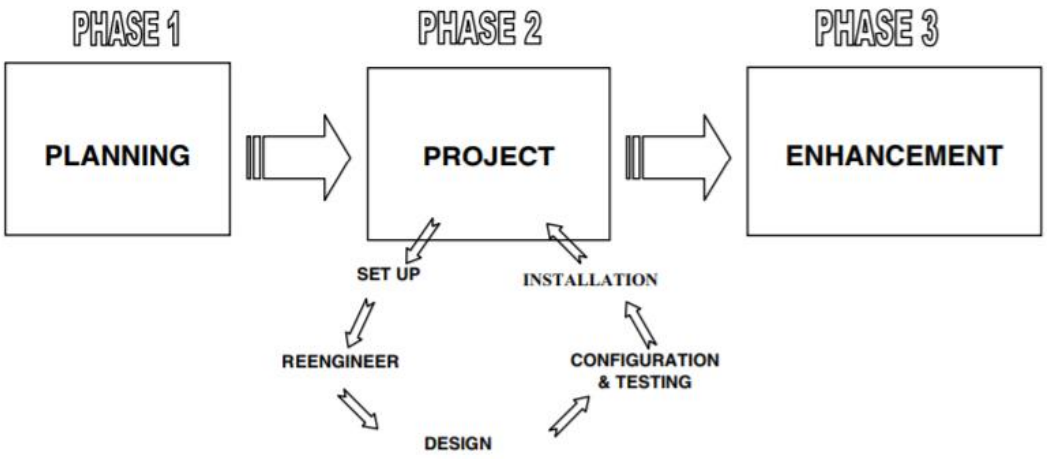

Figure 2.1: PPM Model

As shown in Figure 2.1 PPM model covers three major phases: Planning, Project, and Enhancement. The planning phase contains a selection of an ERP, the appointment of a steering committee, the definition of high-level project scope and implementation approach, selection of a project team and the manager, and resource determination. The project phase extends from the understanding of ERP modules, through to Go Live and support. The enhancement phase may continue over several years which includes system repair, bug corrections, extension, functional enhancements, and transformation.

Since the focus of Parr & Shanks's PPM model is in project phase, it has divided in to five sub phases such as set-up, reengineer, design, configuration and testing, and installation.

During the set-up phase, the project teams from both client and vendor sides are selected and organized with an appropriate mix of technical and business expertise, team's integration and reporting processes are established, and guiding principles are developed and re-affirmed.

The reengineering phase includes the analysis of existing business processes to determine the level of Business Process Reengineering (BPR) required, installation of the ERP system, mapping of the business practices on to the ERP system functions, and training of the project teams.

The design sub-phase involves high-level design and then detailed design focus on user acceptance which is accompanied by interactive prototyping and by continuous communication with users.

Key elements in configuration and testing sub-phase are the development of a comprehensive configuration, the population of the test instance with live data, developing, building and testing all interfaces and reports, finally system and user testing.

Data migration plays a significant role in this phase. Both customer and vendor parties should take the responsibility on data migration process. Therefore, it is required to outline a plan, assigning and delegating roles and responsibilities, and empowering decision-makers. Stakeholders should prioritize business tasks associated with the open/live data and master data. Prepare a logical, workable sequence of actions, along with deadlines to align with the ERP systems implementation methodology.

Migration process may require moving data from different number of sources such as Microsoft Excel databases, Quickbooks, legacy systems, or an older ERP system. Each source will have classified information in a manner different from the other. Hence, it is essential to have uniformity, a migration design, some manner of standardization for all data which will be migrated to new ERP solution.

Data mapping is comparing existing data source and new ERP systems target data and setting up certain translation rules. Potential issues need to be identified and resolved

prior to migration so no data will be lost or incorrectly assigned. The process consists of a field-by-field analysis of the source data according to various attributes of the ERP software. After completion of data migration, existing source data is no longer used but is archived and available for "inquiry only."

It is required to review all data for its viability, eliminate and reduce redundancy, and clean the data by removing incorrect or corrupt data from records, tables, and databases prior to ERP systems data migration. These actions are often performed manually.

It is important to make certain that migrated data will load properly. Therefore, best practice is to initially test a small amount of data by loading it into the new ERP solution, then, increasing the frequency and amount of data migration until the process completion. This helps to troubleshoot and overcome any difficulties prior to go-live. The loaded the data will be validated to verify that the data is mapped to the correct fields. Reconcile the records, values, or volume of data moved from the source with the number of corresponding records, values, or volume of data residing in the ERP solution. According to Howard (2011), it was revealed that 30% of data migration projects fail, and 38% run overtime or over budget.

The final stage of project phase installation sub-phase contains building networks, installing desktops, and managing user training and support.

The study has identified success and failure factors elicited from above mentioned stages how those factors affected the overall success of the project and completion of the project implementation as planned.

2.3 Key Success Factors

Through an extensive literature review, it has been identified that understanding of Key Success Factors (KSF) impacting ERP implementation will help to reduce the delay or failure in the implementation process. Therefore, identifying these factors and executing suitable actions to avoid delays and fast track the process is important to an ERP systems implementation organization. Summary of literature found on KSF is shown in Table 2.2.

Table 2.2: Key Success Factors Literature Summary

#	Factor Description	No of Studies	Literature Source
1	Top Management Support	19	Roberts & Barrar (1992); Holland & Light (1999); Bingi, ,Sharma & Godla (1999); Buckhout et al. (1999); Brown & Vessey (1999; 2003); Esteves & Pastor (2000); Parr & Shanks (2000); Roseman Sedera & Gable (2001); Allen, Kern & Havenhand (2002); Umble, Haft, Umble (2003); Somer & Nelson (2004); Soja (2006); Yahaya, Angappa & Canglin (2006);

			Wenrich, Kristi & Norita (2009); Maditinos, Chatzoudes & Tsairidis (2011); Loh & Koh (2004); Wang & Chen (2006); Hasibuan & Dantes (2012); Nah, Zuckweiler & Lee-Shang (2003)
2	Clear Objectives, Scope of work and Vision	16	Wenrich et al. (2009); Sun et al. (2005); Umble et al. (2003); Kumar, Maheshwari & Kumar (2003); Holland & Light (1999); Zhang et al. (2005); Somer & Nelson (2004); Bhatti (2005); Hasibuan & Dantes (2012); Roberts & Barrar (1992); Buckhout et al. (1999); Falkowski et al. (1998); Rosario (2000); Shanks et al. (2000); Loh & Koh (2004); Nah et al. (2003)
3	Project Team and Team Work	13	Wu & Wong (2007); Soja (2006); Zhang et al. (2005); Somer & Nelson (2004); Umble et al. (2003); Mashari (2003); Kumar et al. (2003); Brown & Vessey (1999); Holland & Light (1999); Maditinos et al. (2011); Loh & Koh (2004); Hasibuan & Dantes (2012); Nah et al. (2003);
4	Project Planning and Management	15	Tsai et al. (2005); Somer & Nelson (2004); Bhatti (2005); Loh & Koh (2004); Soja (2006); Yahaya et al. (2006); Sun et al. (2005); Umble et al. (2003); Kumar et al. (2003); Parr & Shanks (2000); Kale (2000); Holland & Light (1999); Summer (1999); Nah et al. (2003); (Akkermans & Helden, 2002)
5	Change Management	7	Wenrich et al. (2009); Tsai et al. (2005); Motwani, Subramanian & Gopalakrishna (2005); Brown & Vessay (1999); Loh & Koh (2004); Hasibuan & Dantes (2012); Nah et al. (2003)
6	Strong ERP product	5	Wu & Wong (2007); Soja (2006); Yahaya et al. (2006); Zhang et al. (2005); Kumar et al. (2003)
7	Team Morale and Motivation	6	Roberts & Barrar (1992); Falkowski et al. (1998); Holland et al. (1999); Murray & Coffin (2001); Rosario (2000); Sumner (1999)
8	Consultant Selection and Relationship	6	Yahaya et al. (2006); Zhang et al. (2005); Wu & Wang (2007); Somer & Nelson (2004); Brown & Vessay (1999); Holland & Light (1999)
9	Project Champion	7	Falkowski et al. (1998); Murray and Coffin (2001); Rosario (2000); Shanks et al. (2000); Stefanou (1999); Sumner (1999); Loh & Koh (2004)

10	ERP Systems Implementation Strategy and Methodology	4	Wenrich et al. (2009); Allen et al. (2002); Holland & Light (1999); Ahituv, Neumann & Zviran (2002)

Based on the above literature analysis it was identified that top management support, clear goal, vision and objectives, project team and team work, project planning and management plays a significant role in successful ERP system implementation. Further, team morale and motivation, consultant selection and relationship, project champion factors can be considered as sub factors of critical factor project team and team work. Since project planning and management covers vast domain it was categorized in to two sub factors such as realistic project plan and estimates and project manager's aptitude.

Therefore, based on the observation and discussions with expertise at EnterpriZe following five factors have been identified to conduct an in-depth analysis.

- Clear Objectives and Scope of Work
- Top Management Support
- Realistic Project Plan and Estimates
- Aptitude of Project Manager
- Team Collaboration

2.3.1 Clear Objectives and Scope of Work

According to Holland & Light (1999), successful project implementation requires a well-defined project vision which outlines the goals, objectives, the business model behind the project and the scope of work. All these elements of the project must remain clear and constant through all stages of the project life cycle.

Roberts & Barrar (1992) stated that a change in the project scope significantly affects the cost, schedule, risk, and quality of the project. The project managers should always focus on maintaining the static scope of work and minimize the level of changes to the project scope. In case if the changes are being done frequently and/or major changes are done for the project it will affect the project milestones to be delayed and eventually the entire project will come to a delay. Therefore, it is project managers responsibility to make sure that sufficient time is spent on defining and redefining the work effort directly with the project owners and stakeholders.

The project team of ERP vendor should have a sharp vision about the project and clear idea about the scope of work. An unclear role and responsibility to achieve defined goals and objectives were found to affect the ERP implementation. This will result in ineffective communication and will ultimately delay the whole implementation if conflicting tasks are allocated. As discussed by Loh & Koh (2004), the project manager

should have a list of tasks to follow up and distribute to all the committee so that they are aware of their responsibilities, objectives and scope work. Setting realistic goals, objectives, and scope of work is another challenge. Unrealistic goals, objectives, and scope of work lead to low morale, a culture of insecurity and finally project failure. Haus (2014) has proven that a well-defined scope with realistic goals, realistic objectives, clear milestones, and deliverables helps to develop realistic, achievable timelines and helps maintain momentum and motivation throughout each milestone of the project. Also, it will create a direction for the project but also transparency and visibility to all the parties involved in it.

2.3.2 Top Management Support

As discussed by Holland & Light (1999), effective implementations require strong leadership, commitment, and participation by top management. Top management must be fully committed to its own involvement and have a willingness to allocate valuable resources to the implementation effort. Further, according to Bhatti (2005), top management should provide the required resources and authorization to achieve ERP implementation success. Management should monitor the project progress and provide clear direction for the project. As the project progresses, active involvement of management remains critical in terms of constantly monitoring the progress of the project and providing direction to the implementation teams (Bingi et al. 1999). According to Roberts and Barrar (1992), top management support includes providing required resources for the implementation and giving an appropriate amount of time to get the job done.

2.3.3 Realistic Project Plan and Estimates

As stated by Akkermans & Helden (2002), successful ERP implementation requires excellent project management which includes a clear definition of objectives, development of both a work plan and a resource plan and careful tracking of project progress. The project plan should realistic and achievable with accurate estimates. Project management activities span whole ERP life cycle from initiating the project to closing it. Project budget and time are absolute requirements to be met in the process of ERP implementation. Inadequate budget and time will cause a failure of implementation.

Ineffective planning at the initial stage will result in insufficient resources at half way of the implementation. There could be lack of human resources at the half way of the project in case if an employee turnover happens in the middle of a project, which results in project delay if there is no contingency plan. Most of the organizations often encounter difficulties with resource allocation in projects since ERP implementation is a long-term process. It is proven that most of the organizations do not spend enough

time on resource scheduling for a project which results the project milestones and timeline will get extended.

The project manager should prepare realistic project plan with accurate estimates which ensure there is no conflict in resource allocations in a multi-project environment. Resource allocation and scheduling is a critical part of project planning in multi-project environments.

2.3.4 Aptitude of Project Manager

The project manager is the key person who leads all project activities by co ordinating all stakeholders of the project. Project management is an evolving discipline where its participants are increasingly interested in the competency or aptitude of its project managers (Leybourne 2007). Project success has also been related to the project manager's knowledge, skills, attitude, experience, and leadership. Thus, understanding and improving the competencies of project managers has become a critical factor in ERP implementation projects.

Posner (1987) studied that the challenge for the project managers is to develop interpersonal skills, which are more important than technical skills. Dainty, Cheng & Moore (2005) stated that they require team building, leadership, decision making, mutuality and approachability, honesty and integrity, communication, ability to learn, self-efficacy, and an external focus.

Project manager's competency in communication is one of the most challenging and difficult tasks in an ERP implementation project. It is considered a critical success component in ERP implementation process. It is important to create an understanding, an agreement on implementation and sharing of information among project teams and to communicate the outcomes and goals across the organization within each stage of implementation (Kim et al, 2005). Communication should start early on ERP implementation project. It can include an overview of the system and reasons for applying it as consistently and sustainably (Bhatti, 2005). Negotiation skills are also important throughout the project, but especially at the beginning, because project manager should try to get people to agree on his opinion while he may need to negotiate what is in and out of scope, and should negotiate a consensus among the stakeholders who may not see eye-to eye.

Most of the projects are terminated in the initial stages because of politics; one needs to know how to get the right support because it is rare that a project has universal support throughout the organization. The project manager needs to know whom to talk to and how to talk to them to get their support. He needs to understand what will and will not sell in the prospective client's environment (Skulmoski & Hartman 2010). Therefore, Leadership skills of projects managers are required to lead the project to a success.

According to Skulmoski & Hartman (2010), the project manager should have knowledge of the organization's business, strategy, and industry. To lead the project to success there should be an ability to understand a strategy and align tactical work around that strategy and ability to pick up on events and interactions and to process those inputs in the context of the project plan is an essential competency. The ability to quickly build and maintain positive relationships with team-members and stakeholders, the ability to serve, motivate and focus a team and to foster collaboration among team members will also help the project manager to lead the project to a success by achieving all planned goal and objectives.

Further Skulmoski & Hartman (2010) stated that willingness and ability to change one's approach to project management and/or course of action in response to business needs, the ability to think through problems and decisions, the ability to understand the end-user or end customer's needs and the drive to ensure that projects meet those needs are some management capabilities which project managers should have to meet project objectives and deadlines. To get things done efficiently and effectively the project manager should have an appealing personality and a strong moral and ethical character.

2.3.5 Team Collaboration

Team work and collaboration is a critical factor for successful ERP Implementation. The project team's business and technological competence is a significant element for successful implementation. The skills and knowledge of the project team are important in providing expertise in areas where team members lack knowledge (Hasibuan & Dantes 2012). Consultants' experience, comprehensive knowledge of certain modules, and experience with the software application is essential for project success. Consultants who perform requirements analysis, recommend a suitable solution and manage implementations play a vital role that diminishes during the latter stages of implementation when the system is operational.

As discussed by Loh & Koh (2004), ERP implementation teams should be composed of people who are chosen for their skills, past accomplishments, reputation, and flexibility. These people should be entrusted with critical decision-making responsibility.

The selection of appropriate consultants greatly affects the success of ERP implementation. A consultant should be used who has a proper knowledge in the industrial field and ERP system that can help the organization to develop and implement a system aligning with the company business's need. Many of ERP consultants have no much experience in ERP implementation process (Somer & Nelson 2004). There should be an environment to outsource or hire external members to deal with the requirement of the specific skills needed for a project or task.

A successful implementation requires that the project team have the authority to complete a project, make decisions, be active participants in the planning process, have ownership of the project plan, and be responsible and accountable for completion of the project.

Project team members should have clear communication channels to access both the Functional/ Technical manager and the project manager within a matrix organization. There should be a method for effective communication between the team members to discuss project related issues and the progress of the project frequently. All team members must be aware of the status of the project and their role. Coordination between team members, mutual support and balance of member contribution are important attributes of effective team work. All members of the project team must be committed to the success of the project and the overall mission of the company.

According to Haughey (2001), a motivated team will go that extra mile to deliver a project on time and budget. Maintaining the moral of the team members at a prominent level throughout the project life cycle is important. It is examined that resignation of some team members may cause lack of motivation for the project progress and hence maintaining the motivation level of team members at high is essential. Motivation level of the team members can be kept high if milestones achieved are communicated to them.

2.4 Implementation Completion Dimensions

ERP implementation Completion is a complex and frequently discussed topic which is crucial importance to effective project implementation. Project completion is recommended to have two major components: issues dealing with the project itself and issues dealing with the client. In this study, the focus is on discuss and analyze the issues dealing with the project itself which has more responsibility on ERP vendor. The sub-issues of time, cost and scope are presented along with items for their measurement. Completing an implementation on time, on budget and with expected performance can be defined as successful implementation.

Time

The Schedule/Time is a non-recoverable commodity. Restricting the schedule affects either the cost or scope. To complete the project on time the project manager should add extra resources. The more resources working on a task equates to a higher cost for task completion. The project manager could also choose to reduce the scope, where some desired features or capabilities are left out or pushed back to a subsequent phase of the project. The driving constraint in this situation is the schedule (Catanio, Armstrong & Tucker 2013).

Cost

All projects have a finite budget. Reducing the project cost will most likely affect the project negatively, for example, reducing cost could mean a reduction in scope. Another example is that cost is closely associated with resources. The more resources assigned to a project to shorten the schedule or meet increased scope, the more the cost will increase. Resources applied to the project include labor, equipment, and material. Cost is the most crucial factor for many projects. In the end, did the project stick to the budget? Did project come in way under budget? The project team should always know where they stand in terms of money spent. ERP vendor regularly gives clients a quote before they start, and once they do so, they need to stick to the budget or come in under. Otherwise, it is not a profitable business (Catanio et al. 2013).

Scope

Quality can also be specifically connected with the scope since the scope defines the quality of the project. The scope defines the quality of the finished product. Therefore, quality can also go on the side of the triangle labeled scope. The resulting constraint triangle where Scope/Quality is on one side of the triangle. One example of a risk to quality is scope creep. Scope creep is where additional requirements are added to the project deliverables after the project has begun execution. Scope creep affects both cost and schedule constraints. Maintaining the project quality where there is scope creep typically requires increases in cost and/or schedule (Catanio et al. 2013). Project success or completion of the project within timeline refers to balanced triple constraints as agreed in the initial stage as shown in Figure 2.2.

Figure 2.2: Triple Constraint

2.5. Summary

This chapter has discussed the comprehensive analysis of previous researches which has been conducted to analyze the critical factors impacting for ERP implementation success. At first, it has discussed the ERP systems implementation life cycles and proposed models in previous researches. Based on an extensive literature review twelve factors have been identified as critical factors and five factors have been selected as the most critical factors which impact the completion of ERP implementation at EnterpriZe. These five factors are Clear Objectives and Scope of Work, Top Management Support, Realistic Project Plan and Estimates, Aptitude of Project Manager, and Team Collaboration. Further, it has discussed the dimensions of these five critical factors in detail. Finally, the dimensions of project completion have also been discussed in this chapter.

3. RESEARCH METHODOLOGY

This chapter constructs a conceptual model to study the research problem identified in chapter 1. The conceptual model utilizes a set of factors derived from the literature review conducted in chapter 2. The classification of factors to independent and dependent variable was done in order to create a theoretical framework for building of a set of hypotheses. The research question created in chapter 1 are modeled as hypotheses for deriving analytical results. The methodology of the study, approach for data gathering, selection of population and determination of the sample is also discussed in this chapter.

3.1 Introduction

As discussed in the literature review, significantly high number of ERP implementation projects fail to complete the implementation work according to the originally planned budget and agreed scope of work. Based on the observation of different ERP projects for different industries, which EnterpriZe has been involved in, it has been identified that several factors impact to delay the completion of ERP implementation. Therefore, identifying these factors and executing suitable actions to avoid delays and fast track the process is important to ERP project implementation success. The overall objective of this study is to recommend an effective guideline towards project completion within the planned timeline for EnterpriZe.

3.2 Research Methodology

As summarized in section 2.5 the literature survey five factors were identified as the most critical factors that impact the completion of ERP project implementation. These five factors have been considered as independent variables and used in the development of a theoretical framework for the study of the identified research problem.

- Clear Objectives and Scope of Work
- Top Management Support
- Realistic Project Plan and Estimates
- Aptitude of Project Manager
- Team Collaboration

In addition to these independent variables that affect the completion of ERP projects implementation, project completion within the planned timeline has been defined as the dependent variable in the theoretical framework. This variable refers to the completion of a project within the planned time frame, within the budgeted cost, and within the specified scope and functions agreed with the customer.

The theoretical framework shown in Figure 3.1 shows the relationship between the independent variables and dependent variable.

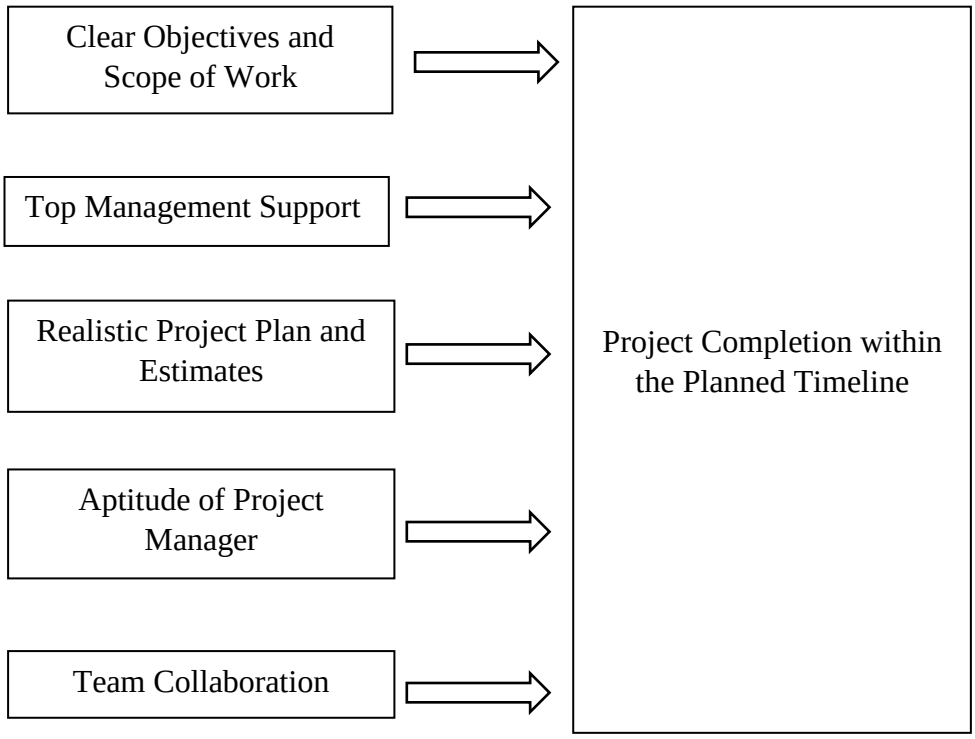

Figure 3.1: Theoretical Framework

Based on the above theoretical framework, five hypotheses have been derived in order to find answers for the research question.

Hypothesis 1

H_{1a}: Clear Objectives and Scope of Work is positively correlated with ERP Project Completion within the Planned Timeline.

H_{10}: There is no correlation between Clear Objectives and Scope of Work and ERP Project Completion within the Planned Timeline.

Hypothesis 2

H_{2a}: Top Management Support is positively correlated with ERP Project Completion within the Planned Timeline.

H_{20}: There is no correlation between Top Management Support and ERP Project Completion within the Planned Timeline.

Hypothesis 3

H_{3a}: Realistic Project Plan and Estimates is positively correlated with ERP Project Completion within the Planned Timeline.

H_{30}: There is no correlation between Realistic Project Plan and Estimates and ERP Project Completion within the Planned Timeline.

Hypothesis 4

H_{4a}: Aptitude of Project Manager is positively correlated with ERP Project Completion within the Planned Timeline.

H_{40}: There is no correlation between Aptitude of Project Manager and ERP Project Completion within the Planned Timeline.

Hypothesis 5

H_{5a}: Team Collaboration is positively correlated with ERP Project Completion within the Planned Timeline.

H_{50}: There is no correlation between Team Collaboration and ERP Project Completion within the Planned Timeline.

3.3 Operationalization of Theoretical Framework

The theoretical framework of variables and relationships need to be reformulated as variables, dimensions and measurements in order to create a scheme of analysis. Table 3.1 illustrate the operationalization of variables for the purpose of analysis in the study.

Table 3.1: Operationalization of Variables

	Variable	Dimension	Scale of Measurement	Question
Demographic Data		Gender, Designation, Experience, Work Load	Linear	No 1 to 6

Independent Variable	Clear Objectives and Scope of Work	Understanding and awareness of project objectives and scope of work	5-point Likert scale	No 7 to 10
	Top Management Support	Top management involvement and approach	5-point Likert scale	No 11 to 13
	Realistic Project Plan and Estimates	Projects planning and estimation tools and techniques, Approach to estimation	5-point Likert scale	No 14 to 17
	Aptitude of Project Manager	Knowledge, Skills, Attitude, Experience, Leadership	5-point Likert scale	No 18 to 24
	Team Collaboration	Staffing, Communication, Motivation	5-point Likert scale	No 25 to 31
Dependent Variable	Project Completion within the Planned Timeline	Time, Cost, Scope	5-point Likert scale	No 32 to 35

3.3.1 Population and Sample Selection

As the research work presented in this thesis is focused on software development organization named EnterpriZe, it was conducted as case study research. Therefore, the population was taken to be all the employees of EnterpriZe. Currently, the company has 94 employees in total including Human Resource, Finance and Admin personnel who are not directly involved with ERP implementation projects. Hence, the population was taken as 90 employees.

The sample size was calculated by considering a confidence level of 95% and a margin of error as 5 for a population of 90. This resulted in a sample size of 73. The testing sample was drawn in a manner that allowed it to be consisted of Project Managers, Application Consultants, Implementation Assistants, Software Architects, Software Engineers, QA Engineers and Marketing Personnel.

3.3.2 Data Collection

A self-administered questionnaire distributed among all the employees of EnterpriZe, was the main instrument for data collection. This survey type questionnaire consisted of 35 questions that were designed to collect demographic data of respondents as well as obtaining measured value for independent and dependent variables.

The questions were designed with statements where the 5-point Likert scale could be used by the respondents to provide objective measurement based on own experiences. The scale of 1-5 was used throughout which represented from 1 - Strongly Disagree to 5 - Strongly Agree. The survey has generated quantitative information on the 5 key factors affecting the completion of ERP systems implementation.

Initially, a preliminary questionnaire was distributed as a pilot survey among a sample of six respondents which included a Project Manager, Senior Software Engineer, Application Consultant, Senior Application Consultant, QA Engineer and a Marketing Specialist. The feedback received from this group was evaluated and used to prepare the final questionnaire with the relevant modifications.

The main intention of pilot survey was to ensure clarity, relevance, and validity of questions. The finalized version of the questionnaire was distributed among all the employees in EnterpriZe via e-mail. The distributed questionnaire is in Appendix A.

The questionnaire was distributed among all the employees (except HR, Finance, and Admin personnel) in EnterpriZe via e-mail and 73 responses were collected within a period of one month starting from 16th October 2017 and ending on 15th November 2017. Figure 3.2 graphically represents the number of responses received over the timeline.

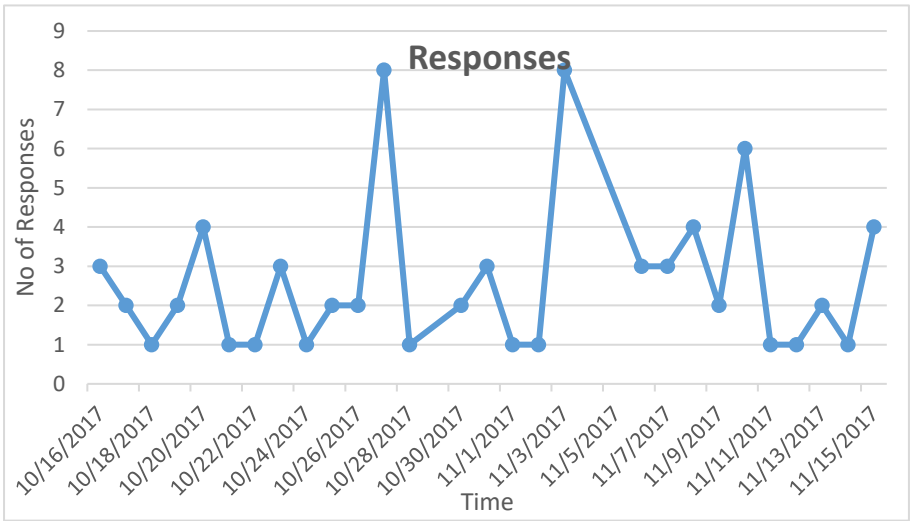

Figure 3.2 Number of Responses Received over Timeline

4. DATA ANALYSIS

This chapter presents the statistical analysis of collected data via survey. The reliability test of the research instrument is done using Cronbach's Alpha Coefficient (CAC) method. Descriptive analysis of collected data has been completed with analyzing the demographic data, the frequency distribution of the responses. Further, Pearson correlation and Linear regression analysis are used to find relationships between the variables. SPSS software is used for all above mentioned analysis.

4.1 Introduction

A self-administered questionnaire distributed among all the employees of EnterpriZe, was the main instrument for data collection. Initially, a preliminary questionnaire was distributed as a pilot survey among a sample of six respondents. The feedback received from this group was evaluated and used to prepare the final questionnaire with the relevant modifications. This survey type questionnaire consisted of 35 questions that were designed to collect demographic data of respondents as well as obtaining measured value for independent and dependent variables. 73 responses were received and all these responses were accepted as valid responses for the analysis. The summary of the responses is included in Appendix B.

4.2 Reliability Analysis

The reliability analysis for five independent variables and the dependent variable has been conducted using the CAC method to prove the reliability of the research instrument. This reliability analysis is based on 73 valid responses received from employees of EnterpriZe during the data collection phase of the research.

Clear Objectives and Scope of Work

As shown in Figure 4.1, the CAC for the variable Clear Objectives and Scope of Work is 0.817 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the four questions used to measure the factor Clear Objectives and Scope of Work are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.817	4

Figure 4.1: Reliability Analysis for Clear Objectives and Scope of Work

Top Management Support

As shown in Figure 4.2, the CAC for the variable Top Management Support is 0.791 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the three questions used to measure the Top Management Support are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.791	3

Figure 4.2: Reliability Analysis for Top Management Support

Realistic Project Plan and Estimates

As shown in Figure 4.3, the CAC for the variable Realistic Project Plan and Estimates is 0.854 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the four questions used to measure the Realistic Project Plan and Estimates are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.854	4

Figure 4.3: Reliability Analysis for Realistic Project Plan and Estimates

Aptitude of Project Manager

As shown in Figure 4.4, the CAC for the variable Aptitude of Project Manager is 0.729 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the seven questions used to measure the Aptitude of Project Manager are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.729	7

Figure 4.4: Reliability Analysis for Aptitude of Project Manager

Team Collaboration

As shown in Figure 4.5, the CAC for the variable Team Collaboration is 0.890 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the seven questions used to measure the Team Collaboration are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.890	7

Figure 4.5: Reliability Analysis for Team Collaboration

Project Completion within the Planned Timeline

As shown in Figure 4.6, the CAC for the variable Project Completion within the Planned Timeline is 0.719 which is significantly higher than the 0.7 threshold for acceptability. Therefore, it can be stated that the four questions used to measure the Project Completion within the Planned Timeline are reliable with a high degree of internal consistency.

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.719	4

Figure 4.6: Reliability Analysis for Project Completion within Planned Timeline

4.3 Demographic Analysis

Demographic analysis is a technique used to verify if a sample of respondents to a self-administrated anonymous survey type data collection is representative of the population. However, as this research was conducted as a case study focusing on a specific company with the sample size nearly equaling the population, such a demographic analysis is not essential. However, to get an understanding of the respondent sample in terms of their experience and project involvement, question 1 to 6 in the questionnaire was used.

4.3.1 Gender Distribution

Question 1 was designed to review the gender distribution of employees at EnterpriZe. As shown in figure 4.7, 79.5% male and 20. 5% female employees have responded to the questionnaire. Since EnterpriZe has approximately 80% male and 20% female gender balance, it shows that the questionnaire was fairly distributed and received a response from a proper sample.

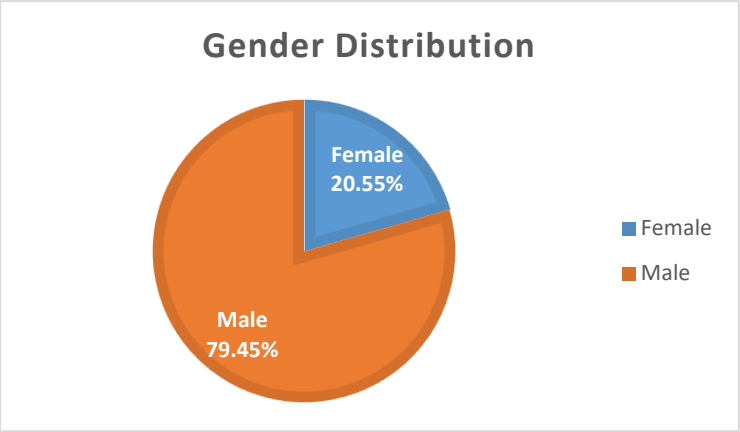

Figure 4.7: Gender Distribution

4.3.2 Age Distribution

Question 2 was designed to review the age group of employees at EnterpriZe. According to Figure 4.8, 52% of employees are in the age group 26 to 30 years which represent more than half of the sample. Approximately, 19% of employees are in the age group 20 to 25 years, 11% of employees are in the age group of 31 to 35 years and 18% of employees are in the age group of 36 to 45 years. This shows that more than 70% of employees are below 30 years which would be indicative of a lower level of maturity among the employees of EnterpriZe.

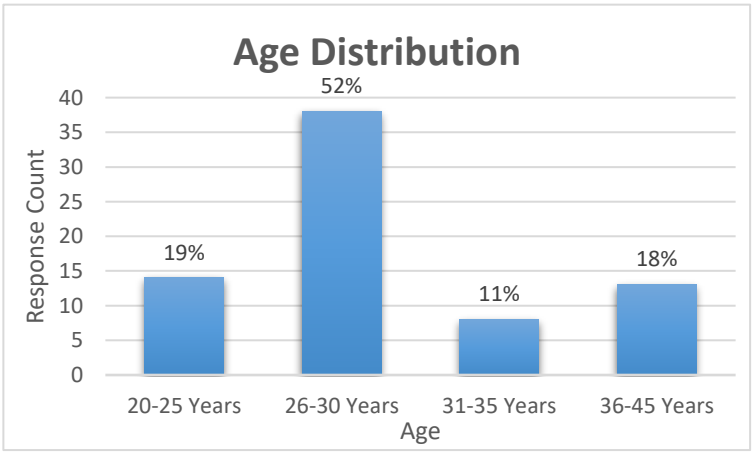

Figure 4.8: Age Distribution

4.3.3 Experience at Current Employer

Question 3 was designed to review the work experience of employees with the organization's own products. As shown in Figure 4.9, Nearly 30% of employees are new to the organization while another 30% have only 1-3 years' experience working with own products. This is not a favorable scenario for an ERP systems

implementation organization since ERP systems implementation requires thorough knowledge on product features and experience in customizing them. Approximately 40% of the employees have more than 3 years' experience working with company own product and this would be the experienced workforce of EnterpriZe. Since ERP systems functionalities cover a wide domain it is a generally accepted industry norm that it requires at least 3 years to gain expertise with the full spectrum of product functionalities.

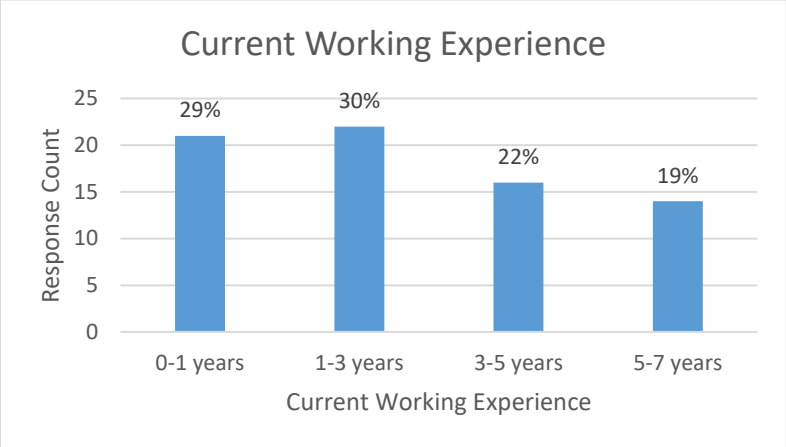

Figure 4.9: Current Working Experience Distribution

4.3.4 Overall Experience

Question 4 was designed to review the overall experience of employees at EnterpriZe. As shown in Figure 4.10, 30% of employees have less than 3 years overall experience which indicate that they have a reasonable fraction of inexperienced employees in the work force. As 44% of employees have 3 to 7 years' experience and 26% of employees have more than 7 years overall experience, the employees of EnterpriZe consists of a significantly well experienced fraction.

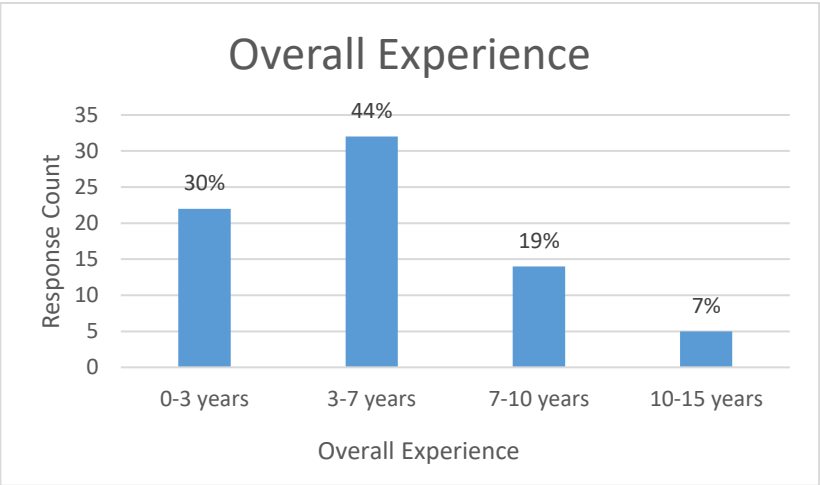

Figure 4.10: Overall Working Experience Distribution

As illustrated in Figure 4.11, 43 employees have 0 – 3 years' experience at EnterpriZe. Therefore, there is a high probability that all 22 people with 0 to 3 years' overall experience have only worked at EnterpriZe. Maximum years of experience employee at EnterpriZe can have is 7 years. Therefore, it can be stated that a majority from 54 employees with 0 – 7 years overall experience has only worked at EnterpriZe.

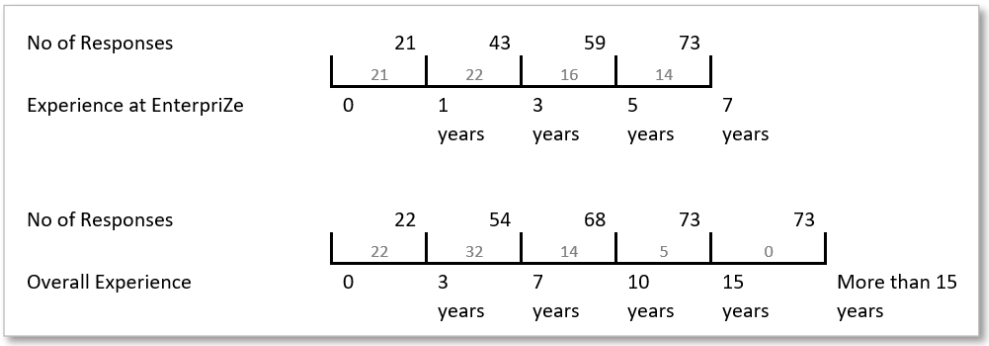

Figure 4.11: Comparison of Current Working Experience and Overall Working Experience

4.3.5 Job Role and Designation

Question 5 was designed to review the designation and job role of each respondent. As illustrated in Figure 4.12, 36% of employees play software development roles while 37.0% of employees play implementation role in the projects. Approximately, 11.0% of employees play software quality assurance roles and 7% of employees are project managers. Therefore, 91% of the sample are individuals who are directly involved with ERP systems implementation activities in their day today work life. Remaining 9% of employees represent the top management and the sales and marketing personnel who involved in implementation activities when required. Designation distribution is shown in Figure 4.13.

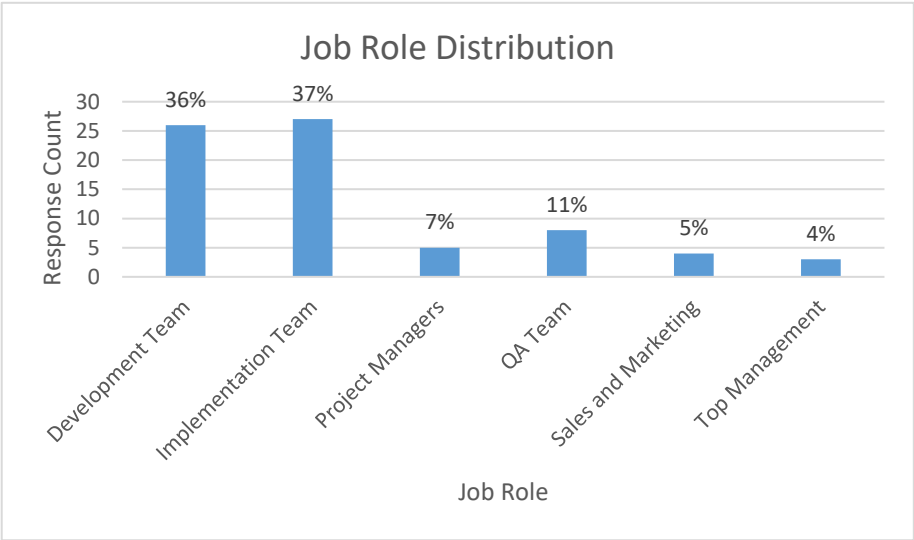

Figure 4.12: Job Role Distribution

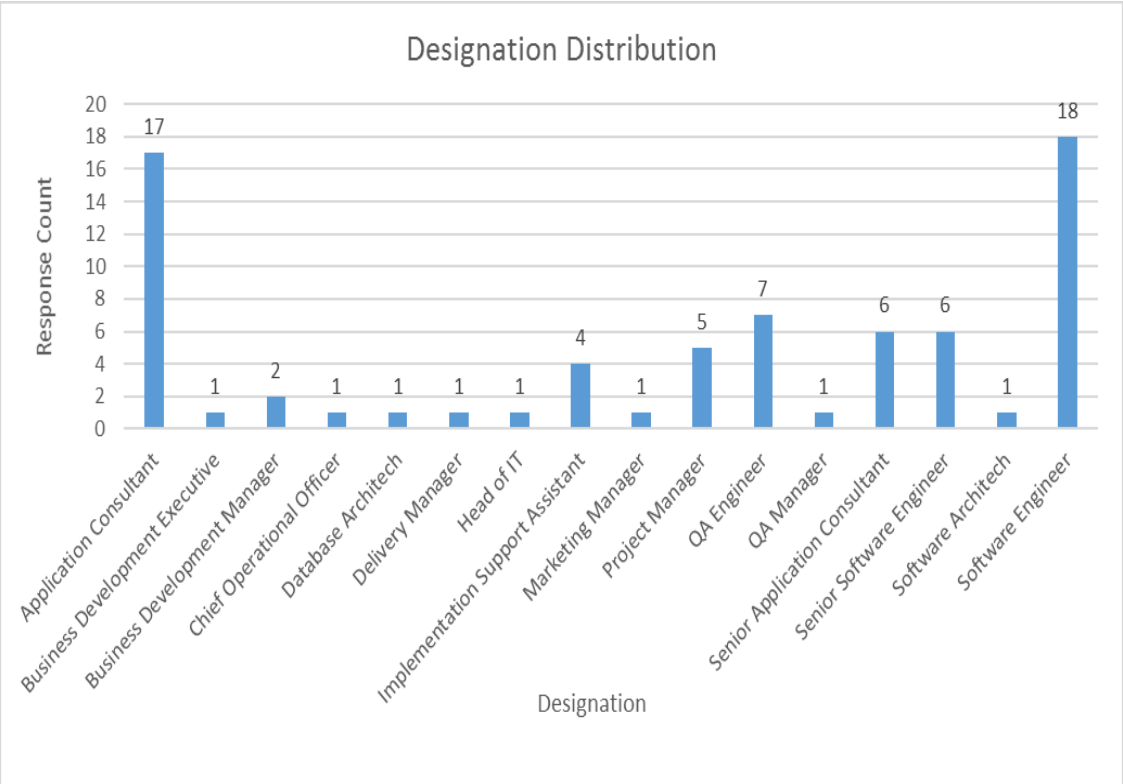

Figure 4.13: Designation Distribution

4.3.6 Projects Involved

Question 6 was designed to review the workload of each employee at EnterpriZe. According to figure 4.12, it has been identified that all the employees are working more than two projects in given period. This is not a favorable indicator for an ERP systems implementation organization. When considering ERP systems implementation, it is necessary to have a dedicated project team until the completion of an ERP systems implementation. It appears that at EnterpriZe this good practice has not been observed diligently.

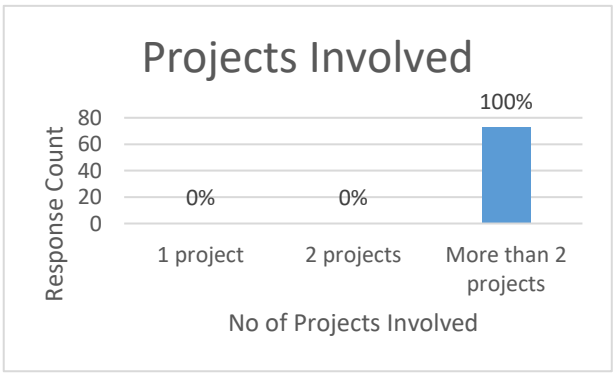

Figure 4.14: Number of Project Involved

4.4 Descriptive Statistics Analysis

4.4.1 Clear Objectives and Scope of Work

As shown in Figure 4.15, the frequency distribution for the factor Clear Objectives and Scope of Work shows the mean value of 2.27 which is more towards the negative side of the measure. This implies that a majority of respondents have the experience of EnterpriZe not clearly defining objectives and scope of work for the projects they have worked on.

Statistics

Clear objectives and Scope of work

N	Valid	73
	Missing	0
Mean		2.2705
Median		2.0000
Std. Deviation		.92960
Variance		.864

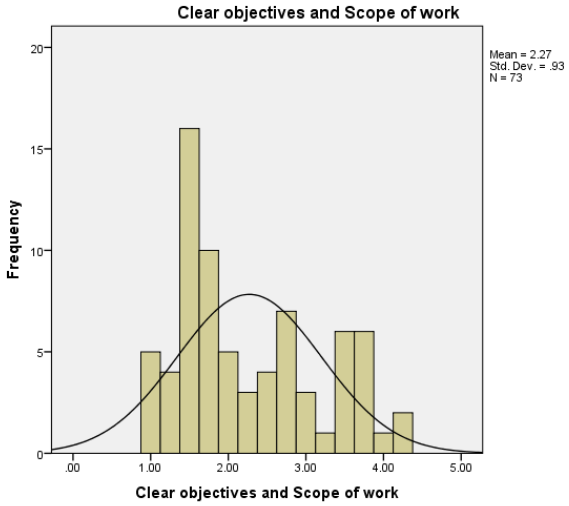

Figure 4.15 Frequency Distribution for the Clear Objectives and Scope of Work

4.4.2 Top Management Support

As illustrated in Figure 4.16, the frequency distribution for the factor Top Management Support shows the mean value of 3.97 which is on the positive side of the measure. This implies that a majority of respondents satisfied with the top management support they are receiving for the projects they are involved in.

Statistics

Top Management Support

N	Valid	73
	Missing	0
Mean		3.9726
Median		4.0000
Std. Deviation		.67301
Variance		.453

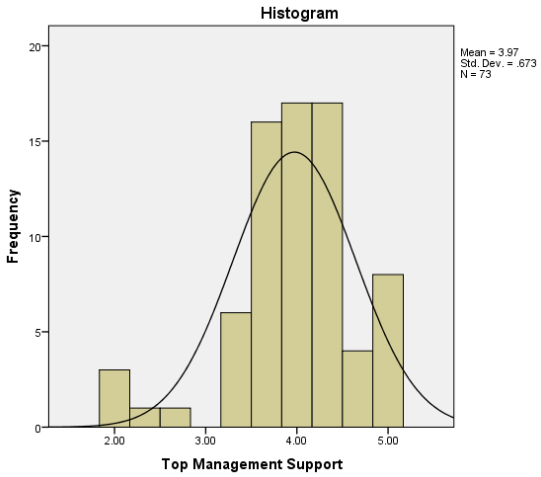

Figure 4.16 Frequency Distribution for the Top Management Support

4.4.3 Realistic Project Plan and Estimates

As shown in Figure 4.17, the frequency distribution for the factor Realistic Project Plan and Estimates shows the mean value of 2.40 which is more towards the negative side of the measure. This implies that a majority of respondents have the experience of EnterpriZe not having realistic project plan and estimates for the projects they have worked on.

Statistics

Realistic Project Plan and Estimates

N	Valid	73
	Missing	0
Mean		2.4041
Median		2.2500
Std. Deviation		.88450
Variance		.782

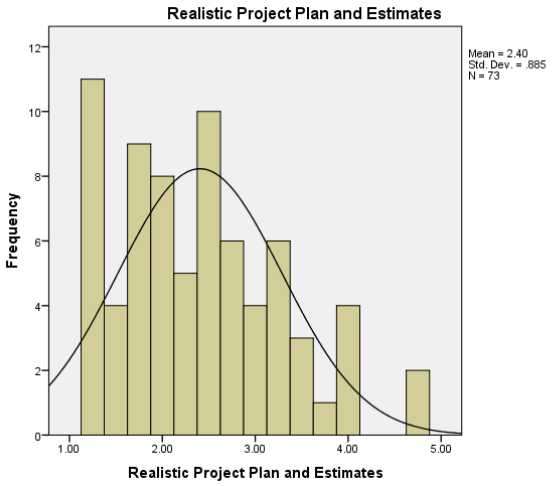

Figure 4.17: Frequency Distribution for the Realistic Project Plan and Estimates

4.4.4 Aptitude of Project Manager

As illustrated in Figure 4.18, the frequency distribution for the factor Aptitude of Project Manager shows the mean value of 3.52 which is more towards the positive side of the measure. This implies that a majority of respondents satisfied with the competencies of project managers they have worked with.

Statistics

Aptitude of Project Manager

N	Valid	73
	Missing	0
Mean		3.5225
Median		3.4286
Std. Deviation		.59819
Variance		.358

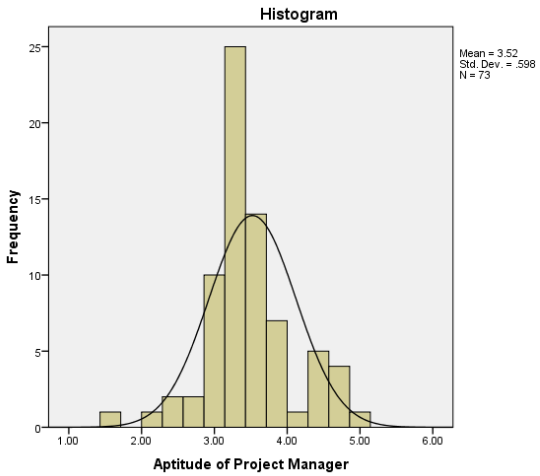

Figure 4.18: Frequency Distribution for the Aptitude of Project Manager

4.4.5 Team Collaboration

As shown in Figure 4.19, the frequency distribution for the factor Team Collaboration shows the mean value of 2.89 which is more towards the negative side of the measure. This implies that a majority of respondents have the experience of EnterpriZe not having team spirit and collaboration with the project teams they have worked with.

Statistics

Team Collaboration

N	Valid	73
	Missing	0
Mean		2.8963
Median		2.7143
Std. Deviation		.86644
Variance		.751

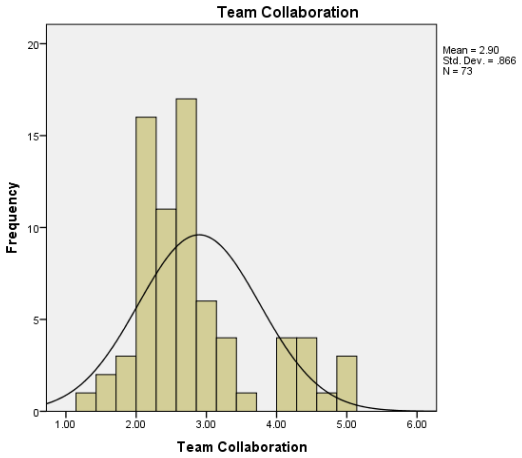

Figure 4.19: Frequency Distribution for the Team Collaboration

4.4.6 Project Completion within the Planned Timeline

As shown in Figure 4.20, the frequency distribution for the factor Project Completion within the Planned Timeline shows the mean value of its response distribution to be 3.00 which is a neutral response.

Statistics

Project Completion within the planned timeline

N	Valid	73
	Missing	0
Mean		3.0068
Median		3.0000
Std. Deviation		.71562
Variance		.512

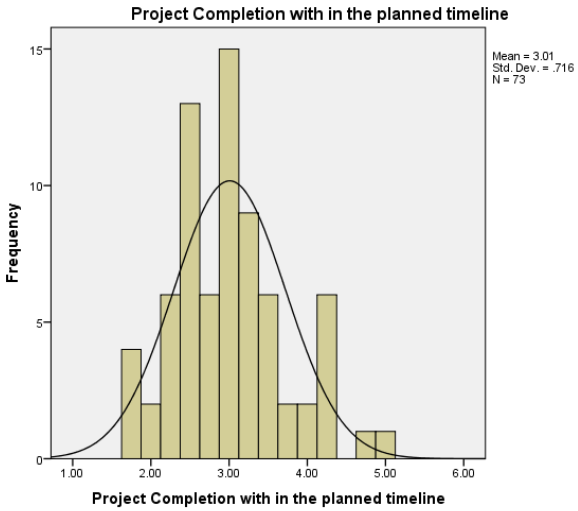

Figure 4.20: Frequency Distribution for the Project Completion within Planned Timeline

4.5 Correlation Analysis

Five hypotheses have been formulated based on the theoretical framework and research question. The Pearson correlation coefficient analysis was done for the total sample of 73 responses to test the hypotheses. Bivariate relationships between the dependent variable and each of the independent variables were examined. It is known that the relationship is considered as positive when the correlation coefficient is a positive value while the relationship is considered as negative when the correlation coefficient is a negative value. Further, the relationship is considered as strongly correlated when the coefficient value is closer to 1 and the relationship becomes weakly correlated when it is closer to 0.

4.5.1 Clear Objectives and Scope of Work

Hypothesis 1 - This is to determine whether there is a correlation between the independent variable Clear Objectives and Scope of Work and the dependent variable ERP Project Completion within the Planned Timeline or not.

Table 4.1: Correlation Coefficient of Clear Objectives and Scope of Work

Correlations

		Clear Objectives and Scope of work
Project Completion within the planned timeline	Pearson Correlation	.522**
	Sig. (2-tailed)	.000
	N	73

**. Correlation is significant at the 0.01 level (2-tailed).

According to the results shown in Table 4.1, there is a moderately positive correlation value of 0.522 between the two variables where correlation is significant at the 0.01 level. Therefore, the alternate hypothesis H_{1a} is accepted and the null hypothesis H_{10} is rejected. Figure 4.21 shows the scatter plot drawn for H1.

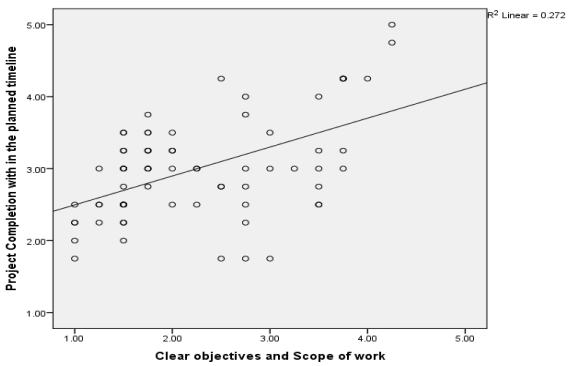

Figure 4.21: Scatter Plot of Clear Objectives and Scope of Work

4.5.2 Top Management Support

Hypothesis 2 - This is to determine whether there is a correlation between the independent variable Top Management Support and the dependent variable ERP Project Completion within the Planned Timeline or not.

Table 4.2: Correlation Coefficient of Top Management Support

Correlations

		Top Management Support
Project Completion within the planned timeline	Pearson Correlation	.382**
	Sig. (2-tailed)	.001
	N	73

**. Correlation is significant at the 0.01 level (2-tailed).

As illustrated in Table 4.2, there is a weak positive correlation value of 0.382 between the two variables where correlation is significant at the 0.01 level. Therefore, the alternate hypothesis H_{2a} is accepted and the null hypothesis H_{20} is rejected. Figure 4.22 shows the scatter plot drawn for H2.

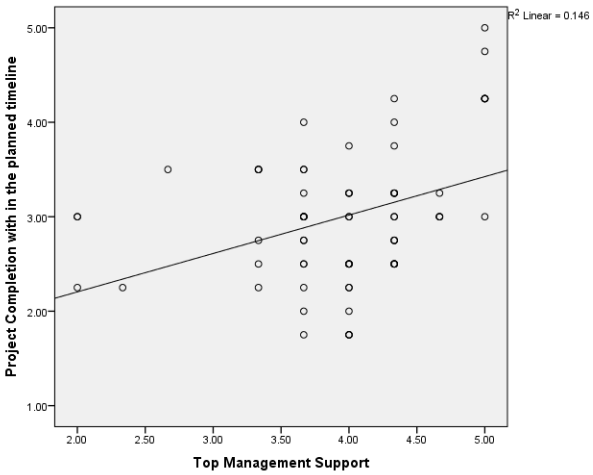

Figure 4.22: Scatter Plot of Top Management Support

4.5.3 Realistic Project Plan and Estimates

Hypothesis 3 - This is to determine whether there is a correlation between the independent variable Realistic Project Plan and Estimates and the dependent variable ERP Project Completion within the Planned Timeline or not.

Table 4.3: Correlation Coefficient of Realistic Project Plan and Estimates

Correlations

		Realistic Project Plan and Estimates
Project Completion within the planned timeline	Pearson Correlation	.789**
	Sig. (2-tailed)	.000
	N	73

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4.3, there is a strongly positive correlation value of 0.789 between the two variables where correlation is significant at the 0.01 level. Therefore, the alternate hypothesis H_{3a} is accepted and the null hypothesis H_{30} is rejected. Figure 4.23 shows the scatter plot drawn for H3.

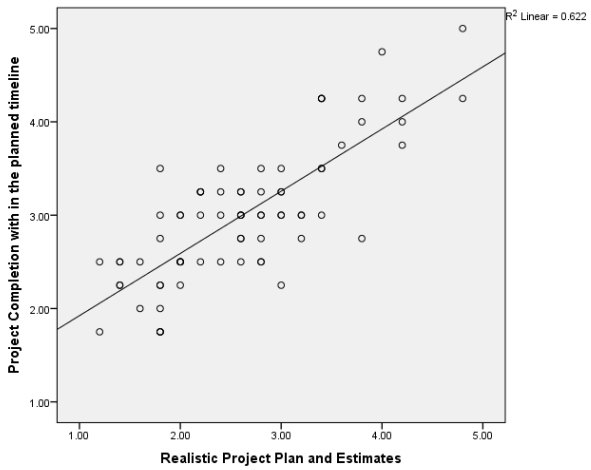

Figure 4.23: Scatter Plot of Realistic Project Plan and Estimates

4.5.4 Aptitude of Project Manager

Hypothesis 4 - This is to determine whether there is a correlation between the independent variable Aptitude of Project Manager and the dependent variable ERP Project Completion within the Planned Timeline or not.

Table 4.4: Correlation coefficient of Aptitude of Project Manager

Correlations

		Aptitude of Project Manager
Project Completion within the planned timeline	Pearson Correlation	.684**
	Sig. (2-tailed)	.000
	N	73

**. Correlation is significant at the 0.01 level (2-tailed).

As illustrated in Table 4.4, there is a moderately positive correlation value of 0.684 between the two variables where correlation is significant at the 0.01 level. Therefore, the alternate hypothesis H_{4a} is accepted and the null hypothesis H_{40} is rejected.

Figure 4.24 shows the scatter plot drawn for H4.

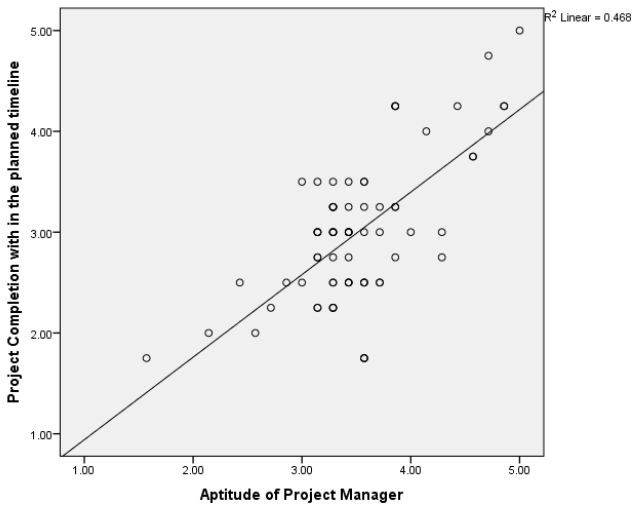

Figure 4.24: Scatter Plot of Aptitude of Project Manager

4.5.5 Team Collaboration

Hypothesis 5 - This is to determine whether there is a correlation between the independent variable Team Collaboration and the dependent variable ERP Project Completion within the Planned Timeline or not.

Table 4.5: Correlation Coefficient of Team Collaboration

Correlations

		Team Collaboration
Project Completion within the planned timeline	Pearson Correlation	.819**
	Sig. (2-tailed)	.000
	N	73

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4.5, there is a strongly positive correlation value of 0.819 between the two variables where correlation is significant at the 0.01 level. Therefore, the alternate hypothesis H_{5a} is accepted and the null hypothesis H_{50} is rejected.

Figure 4.25 shows the scatter plot drawn for H5.

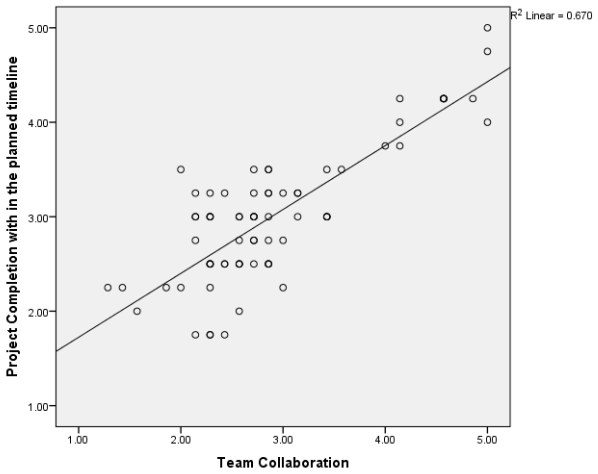

Figure 4.25: Scatter Plot of Team Collaboration

4.5.6 Correlation by Age Distribution

The Table 4.6 correlates the 5 independent variables with the dependent variable in the context of respondents age distribution. It reveals that employees who are in 26 - 30 years age category believed that 3 independent variables Realistic Project Plan and Estimates, Aptitude of Project Manager and Team Collaboration are positively correlated with the dependent variable Project Completion within the Planned Timeline. Employees who are in 31 - 35 years age category have confidence that independent variables Clear Objectives and Scope of Work, Realistic Project Plan and Estimates and Team Collaboration are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline. The employees above 36 years believed that all independent variables except Clear Objectives and Scope of Work are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline.

Table 4.6: Correlation by Age Distribution

Correlations

My Age Range is:			Clear objectives and Scope of work	Top Management Support	Realistic Project Plan and Estimates	Aptitude of Project Manager	Team Collaboration
20-25	Project Completion within the planned timeline	Pearson Correlation	-.471	.330	-.317	.218	.153
		Sig. (2-tailed)	.089	.248	.270	.455	.602
		N	14	14	14	14	14
26-30	Project Completion within the planned timeline	Pearson Correlation	.137	-.313	.707**	.489**	.643**
		Sig. (2-tailed)	.413	.056	.000	.002	.000
		N	38	38	38	38	38
31-35	Project Completion within the planned timeline	Pearson Correlation	.987**	.809*	.833*	.828*	.928**
		Sig. (2-tailed)	.000	.015	.010	.011	.001
		N	8	8	8	8	8
36-45	Project Completion within the planned timeline	Pearson Correlation	.469	.688**	.884**	.873**	.938**
		Sig. (2-tailed)	.106	.009	.000	.000	.000
		N	13	13	13	13	13

**. Correlation is significant at the 0.01 level (2-tailed).

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

4.5.7 Correlation by Total Work Experience

The Table 4.7 correlates the 5 independent variables with the dependent variable in the context of respondents total working experience in the ERP systems domain. It reveals that employees who have 3 - 7 years overall experience believed that 3 independent variables Realistic Project Plan and Estimates, Aptitude of Project Manager and Team Collaboration are positively correlated with the dependent variable Project Completion within the Planned Timeline. Employees who have 7 – 10 years overall experience have confidence that all 5 independent variables are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline. The employees who have more than 10 years' experience believed that independent variables Clear Objectives and Scope of Work, Realistic Project Plan and Estimates and Team Collaboration are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline.

Table 4.7: Correlation by Total Work Experience

Correlations

My total experience in current working domain is,			Clear objectives and Scope of work	Top Management Support	Realistic Project Plan and Estimates	Aptitude of Project Manager	Team Collaboration
0-3 years	Project Completion within the planned timeline	Pearson Correlation	-.059	.094	.499*	.364	.216
		Sig. (2-tailed)	.794	.676	.018	.096	.334
		N	22	22	22	22	22
3-7 years	Project Completion within the planned timeline	Pearson Correlation	.302	-.042	.738**	.541**	.697**
		Sig. (2-tailed)	.093	.820	.000	.001	.000
		N	32	32	32	32	32
7-10 years	Project Completion within the planned timeline	Pearson Correlation	.897**	.792**	.887**	.838**	.944**
		Sig. (2-tailed)	.000	.001	.000	.000	.000
		N	14	14	14	14	14
10-15 years	Project Completion within the planned timeline	Pearson Correlation	.974**	.717	.985**	.895*	.975**
		Sig. (2-tailed)	.005	.173	.002	.040	.005
		N	5	5	5	5	5

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

**. Correlation is significant at the 0.01 level (2-tailed).

4.5.8 Correlation by Current Work Experience

The Table 4.8 correlates the 5 independent variables with the dependent variable in the context of respondents current working experience at EnterpriZe. It reveals that employees who have 0 - 3 years' experience at EnterpriZe believed that 3 independent variables Realistic Project Plan and Estimates, Aptitude of Project Manager and Team Collaboration are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline. Employees who have 1-3 years' experience at EnterpriZe believed that independent variable Clear Objectives and Scope of Work also strongly positively correlated with the dependent variable Project Completion within the Planned Timeline. The Employees who have more than 5 years' experience at EnterpriZe have confidence that all 5 independent variables are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline.

Table 4.8: Correlation by Current Work Experience

Correlations

How long have you worked for your current employer:			Clear objectives and Scope of work	Top Management Support	Realistic Project Plan and Estimates	Aptitude of Project Manager	Team Collaboration
0-1 years	Project Completion within the planned timeline	Pearson Correlation	.289	.280	.620**	.746**	.779**
		Sig. (2-tailed)	.204	.218	.003	.000	.000
		N	21	21	21	21	21
1-3 years	Project Completion within the planned timeline	Pearson Correlation	.727**	-.004	.819**	.811**	.840**
		Sig. (2-tailed)	.000	.987	.000	.000	.000
		N	22	22	22	22	22
3-5 years	Project Completion within the planned timeline	Pearson Correlation	-.376	-.613*	.608*	.193	.547*
		Sig. (2-tailed)	.151	.012	.013	.473	.028
		N	16	16	16	16	16
5-7 years	Project Completion within the planned timeline	Pearson Correlation	.718**	.803**	.914**	.809**	.964**
		Sig. (2-tailed)	.004	.001	.000	.000	.000
		N	14	14	14	14	14

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

**. Correlation is significant at the 0.01 level (2-tailed).

4.5.9 Correlation by Job Role

The Table 4.9 correlates the 5 independent variables with the dependent variable in the context of respondents' job role in ERP systems implementation projects at EnterpriZe. It reveals that employees who perform a managerial role in ERP systems implementation projects have confidence that 3 independent variables Realistic Project Plan and Estimates, Aptitude of Project Manager, Team Collaboration are strongly positively correlated with the dependent variable Project Completion within the Planned Timeline. The Employees who perform an operational role in ERP systems implementation projects at EnterpriZe believed that all independent variables except Top Management Support are moderately positively correlated with the dependent variable Project Completion within the Planned Timeline.

Table 4.9: Correlation by Job Role

Correlations							
Role			Clear objectives and Scope of work	Top Management Support	Realistic Project Plan and Estimates	Aptitude of Project Manager	Team Collaboration
Managerial Role	Project Completion within the planned timeline	Pearson Correlation	.683*	.661*	.856**	.884**	.939**
		Sig. (2-tailed)	.014	.019	.000	.000	.000
		N	12	12	12	12	12
Operational Role	Project Completion within the planned timeline	Pearson Correlation	.343**	.242	.686**	.486**	.697**
		Sig. (2-tailed)	.007	.060	.000	.000	.000
		N	61	61	61	61	61
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

4.6 Regression Analysis

Regression analysis was done to examine the relationship between independent and dependent variables and F statistic was used when deciding to accept or reject the null hypothesis.

4.6.1 Clear Objectives and Scope of Work

As shown in Table 4.11, the F value of 26.556 is significant at the 0.000 level. Therefore, the null hypothesis H_{10} is rejected and the alternate hypothesis H_{1a} is substantiated.

Table 4.10: Model Summary of Clear Objectives and Scope of Work

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.522[a]	.272	.262	.61478

a. Predictors: (Constant), Clear objectives and Scope of work

Table 4.11: ANOVA of Clear Objectives and Scope of Work

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.037	1	10.037	26.556	.000[b]
	Residual	26.835	71	.378		
	Total	36.872	72			

a. Dependent Variable: Project Completion within the planned timeline

b. Predictors: (Constant), Clear objectives and Scope of work

Table 4.12: Coefficients of Clear Objectives and Scope of Work

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.095	.191		10.966	.000
	Clear objectives and Scope of work	.402	.078	.522	5.153	.000

a. Dependent Variable: Project Completion within the planned timeline

4.6.2 Top Management Support

As shown in Table 4.14, the F value of 12.168 is significant at the 0.001 level. Therefore, the null hypothesis H_{20} is rejected and the alternate hypothesis H_{2a} is substantiated.

Table 4.13: Model Summary of Top Management Support

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.382[a]	.146	.134	.66584

a. Predictors: (Constant), Top Management Support

Table 4.14: ANOVA of Top Management Support

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.395	1	5.395	12.168	.001[b]
	Residual	31.477	71	.443		
	Total	36.872	72			

a. Dependent Variable: Project Completion within the planned timeline

b. Predictors: (Constant), Top Management Support

Table 4.15: Coefficients of Top Management Support

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.391	.470		2.962	.004
	Top Management Support	.407	.117	.382	3.488	.001

a. Dependent Variable: Project Completion within the planned timeline

4.6.3 Realistic Project Plan and Estimates

As shown in Table 4.17, the F value of 117.044 is significant at the 0.000 level. Therefore, the null hypothesis H_{30} is rejected and the alternate hypothesis H_{3a} is substantiated.

Table 4.16: Model Summary of Realistic Project Plan and Estimates

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789[a]	.622	.617	.44281

a. Predictors: (Constant), Realistic Project Plan and Estimates

Table 4.17: ANOVA of Realistic Project Plan and Estimates

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	22.950	1	22.950	117.044	.000[b]
	Residual	13.922	71	.196		
	Total	36.872	72			

a. Dependent Variable: Project Completion within the planned timeline

b. Predictors: (Constant), Realistic Project Plan and Estimates

Table 4.18: Coefficients of Realistic Project Plan and Estimates

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.258	.170		7.408	.000
	Realistic Project Plan and Estimates	.666	.062	.789	10.819	.000

a. Dependent Variable: Project Completion within the planned timeline

4.6.4 Aptitude of Project Manager

As shown in Table 4.20, the F value of 62.579 is significant at the 0.000 level. Therefore, the null hypothesis H_{40} is rejected and the alternate hypothesis H_{4a} is substantiated.

Table 4.19: Model Summary of Aptitude of Project Manager

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.684[a]	.468	.461	.52538

a. Predictors: (Constant), Aptitude of Project Manager

Table 4.20: ANOVA of Aptitude of Project Manager

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.274	1	17.274	62.579	.000[b]
	Residual	19.598	71	.276		
	Total	36.872	72			

a. Dependent Variable: Project Completion within the planned timeline

b. Predictors: (Constant), Aptitude of Project Manager

Table 4.21: Coefficients of Aptitude of Project Manager

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.123	.370		.332	.741
	Aptitude of Project Manager	.819	.104	.684	7.911	.000

a. Dependent Variable: Project Completion within the planned timeline

4.6.5 Team Collaboration

As shown in Table 4.23, the F value of 144.398 is significant at the 0.000 level. Therefore, the null hypothesis H_{50} is rejected and the alternate hypothesis H_{5a} is substantiated.

Table 4.22: Model Summary of Team Collaboration

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819[a]	.670	.666	.41374

a. Predictors: (Constant), Team Collaboration

Table 4.23: ANOVA of Team Collaboration

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	24.718	1	24.718	144.398	.000[b]
	Residual	12.154	71	.171		
	Total	36.872	72			

a. Dependent Variable: Project Completion within the planned timeline

b. Predictors: (Constant), Team Collaboration

Table 4.24: Coefficients of Team Collaboration

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.048	.170		6.165	.000
	Team Collaboration	.676	.056	.819	12.017	.000

a. Dependent Variable: Project Completion within the planned timeline

4.7 Data Analysis Summary

The summary of data analysis for identified five factors as follows:

Table 4.25: Summary of Data Analysis

Factor	CAC	Mean	Std. Dev	V	R	R^2	F	Sig
Clear Objectives and Scope of Work	0.817	2.270	0.929	0.864	0.522	0.272	26.556	0.000
Top Management Support	0.791	3.972	0.673	0.453	0.382	0.146	12.168	0.001
Realistic Project Plan and Estimates	0.854	2.404	0.884	0.782	0.789	0.622	117.044	0.000
Aptitude of Project Manager	0.729	3.522	0.598	0.358	0.684	0.468	62.579	0.000
Team Collaboration	0.890	2.896	0.866	0.751	**0.819**	0.670	**144.398**	0.000

As summarized in Table 4.25, it can be concluded that the five factors considered as independent variables and used in the development of a theoretical framework for the study of the identified research problem are positively correlated with the dependent variable. Moreover, it can be stated that from the five hypotheses derived in order to find answers for the research question, all null hypotheses are rejected and all alternate hypotheses are substantiated. Further, based on the F value comparison it was identified that Team Collaboration as the most critical factor which impact the ERP project completion within the planned timeline at EnterpriZe.

As the conclusion of data analysis, it can be stated that Clear Objectives and Scope of Work, Top Management Support, Realistic Project Plan and Estimates, Aptitude of Project Manager and Team Collaboration factors play key role in ERP system implementation projects at EnterpriZe and make significant impact on the completion of ERP systems implementation within the planned timeline.

5. RECOMMENDATIONS AND CONCLUSION

This study was conducted to identify the factors which impact the completion of ERP implementation within the planned timeline at EnterpriZe. This chapter is to discuss the findings, to recommend an effective guideline to complete implementation within the planned timeline. Further, this chapter discusses the future research and the conclusion of the study.

5.1 Discussion of Research Findings

According to section 4.2, it has proven that the validity of the research instrument is 100% since the CAC value for all 6 variables are significantly higher than the 0.7 threshold for acceptability. This indicates that all responses were provided with a good understanding of the questions.

Based on the results mentioned in section 4.3.1, it was revealed that the questionnaire was fairly distributed and received responses from a proper sample. Section 4.3.2 illustrated that more than 70% of employees are below the age of 30 years. However, it would be indicative of a lower level of maturity among the employees of EnterpriZe. Experience at current employer's in section 4.3.3 revealed that approximately 60% of employees are new to the organization have less than 3 years' experience working with own products. Remain 40% of the employees have more than 3 years' experience working with company own product and this would be the experienced workforce of EnterpriZe. Since ERP systems functionalities cover a wide domain it is a generally accepted industry norm that it requires at least 3 years to gain expertise with the full spectrum of product functionalities. Therefore, experience at current employer's distribution at EnterpriZe cannot be considered as a favorable scenario for an ERP systems implementation organization. As explained in section 4.3.4, the overall experience of employees revealed that 30% of employees have less than 3 years overall experience which can be considered as having a reasonable fraction of inexperienced employees in the work force. As 44% of employees have 3 to 7 years' experience and 26% of employees have more than 7 years overall experience, it can be stated that the employees of EnterpriZe consists of a significantly well experienced fraction. Further, it was identified that 43 employees have 0 – 3 years' experience at EnterpriZe. Therefore, there is a high probability that all people with 0 to 3 years' overall experience have only worked at EnterpriZe. And also, maximum years of experience employee at EnterpriZe can have is 7 years. Therefore, it can be stated that a majority from 54 employees with 0 – 7 years overall experience has only worked at EnterpriZe. Designation and job role distribution explained in section 4.3.5 revealed that 91% of the sample are individuals who are directly involved with ERP systems implementation activities in their day today work life and remaining 9% of employees involved in implementation activities only when required.

According to section 4.3.6, it was revealed that all the employees are working more than two projects in given period which cannot be accepted as favorable indicator for an ERP systems implementation organization. When considering ERP systems implementation, it is necessary to have a dedicated project team until the completion of an ERP systems implementation. It appears that at EnterpriZe this good practice has not been implemented.

Descriptive Statistics Analysis illustrated in section 4.4 revealed that majority of respondents have the experience of EnterpriZe not clearly defining objectives, scope of work, realistic project plan and estimates for the projects they have worked on. It was also revealed that majority of respondents satisfied with the top management support they are receiving for the projects they are involved in. Further, majority of respondents satisfied with the competencies of project managers they have worked with. Finally, majority of respondents have experienced not having team spirit and collaboration with the project teams they have worked with.

The summary of results explained in section 4.5 as follows. It was revealed that there is a moderately positive correlation value of 0.522 between the independent variable Clear Objectives and Scope of Work and the dependent variable Project Completion within the Planned Timeline where correlation is significant at the 0.01 level. Further, it was exposed that there is a weak positive correlation value of 0.382 between the independent variable Top Management Support and the dependent variable Project Completion within the Planned Timeline where correlation is significant at the 0.01 level. There was a strongly positive correlation value of 0.789 between the independent variable Realistic Project Plan and Estimates and the dependent variable Project Completion within the Planned Timeline where correlation is significant at the 0.01 level. Moreover, it was observed that there is a moderately positive correlation value of 0.684 between the independent variable Aptitude of Project Manager and the dependent variable Project Completion within the Planned Timeline where correlation is significant at the 0.01 level. Finally, the results showed that there is a strongly positive correlation value of 0.819 between the independent variable Team Collaboration and the dependent variable Project Completion within the Planned Timeline where correlation is significant at the 0.01 level. Therefore, it can be stated that all 5 independent variables which were analyzed in this study, have a positive correlation with the dependent variable Project Completion within the Planned Timeline.

ANOVA analysis shown in section 4.6 resulted the F value of 26.556 for the independent variable Clear Objectives and Scope of Work which is significant at the 0.000 level. Therefore, the null hypothesis H_{10} is rejected and the alternate hypothesis H_{1a} is substantiated. The F value of 12.168 for the independent variable Top Management Support which is significant at the 0.001 level revealed that the null hypothesis H_{20} is rejected and the alternate hypothesis H_{2a} is substantiated. The F value of 117.044 for the independent variable Realistic Project Plan and Estimates which is significant at the 0.000 level showed that the null hypothesis H_{30} is rejected and the

alternate hypothesis H_{3a} is substantiated. Further, the F value of 62.579 for the independent variable Aptitude of Project Manager is significant at the 0.000 level. Therefore, the null hypothesis H_{40} is rejected and the alternate hypothesis H_{4a} is substantiated. Further, the F value of 144.398 for the independent variable Team Collaboration which is significant at the 0.000 level revealed that the null hypothesis H_{50} is rejected and the alternate hypothesis H_{5a} is substantiated. Therefore, it was concluded that all the null hypotheses are rejected and all the alternate hypotheses are substantiated in this analysis. Finally, based on the F value comparison shown in Table 4.25, it was identified that Team Collaboration as the most critical factor which impact the ERP project completion within the planned timeline at EnterpriZe.

5.2 Recommendations

Based on the facts which were revealed from the data analysis following recommendations have been made. This recommendation can be used as a guideline for project managers and management at EnterpriZe to complete implementation on time, on budget with agreed scope of work.

Clear Objectives and Scope of Work

According to results attached in Appendix B for question 7 and 9, following guidelines can be recommended. Understand and document the customer vision and project requirements clearly, clearly define the project deliverables and their functionality and get the sign off from all the stakeholders.

Further, based on results for question 8 and 10, following guidelines can be recommended. Advise all the team members to go through the documentation regularly and make them up to date, get the sign off on the amendments made, discourage the scope changes in the planned timeline and if scope change is essential then establish a process for changing scope, define how the changes will be done and responsible personnel for them and revise project plan and budget according to the new scope.

Top Management Support

Following guidelines can be recommended based on the results attached in Appendix B for question 11 and 12. Regular progress meetings should be held with top management and top management should always aware of the latest update on the project status.

And also based on results for question 13, following guideline can be recommended. The resource requirement and funding requirement should be clearly informed to the top management and their approval should be obtained then and there.

Realistic Project Plan and Estimates

According to results attached in Appendix B for question 15,16 and 17, following guidelines can be recommended. Consider expertise advice and past similar projects experience to prepare the project plan, create detailed WBS with the activities, their sequence and the effort required. Always have a buffer time in the project plan to keep the project on track in unforeseen situations.

Further, based on results for question 14, following guideline is made. Use software tools to generate time and cost estimations to avoid human error. Verify the estimations with experienced employees and spend adequate time for estimation.

Aptitude of Project Manager

Following guidelines can be recommended based on the results attached in Appendix B for question 18, 19 and 20. Experienced, responsible and independent personnel should be appointed as project managers. Based on results for question 21 and 23 following guideline can be recommended. The project manager should always maintain a healthy relationship with team members and focus more on their wellbeing.

Moreover, based on results for question 22 and 24, following guideline can be made. Encourage and give opportunities to project managers to improve their communication, negotiation, leadership and problem-solving skills.

Team Collaboration

According to results attached in Appendix B for question 25, 26 and 27, following guidelines can be recommended. Opportunities should be given to team members to take ownership of the project and directly involves in project related decision making. Individual competency and the best-fit to each project objectives should be considered when selecting and qualifying the team members. Outsourcing should be done to deal with the requirement of the specific skills.

Further based on the results discussed in section 4.3.6, following guideline can be recommended. Resource availability should be considered when selecting the project team. It is recommended to have a dedicated team to the completion of ERP systems implementation. Team members should be assigned in to one project at given period.

Based on results for question 28, 29 and 30, following guidelines can be recommended. Frequent team meetings should be held to discuss the project progress to ensure that everyone aligns with the overall goal and the plan. Discuss the latest issues and decide on the best approach to move forward to the next step. Workshops and campaigns should be conducted to improve the team spirit to work together to achieve a common goal by supporting each other.

Based on the analysis discussed in section 4.5.6 and 4.5.7, following guideline is made. Knowledge transferring sessions, training sessions should be held regularly with the expertise to share the experience and business knowledge among all the employees.

Finally, according to results attached in Appendix B for question 31, following guideline can be recommended. Effective performance management system should be introduced to motivate employees to work productively and more focus should be put on compensating experienced employees.

5.3 Research Limitations

Although the research has achieved its objectives, there were some unavoidable limitations. Following are identified as major limitations.

- The research was conducted only on a small size of population.
- Company normal process cannot be disturbed due to the research.
- Some methods and information are protected from researchers' due to confidentiality.
- Company process, methods cannot be published with research.

5.4 Conclusion and Future Research

The research presented in this study has discussed the analysis of the factors which impact the completion of ERP implementation within the planned timeline in the company named EnterpriZe as a case study. This research has been conducted based on the research question, "What factors impacting the completion of ERP systems implementation and how those factors impact on the completion of ERP systems implementation within the planned timeline?" and three objectives were defined to answer the above research question.

The first objective was identifying the factors which impact to delay the project completion within the planned timeline. Clear objectives and scope of work, top management support, realistic project plan and estimates, the aptitude of project manager, and team collaboration have been identified as the critical factors by conducting in depth analysis of literature review, observation and discussions with expertise. Evaluating most significant factors impact for project timeline delays was the second objective. The survey was distributed among the employees of EnterpriZe and Pearson correlation coefficient analysis has been conducted for gathered primary data. It has revealed that all five factors have a positive relationship with the completion of ERP implementation within the planned timeline. Recommending an effective guideline towards project completion within the planned timeline was the major outcome of this study and based on the facts which were revealed from the data analysis, recommendations have been made. These recommendations can be used as a guideline to complete ERP systems implementation projects on time, on budget with agreed scope of work for project managers and management at EnterpriZe.

Suggestions for Future Research

This research study revealed significant information on five factors that impact the project completion within the planned timeline. Still, there are opportunities for further study. Future research can be conducted by narrowing down the current research question. How do Clear Objectives and Scope of Work increase project completion within planned timeline?, Can active Top Management Involvement increase project completion within planned timeline?, How Realistic Project Plan and Estimates help the organization to complete project implementation within planned timeline?, Does Aptitude of Project Manager impact the completion of implementation within the planned timeline?, and Can Team Collaboration boost the completion of implementation within the planned timeline? are sample research questions which can be constructed by narrowing down the current research work.

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APPENDIX A – RESEARCH INSTRUMENT

Study of the factors impacting the completion of ERP Implementation within the planned timeline

This is a survey conducted as a partial fulfillment of my MBA under the University of Moratuwa. The information provided by you will be used only for the academic purpose and will be kept strictly confidential. Thank you very much for your kind cooperation and for investing your valuable time in responding to this questionnaire.

Demographic Analysis

1. My Gender is:
    - Male
    - Female
2. My Age Range is:
    - 20-25 Years
    - 26-30 Years
    - 31-35 Years
    - 36-45 Years
    - More than 45 Years

3. How long have you worked for your current organization?
    - 0-1 years
    - 1-3 years
    - 3-5 years
    - 5-7 years
    - More than 7 years

4. My total experience in current working domain is,
    - 0-3 years
    - 3-7 years
    - 7-10 years
    - 10-15 years
    - More than 15 years

5. My current job designation is,

    _____

6. How many projects are you involved in at this moment?
    - 1 project
    - 2 projects
    - More than 2 projects

The following section contains 29 questions. You are requested to select only one option per question.

1- Strongly Disagree

2- Disagree

3- Neither Disagree nor Agree (Neutral)

4- Agree

5- Strongly Agree

Question	**1**	**2**	**3**	**4**	**5**
Clear Goal and Objectives					
7. Project objectives and scope of work are clearly identified and documented in the planning stage.					
8. The scope of work and requirements are not changed during the project life cycle.					
9. I know all system features of my project/projects will deliver and what customer expects.					
10. All stakeholders have approved the Scope of work and have a clear idea about it.					
Top Management Involvement					
11. Top management directly involves to each project and give their full support and commitment to it.					
12. Top management is always aware of the latest update on the project status.					
13. Top management identifies critical tasks and allocates additional resources when required.					
Realistic Project Plan and Estimates					
14. Software tools are used to generate time and cost estimations.					
15. The realistic project plan is created with a detail Work Breakdown Structure (WBS).					
16. Expertise advice and past similar projects experience is also considered to prepare the project plan.					
17. Buffer time is included in the project plan to keep the project on track in unforeseen situations.					
Aptitude of Project Manager					
18. Project Manager has good overall experience as well as agreeable experience in the similar domain.					

19. Project Manager has authority to make decisions and act independently.					
20. Project Manager solves bottlenecks effectively by identifying their root causes.					
21. Project Manger's priority is scattered around meeting the deadlines while focusing less on the team members' well-being.					
22. Project Manager is an active member when it comes to project execution.					
23. Project Manager is always maintaining a healthy relationship with his team mates.					
24. Project Managers encourage team members to celebrate the small win during project implementation time.					
Team Collaboration					
25. Project team members are given the ownership of the project and directly involves in project related decision making.					
26. Individual competency and the best-fit to each project objectives are considered when selecting and qualifying of team members.					
27. Outsourcing is done to deal with the requirement of the specific skills needed for a project or task.					
28. Frequent team meetings are held to discuss the project progress to ensure that everyone aligns with the overall goal and the plan.					
29. Team members discuss the latest issues and decide on the best approach to move forward to the next step.					
30. All members work together to achieve a common goal by supporting each other without focusing on individual wellbeing.					
31. I enjoy my work because it provides me a wide range of opportunities for my personal growth.					
Project Completion within the Planned Timeline					
32. I believe most of the projects are completed on time, on a budget, and deliver on the agreed scope.					
33. You are forced to work long hours to meet the deadlines of project deliverables.					
34. A realistic budget is allocated to complete on time and without cost overrun.					
35. Scope of project deliverables are validated and appropriate actions are taken immediately to fix the identified deviations.					

APPENDIX B – SUMMARY OF RESPONSES

Question 1. My Gender is

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	15	20.5	20.5	20.5
	Male	58	79.5	79.5	100.0
	Total	73	100.0	100.0	

Question 2. My Age Range is:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25	14	19.2	19.2	19.2
	26-30	38	52.1	52.1	71.2
	31-35	8	11.0	11.0	82.2
	36-45	13	17.8	17.8	100.0
	Total	73	100.0	100.0	

Question 3. How long have you worked for your current employer:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-1 years	21	28.8	28.8	28.8
	1-3 years	22	30.1	30.1	58.9
	3-5 years	16	21.9	21.9	80.8
	5-7 years	14	19.2	19.2	100.0
	Total	73	100.0	100.0	

Question 4. My total experience in current working domain is,

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-3 years	22	30.1	30.1	30.1
	10-15 years	5	6.8	6.8	37.0
	3-7 years	32	43.8	43.8	80.8
	7-10 years	14	19.2	19.2	100.0
	Total	73	100.0	100.0	

Question 5. My current job designation is,

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Application Consultant	17	23.3	23.3	23.3
	Business Development Executive	1	1.4	1.4	24.7
	Business Development Manager	2	2.7	2.7	27.4
	Chief Operational Officer	1	1.4	1.4	28.8
	Database Architect	1	1.4	1.4	30.1
	Delivery Manager	1	1.4	1.4	31.5
	Head of IT	1	1.4	1.4	32.9
	Implementation Support Assistant	4	5.5	5.5	38.4
	Marketing Manager	1	1.4	1.4	39.7
	Project Manager	5	6.8	6.8	46.6
	QA Engineer	7	9.6	9.6	56.2
	QA Manager	1	1.4	1.4	57.5
	Senior Application Consultant	6	8.2	8.2	65.8
	Senior Software Engineer	6	8.2	8.2	74.0
	Software Architect	1	1.4	1.4	75.3
	Software Engineer	18	24.7	24.7	100.0
	Total	73	100.0	100.0	

Question 6. How many projects you are involved in?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More than 2 projects	73	100.0	100.0	100.0

Question 7. Project objectives and scope of work are clearly identified and documented in the planning stage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	22	30.1	30.1	30.1
	2	26	35.6	35.6	65.8
	3	7	9.6	9.6	75.3
	4	15	20.5	20.5	95.9
	5	3	4.1	4.1	100.0
	Total	73	100.0	100.0	

Question 8. The scope of work and requirements are not changed during the project life cycle.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	40	54.8	54.8	54.8
	2	32	43.8	43.8	98.6
	4	1	1.4	1.4	100.0
	Total	73	100.0	100.0	

Question 9. I know all system features of my project/projects will deliver and what customer expects.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	21.9	21.9	21.9
	2	29	39.7	39.7	61.6
	3	3	4.1	4.1	65.8
	4	21	28.8	28.8	94.5
	5	4	5.5	5.5	100.0
	Total	73	100.0	100.0	

Question 10. All stakeholders have approved the Scope of work and have a clear idea about it.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	21.9	21.9	21.9
	2	25	34.2	34.2	56.2
	3	5	6.8	6.8	63.0
	4	18	24.7	24.7	87.7
	5	9	12.3	12.3	100.0
	Total	73	100.0	100.0	

Question 11. Top management directly involves to each project and give their full support and commitment to it.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	5	6.8	6.8	6.8
	3	1	1.4	1.4	8.2
	4	36	49.3	49.3	57.5
	5	31	42.5	42.5	100.0
	Total	73	100.0	100.0	

Question 12. Top management is always aware about latest update of the project status.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	4	5.5	5.5	5.5
	3	1	1.4	1.4	6.8
	4	47	64.4	64.4	71.2
	5	21	28.8	28.8	100.0
	Total	73	100.0	100.0	

Question 13. Top Management identifies critical tasks and allocate additional resources when required.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	1.4	1.4	1.4
	2	8	11.0	11.0	12.3
	3	27	37.0	37.0	49.3
	4	29	39.7	39.7	89.0
	5	8	11.0	11.0	100.0
	Total	73	100.0	100.0	

Question 14. Software tools are used to generate time and cost estimations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	4.1	4.1	4.1
	2	34	46.6	46.6	50.7
	3	18	24.7	24.7	75.3
	4	16	21.9	21.9	97.3
	5	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

Question 15. The realistic project plan is created with a detail Work Breakdown Structure (WBS).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	30	41.1	41.1	41.1
	2	31	42.5	42.5	83.6
	3	1	1.4	1.4	84.9
	4	11	15.1	15.1	100.0
	Total	73	100.0	100.0	

Question 16. Expertise advice and past similar projects experience is also considered to prepare the project plan.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	17.8	17.8	17.8
	2	26	35.6	35.6	53.4
	3	7	9.6	9.6	63.0
	4	25	34.2	34.2	97.3
	5	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

Question 17. Buffer time is included in the project plan to keep the project on track in unforeseen situations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	15	20.5	20.5	20.5
	2	37	50.7	50.7	71.2
	3	7	9.6	9.6	80.8
	4	12	16.4	16.4	97.3
	5	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

Question 18. Project Manager has good overall experience as well as agreeable experience in the similar domain.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.7	2.7	2.7
	2	16	21.9	21.9	24.7
	3	5	6.8	6.8	31.5
	4	43	58.9	58.9	90.4
	5	7	9.6	9.6	100.0
	Total	73	100.0	100.0	

Question 19. Project Manager has authority to make decisions and act independently.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	4.1	4.1	4.1
	2	2	2.7	2.7	6.8
	3	4	5.5	5.5	12.3
	4	31	42.5	42.5	54.8
	5	33	45.2	45.2	100.0
	Total	73	100.0	100.0	

Question 20. Project Manager solves bottlenecks effectively by identifying their root causes.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	9	12.3	12.3	12.3
	2	36	49.3	49.3	61.6
	3	12	16.4	16.4	78.1
	4	13	17.8	17.8	95.9
	5	3	4.1	4.1	100.0
	Total	73	100.0	100.0	

Question 21. Project Manger's priority is scattered around meeting the deadlines while focusing less on the team members' well-being.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	5.5	5.5	5.5
	2	21	28.8	28.8	34.2
	3	15	20.5	20.5	54.8
	4	23	31.5	31.5	86.3
	5	10	13.7	13.7	100.0
	Total	73	100.0	100.0	

Question 22. Project Manager is an active member when it comes to project execution.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	5.5	5.5	5.5
	2	22	30.1	30.1	35.6
	3	10	13.7	13.7	49.3
	4	29	39.7	39.7	89.0
	5	8	11.0	11.0	100.0
	Total	73	100.0	100.0	

Question 23. Project Manager is always maintaining a healthy relationship with his team mates.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	3	4.1	4.1	4.1
	3	7	9.6	9.6	13.7
	4	51	69.9	69.9	83.6
	5	12	16.4	16.4	100.0
	Total	73	100.0	100.0	

Question 24. Project Managers encourage team members to celebrate the small win during project implementation time.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	1.4	1.4	1.4
	2	1	1.4	1.4	2.7
	3	2	2.7	2.7	5.5
	4	60	82.2	82.2	87.7
	5	9	12.3	12.3	100.0
	Total	73	100.0	100.0	

Question 25. Project team members are given the ownership of the project and directly involves in project related decision making.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.7	2.7	2.7
	2	5	6.8	6.8	9.6
	3	11	15.1	15.1	24.7
	4	45	61.6	61.6	86.3
	5	10	13.7	13.7	100.0
	Total	73	100.0	100.0	

Question 26. Individual competency and the best-fit to each project objectives are considered when selecting and qualifying of team members.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	27	37.0	37.0	37.0
	2	23	31.5	31.5	68.5
	3	2	2.7	2.7	71.2
	4	14	19.2	19.2	90.4
	5	7	9.6	9.6	100.0
	Total	73	100.0	100.0	

Question 27. Outsourcing is done to deal with the requirement of the specific skills needed for a project or task.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	8	11.0	11.0	11.0
	2	38	52.1	52.1	63.0
	3	3	4.1	4.1	67.1
	4	17	23.3	23.3	90.4
	5	7	9.6	9.6	100.0
	Total	73	100.0	100.0	

Question 28. Frequent team meetings are held to discuss the project progress to ensure that everyone aligns with the overall goal and the plan.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	1.4	1.4	1.4
	2	23	31.5	31.5	32.9
	3	2	2.7	2.7	35.6
	4	42	57.5	57.5	93.2
	5	5	6.8	6.8	100.0
	Total	73	100.0	100.0	

Question 29. Team members discuss the latest issues and decide on the best approach to move forward to the next step.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	12	16.4	16.4	16.4
	2	48	65.8	65.8	82.2
	3	1	1.4	1.4	83.6
	4	5	6.8	6.8	90.4
	5	7	9.6	9.6	100.0
	Total	73	100.0	100.0	

Question 30. All members work together to achieve a common goal by supporting each other without focusing on individual wellbeing.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	11	15.1	15.1	15.1
	2	34	46.6	46.6	61.6
	3	16	21.9	21.9	83.6
	4	7	9.6	9.6	93.2
	5	5	6.8	6.8	100.0
	Total	73	100.0	100.0	

Question 31. I enjoy my work because it provides me a wide range of opportunities for my personal growth.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	1.4	1.4	1.4
	2	16	21.9	21.9	23.3
	3	18	24.7	24.7	47.9
	4	30	41.1	41.1	89.0
	5	8	11.0	11.0	100.0
	Total	73	100.0	100.0	

Question 32. I believe most of the projects are completed on time, on a budget, and deliver on the agreed scope.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	17	23.3	23.3	23.3
	2	39	53.4	53.4	76.7
	3	7	9.6	9.6	86.3
	4	8	11.0	11.0	97.3
	5	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

Question 33. You are forced to work long hours to meet the deadlines of project deliverables.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	4	5.5	5.5	5.5
	3	1	1.4	1.4	6.8
	4	44	60.3	60.3	67.1
	5	24	32.9	32.9	100.0
	Total	73	100.0	100.0	

Question 34. A realistic budget is allocated to complete on time and without cost overrun.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	13	17.8	17.8	17.8
	2	35	47.9	47.9	65.8
	3	11	15.1	15.1	80.8
	4	12	16.4	16.4	97.3
	5	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

Question 35. Scope of project deliverables are validated and appropriate actions are taken immediately to fix the identified deviations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.7	2.7	2.7
	2	21	28.8	28.8	31.5
	3	12	16.4	16.4	47.9
	4	31	42.5	42.5	90.4
	5	7	9.6	9.6	100.0
	Total	73	100.0	100.0	