

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE DEPARTMENT OF BUSINESS ADMINISTRATION AND INFORMATION SYSTEMS

ANALYSIS OF CRITICAL SUCCESS FACTORS FOR ENTERPRISE RESOURCE PLANNING PROJECT IMPLEMENTATION: A MIXED-METHOD STUDY AT ETHIO TELECOM

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DECLARATION

The undersigned here announces that this thesis reflects my own work and has not been turned in for a degree to any other university. We thus recognize all the materials taken from various sources.

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CERTIFICATION

This certifies that, this thesis "Analysis of Critical Success Factors of ERP Project Implementation: A Mixed-Method Study at Ethio Telecom" prepared as required for Master of Project Management degree has been original work of ZelalemDesta (GSD/4989/16).

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ACRONYMS

ERP - Enterprise Resource Planning

CSF - Critical Success Factor

RII - Relative Importance Index

IT - Information Technology

IS - Information Systems

PM - Project Management

PMO - Project Management Office

FR - Functional Area Representative

SME - Senior Manager and Executive

CVR - Consultant and Vendor Representative

TOE - Technology-Organization-Environment

BPR - Business Process Reengineering

N - Total population / Number of respondents

N - Sample size / frequency count

ΣW - Sum of Weights

Wi - Weight assigned by respondents

Ni - Number of respondents giving a particular weight

A - Maximum weight (5 on the Likert scale)

Abstract

Enterprise Resource Planning (ERP) systems are essential for organizations seeking to integrate business processes and enhance operational efficiency, yet implementations frequently fail, particularly in developing nations. This study identifies, describes, and ranks the relative importance of critical success factors (CSFs) for ERP deployment at Ethio Telecom using a mixed-methods design integrating quantitative ranking with qualitative triangulation. All 92 members of Ethio Telecom's ERP implementation project team were selected via census sampling, yielding 82 usable responses (89.1% response rate). Data were collected through a structured five-point Likert scale questionnaire, semi-structured interviews with four key informants, and document reviews of internal project evaluation reports. Four CSFs Top Management Support, Teamwork and Collaboration, Capacity Building (Training and Education), and User Involvement and Vendor Support were ranked using the Relative Importance Index (RII). Results revealed a clear hierarchy: Top Management Support (RII = 0.8073, Very High Importance), Teamwork and Collaboration (RII = 0.6707, High Importance), Capacity Building (RII = 0.5268, Moderate Importance), and User Involvement and Vendor Support (RII = 0.2780, Low Importance). One-way ANOVA showed significant perception differences across functional categories for Teamwork and Collaboration (F = 3.42, p = 0.012) and Capacity Building (F = 2.89, p = 0.028). Qualitative findings confirmed quantitative trends, revealing declining executive engagement, structural silos, training budget cuts, and systematic vendor abandonment.

Keywords: Enterprise Resource Planning, Critical Success Factors, Relative Importance Index, ERP Implementation, Ethio Telecom.

CHAPTER ONE: INTRODUCTION

This chapter establishes the foundation for the study by presenting the background, context, and rationale for investigating critical success factors in Enterprise Resource Planning (ERP) implementation at Ethio Telecom. It begins with the broader context of ERP systems in organizational management, followed by specific background on Ethio Telecom as the study setting. The chapter then articulates the problem statement, research objectives and questions, significance, scope, and limitations of the study, and concludes with definitions of key terms. Together, these elements provide the necessary framework for understanding the subsequent literature review, methodology, findings, and recommendations presented in this thesis.

1.1 BACKGROUND OF THE STUDY

Enterprise Resource Planning (ERP) systems are integrated software platforms designed to streamline business processes, enhance data visibility, and improve decision-making across organizational functions (Markus and Tanis, 2000). In the twenty-first century, competitive advantage has increasingly shifted from physical resources to intangible assets such as information technology, making ERP systems essential for organizational integration, efficiency, and productivity (Bekele, 2019). ERP implementation, however, remains a high-risk undertaking. Despite their potential benefits, ERP projects frequently exceed budgets, miss deadlines, and fail to deliver expected returnsparticularly in developing nations where organizational, technological, and environmental conditions differ substantially from industrialized contexts (Garg, 2004; Huang and Palvia, 2001; Fissha, 2024).

The identification and prioritization of Critical Success Factors (CSFs) is essential for improving ERP implementation outcomes. CSFs represent the limited set of areas where satisfactory results ensure successful competitive performance and require constant managerial attention (Rockart, 1979). Research consistently demonstrates that ERP success depends more on organizational and human factors than on technical specifications alone (Finney and Corbett, 2007; Nah et al., 2001). Recent studies in emerging economies confirm that organizational factorstop management support, teamwork, and trainingroutinely outrank technological factors in perceived importance, while vendor

accountability and user empowerment remain particularly weak in practice (Kruja and Bullari, 2024; Fissha, 2024; Saini et al., 2024).

This study examines four CSFs grounded in the Technology-Organization-Environment (TOE) framework (Tornatzky and Fleischer, 1990). Top Management Support provides strategic vision, resource allocation, and organizational legitimacy; without sustained executive engagement, ERP projects lose momentum and encounter resistance (Finney and Corbett, 2007). Teamwork and Collaboration ensures cross-functional integration, accurate requirements gathering, and effective problem-solving; structural silos and communication barriers frequently undermine this factor in developing-country contexts (Fissha, 2024). Capacity Building (Training and Education) develops user competence, reduces resistance, and maintains productivity during transition; yet it is often treated as a cost to minimize rather than a strategic investment (Mabert et al., 2003; Somers and Nelson, 2004). User Involvement and Vendor Support combines end-user participation in system design with external technical expertise; weak vendor accountability systems and limited user empowerment in developing nations make this factor especially vulnerable to failure (Huang and Palvia, 2001; Al-Mudimigh et al., 2000).

Each factor directly influences ERP implementation success through distinct mechanisms. Top management support affects success via resource provision, legitimacy creation, conflict resolution, and vision articulation. Teamwork and collaboration impact requirements accuracy, problem-solving speed, knowledge integration, and change advocacy. Capacity building enhances user competence, reduces resistance, maintains productivity, and ensures full system utilization. User involvement and vendor support jointly determine requirements accuracy, ownership building, usability, technical expertise transfer, and post-implementation sustainability. The interaction of these organizational, technological, and environmental dimensions shapes overall implementation outcomesa relationship this study investigates at Ethio Telecom.

Recent technological developments have introduced new dimensions to ERP implementation. Cloud ERP, now dominant globally, offers lower capital expenditure and faster deployment but faces obstacles in Africa including connectivity limitations and data sovereignty concerns (Acumatica, 2025). AI-enabled ERP integrates machine learning and natural language processing, potentially reducing reliance on traditional consulting models while requiring new forms of user training and involvement (Linthicum, 2025; McKnight, 2025). These evolutions suggest that while core CSFs remain relevant, their operationalization continues to evolve, reinforcing the need for context-specific empirical assessment.

Despite extensive research, significant gaps persist. Most studies focus on manufacturing or private-sector organizations in developed countries, leaving public-sector telecommunications implementations in developing nations understudied (Bekele, 2019; Mesfin, 2015). Previous Ethiopian ERP research has relied on regression-based approaches without ranking factor importance or triangulating findings qualitatively. This study addresses these gaps by providing ranked, context-specific evidence on CSF importance at Ethio Telecom, a state-owned telecommunications operator serving over 70 million customers in Ethiopia.

1.2 BACKGROUND OF THE ORGANIZATION

Established in 1894, Ethio Telecom is the first public telecommunications operator in Africa. Since that year, the technological infrastructure helped Ethiopian society to be more integrated by means of large open wire line systems connecting the capital city with crucial administrative hubs. Following the war with Italy, during which the telecommunication network was destroyed, the nation rebuilt postal, telegraph, and phone services in 1941.

Declared by proclamation No. 131/52 in 1952, the Impirical Board of Telecommunications was founded under complete financial and administrative control over telecommunications services. Charged with both operation and regulation, the Impirical Board grew to be the Ethiopian Telecommunications Authority in 1981. By proclamation No. 49/1996, the government created the Ethiopian Telecommunication Agency (ETA) in 1996; by regulation 10/1996, it created the Ethiopian Telecommunication Corporation (ETC).

To expand fixed line, mobile, and internet services, ETC signed a significant telecommunication infrastructure development project in 2008 with Chinese company ZTE. Signing a management contract with France Telecom for two years (closed in 2012), the company changed its name to Ethio Telecom and restructure in 2010. Serving more than 70 million consumers (Ethio Telecom Annual Report, 2023), Ethio Telecom is a state-owned company currently the only telecom service provider available in Ethiopia.

Ethio Telecom has always improved its internal business processes in order to handle difficulties in the global telecom industry. This paper looks at Enterprise Resource Planning, a crucial reform tool.

1.3 STATEMENT OF THE PROBLEM

ERP implementation is a complex undertaking requiring organizational change management, technological innovation, and coordination among multiple stakeholders including staff, managers, IT

experts, business analysts, consultants, and vendor companies (Kumar et al., 2002; Markus and Tanis, 2000). Unlike conventional system implementations, ERP deployment differs in scale, complexity, organizational impact, user participation, cost, and business impact (Bekele, 2019). Despite these recognized complexities, implementation failures remain prevalent globally, with documented cases of budget overruns, schedule delays, and benefit shortfalls (Chen, 2001; Farmer et al., 2001).

Ethio Telecom initiated ERP implementation in 2012, executing the project phase-by-phase with full ERP interface completion by 2017. Internal evaluation reports from 2018conducted one year post go-live when operational challenges had become visibledocumented that the project exceeded budget, was delayed beyond schedule, and performed below expectations (Ethio Telecom, 2018). More recent annual reports (2021/2022, 2022/2023) confirm persistent challenges including inadequate software fit with existing business processes, erroneous system specifications, lack of sustained priority from business leadership, and insufficient resource allocation to the implementation team (Ethio Telecom, 2022, 2023).

These documented shortcomings indicate that despite significant investment and initial executive commitment, the ERP implementation at Ethio Telecom failed to realize its full potential.
These implementation problems directly correspond to the four critical success factors examined in this study. Inadequate software fit and erroneous specifications reflect deficiencies in User Involvement and Vendor Support, where insufficient user participation in requirements gathering and premature vendor departure compromised system alignment with business needs. Lack of sustained priority from business leadership indicates weakening Top Management Support beyond initial project launch. Insufficient resources for the implementation team and inadequate training demonstrate failures in Capacity Building. Structural silos and cross-departmental coordination breakdowns, documented in internal project reviews, reveal limitations in Teamwork and Collaboration. These linkages suggest that the observed implementation shortfalls were not random technical failures but systematically rooted in the inadequate management of identifiable critical success factors.

Empirical studies in comparable contexts corroborate these challenges. In Ethiopian public-sector organizations, Fissha (2024) found that weak vendor accountability, insufficient user training, and excessive reliance on top management directives characterize ERP implementation failures. In Kenya, Otieno (2010) identified insufficient top management commitment, poor vendor support, and inadequate training as primary failure causes. Research in Ghana (Samuel et al., 2013) and Egypt (Abdelghaffar, 2012) similarly confirmed that top management support, user involvement, and training are critical, while vendor support is frequently deficient in developing-country implementations. These studies demonstrate that the challenges observed at Ethio Telecom are not unique but reflect systemic patterns in developing-nation ERP deployment.

Despite these recognized challenges, existing research presents significant gaps. First, there is limited empirical evidence on ERP implementation in Ethiopian public-sector telecommunications organizations, with most studies focusing on manufacturing or private-sector firms (Bekele, 2019; Mesfin, 2015). Second, prior studies at Ethio Telecom and similar organizations have relied primarily on regression-based explanatory designs that identify relationships between variables but do not rank their relative importance for resource allocation decisions (Bekele, 2019). Third, previous Ethiopian ERP studies lack qualitative triangulation, leaving quantitative findings without contextual depth and explanatory validation. Fourth, the passage of time since Ethio Telecom's implementation (2012–2017) enables a more mature retrospective assessment than was possible in immediate post-implementation studies, yet no research has exploited this temporal advantage for critical evaluation. Fifth, the predominance of developed-country CSF frameworks (Nah and Delgado, 2006) limits their applicability to Ethiopian public-sector contexts characterized by centralized decision-making, bureaucratic procurement, and limited vendor accountability.

These gaps necessitate a mixed-methods study that integrates quantitative ranking of CSF importance with qualitative triangulation, applied to a mature retrospective assessment of ERP implementation at Ethio Telecom. By determining the relative importance ranking of critical success factors from the perspective of implementation team members, this study provides evidence-based prioritization for future resource allocation and strategic planning.

1.4 RESEARCH OBJECTIVES

1.4.1 General Objective

The general objective of this study is to analyze and rank the relative importance of critical success factors for Enterprise Resource Planning project implementation at Ethio Telecom.

1.4.2 Specific Objectives

- To identify and describe the role of top management support in enterprise resource planning implementation success at Ethio Telecom.
- To identify and describe the role of teamwork and collaboration in enterprise resource planning implementation success at Ethio Telecom.
- To identify and describe the role of capacity building in enterprise resource planning implementation success at Ethio Telecom.

- To identify and describe the role of user involvement in enterprise resource planning implementation success at Ethio Telecom.
- To identify and describe the role of vendor support in enterprise resource planning implementation success at Ethio Telecom.
- To assess and rank the relative importance of the identified critical success factors using the Relative Importance Index (RII).
- To compare perceptions of critical success factors across different functional categories of respondents using inferential statistical analysis.

1.5 RESEARCH QUESTIONS

1. What is the role of top management support in enterprise resource planning implementation success at Ethio Telecom?
2. What is the role of teamwork and collaboration in enterprise resource planning implementation success at Ethio Telecom?
3. What is the role of capacity building in enterprise resource planning implementation success at Ethio Telecom?
4. What are the roles of user involvement and vendor support Combined in enterprise resource planning implementation at Ethio Telecom?
5. What is the relative importance ranking of the identified critical success factors for ERP implementation success at Ethio Telecom?
6. Are there significant differences in the perception of critical success factors across different functional categories of respondents?

1.6 SIGNIFICANCE OF THE STUDY

ERP systems must be implemented successfully if we are to guarantee that funds spent are not wasted. Although using an ERP system is costly and time-consuming, businesses must guarantee correct application of the implementation technique. Particularly in the telecom industry, the results of this study will assist businesses intending to install ERP systems by offering in-depth analysis of elements influencing ERP implementation.

By inspiring other businesses to use ERP systems and raising awareness of the need of critical success factors that demand particular attention from management and project managers for effective implementation, the study helps to diffuse technologies. The results are significant for academics and professionals since they provide both theoretical and pragmatic understanding of important success elements in ERP implementation projects in the telecom industries. Planning and reference for next research in this knowledge field start from the knowledge acquired.

1.7 SCOPE OF THE STUDY

1.7.1 Conceptual Scope

The identification, description, and relative importance ranking of four key success factors for ERP deploymenttop management support, teamwork and collaboration, capacity building (training and education), and user involvement and vendor supportdefines this research. The relationship between these independent variables and the dependent variable of ERP Implementation Success, which is measured through multiple dimensions including project completion inside budget and schedule, system quality, user satisfaction, operational efficiency improvement, decision-making enhancement, and realization of expected benefits, is investigated in this paper. There is no practical component of ERP application covered. The study's information sources consist just of Ethio Telecom managers and staff members involved in ERP implementation projects.

1.7.2 Methodological Scope

The study follows a mixed-methods research approach combining qualitative triangulation with quantitative descriptive analysis. With data examined using descriptive statistics and the Relative Importance Index, the quantitative component uses a structured questionnaire sent to every member of the Ethio Telecom ERP implementation project team. Semi-structured interviews with four key informants and document reviews of internal project evaluation reports and annual reports make up the qualitative element. Comparative views across respondent functional categories are obtained using inferential statistical analysismore especially, one-way ANOVA. The single-organizational case study character of the research means that the methodological scope excludes structural equation modeling, experimental design, or longitudinal data collecting.

1.7.3 Geographic and Time Scope

The geographic scope includes Addis Ababa, more especially the head office of Ethio Telecom and project team members engaged in ERP deployment. With data collecting between January and March 2026, the temporal scope centers on the ERP implementation period from 2012 to 2017. There are several reasons why this retroactive period is justified: enough time has passed to enable critical assessment of the implementation process and its long-term results, so minimizing the possibility of instantaneous post-implementation bias and guaranteeing that participants have enough memory of their experiences. The eight-year interval also helps to evaluate whether first implementation choices have resulted in long-lasting challenges or sustainable gains, so offering a more developed view of the relative relevance of important success elements. But this discrepancy also brings possible memory

degradation related to particular implementation events and possible participant attrition through retirement, resignation, or transfer.

1.8 LIMITATIONS OF THE STUDY

The study only covers one Ethiopian technology company; hence, conclusions cannot be applied to the whole technology sector or service industry. Only four independent variables have been taken into account, excluding business process reengineering and change management as perhaps significant factors. The study mostly relies on questionnaire techniques, thus restrictions of these techniques remain. The sample consists of only project team members of Ethio Telecom working at head office in Addis Ababa. Descriptive in character, the study does not prove cause-and- effect links. Data on an implementation spanning 2012 to 2017 were compiled under retroactive perspective bias in 2026. Later events or changes in organization could have molded respondents' memories. Though the census approach got an 89.1% response rate, the 10 non-respondents could have held methodically different views from the participants. Common method bias is introduced by the reliance on self-report questionnaires; the combination of User Involvement and Vendor Support into a single factor may have hidden different perspectives of these two constructions.

1.9 ORGANIZATION OF THE STUDY

This thesis is organized into five chapters, each building systematically upon the preceding chapter to achieve the research objectives. The structure follows the conventional research thesis format, progressing from problem identification through literature review, methodology, findings, and conclusions. Figure 1.1 presents the chapter flow and logical interconnections.

Chapter One: Introduction. This chapter establishes the foundation for the study by presenting the background and context of ERP systems in organizational management, followed by specific background on Ethio Telecom as the study setting. It articulates the problem statement, research objectives and questions, significance, scope, and limitations of the study, and concludes with definitions of key terms. Together, these elements provide the necessary framework for understanding the subsequent chapters.

Chapter Two: Review of Related Literature. This chapter presents the theoretical foundations, operationalization of constructs, conceptual developments, empirical evidence, and research gaps that inform this study. It establishes the Technology-Organization-Environment (TOE) theoretical framework, reviews ERP concepts and contemporary developments (including cloud ERP and AI-enabled ERP), examines the four critical success factors in depth, synthesizes empirical studies from diverse contexts, articulates the research gap, and presents the conceptual framework guiding this research.

Chapter Three: Research Design and Methodology. This chapter details the convergent parallel mixed-methods approach, population and sampling techniques, data collection instruments (structured questionnaire, semi-structured interviews, document review), data analysis methods (multiple regression, Relative Importance Index, ANOVA, Kruskal-Wallis, thematic analysis), and validity, reliability, and ethical considerations.

Chapter Four: Results and Discussion. This chapter presents quantitative findings from the RII analysis, regression, and cross-category comparisons; qualitative findings from interviews and document reviews; integration of quantitative and qualitative findings through joint display analysis; and discussion in relation to previous studies and the TOE framework.

Chapter Five: Summary of Findings, Conclusion and Recommendations. This chapter summarizes the main findings, derives conclusions, offers evidence-based recommendations for Ethio Telecom and similar organizations, proposes directions for future research, acknowledges limitations, and articulates the study's contribution to knowledge

1.10 DEFINITION OF KEY TERMS

Driven by a suite of software modules supporting basic internal business processes, enterprise resource planning (ERP) is a cross-functional enterprise system that allows integration of transaction-oriented data across organizational units (Markus and Tanis, 2000).

Critical Success Factors (CSFs):Representing the limited number of areas in which satisfactory results will ensure successful competitive performance, an area of activity that should be given constant and careful attention to bring about the successful implementation of a project or system is the critical success factor (CSF).

Project: A temporary effort with defined beginning and ending dates, specific objectives, and allocated resources to produce a distinctive good, service, or result (PMBOK Guide, 2017).

Project implementation is the process by which proposed activities are realized from project inputs to outputs; it is the mechanism by which project inputs become outputs; hence, actual implementation of proposed activities.

Vendor: A person or company providing goods or services for sale; in ERP terms, a software provider or implementation consultant.

Relative Importance Index (RII): Calculated as the total of weighted responses divided by the product of maximum weight and total number of respondents, the relative importance index (RII) is a statistical technique used to rank elements according to respondent-perceived importance (Omar and Arokiasamy, 2010).

Technology-Organization-Environment (TOE) Framework: Three elements of a firm's context that affect the acceptance and application of technological innovationstechnical context, organizational context, and environmental contextare identified theoretically by the Technology-Organization-Environment (TOE) Framework (Tornatzky and Fleischer, 1990).

Business Process Reengineering (BPR): The basic reevaluation and radical redesign of corporate processes to attain notable increases in important benchmarks of performance (Bhatti, 2005).

Capacity Building: Knowledge, skills, and competencies are methodically developed among staff members and stakeholders to support efficient use of ERP systems and adaptation to new organizational processes.

User Involvement: Active involvement of end users in requirements collecting, system design, testing, and feedback provision during ERP deployment.

Vendor Support: Technical help, knowledge sharing, documentation, and post-implementation support given by ERP software consultants and vendors.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This chapter presents the theoretical foundations, operationalization of constructs, conceptual developments, empirical evidence, and research gaps that inform this study. The chapter is structured to follow a logical progression from theory to measurement, from conceptual understanding to empirical validation, and from identified gaps to the conceptual framework guiding this research. Section 2.2 establishes the theoretical framework anchored in the Technology-Organization-Environment (TOE) framework and the multidimensional conceptualization of ERP implementation success. Section 2.3 operationalizes the key constructs by defining how each critical success factor and the dependent variable are measured in this study. Section 2.4 reviews the conceptual foundations of Enterprise Resource Planning and its contemporary developments, including cloud ERP, AI-enabled ERP, and the broader digital transformation context. Section 2.5 examines the ERP implementation process, project management considerations, and business process reengineering. Section 2.6 provides a comprehensive critical success factors review grounded in the literature. Section 2.7 synthesizes empirical studies from diverse contexts. Section 2.8 articulates the research gap, and Section 2.9 presents the conceptual framework of the study.

2.2 THEORETICAL FRAMEWORK

2.2.1 Technology-Organization-Environment (TOE) Framework

The theoretical foundation of this study rests upon Tornatzky and Fleischer's (1990) Technology-Organization-Environment (TOE) framework, which posits that technological innovation adoption and implementation within organizations are shaped by three interrelated contextual domains: the technological context, the organizational context, and the environmental context. The technological context encompasses both existing internal technologies and new technologies available in the marketplace that are relevant to the firm. In the ERP implementation domain, this includes the technical infrastructure of the adopting organization, the capabilities and reliability of the ERP vendor, the functional fit between the ERP system and organizational requirements, and the compatibility of the new system with legacy technologies. The organizational context refers to the characteristics and resources of the firm, including firm size, degree of centralization, formalization, complexity, quality of human resources, and the availability of slack resources. For this study, the organizational context encompasses top management support, teamwork and collaboration, and capacity building through training and education. The environmental context captures the external conditions in which the firm operates, including competitive dynamics, regulatory pressures, industry structure, and the broader institutional environment. In this study, vendor support and the external technological assistance ecosystem are positioned within the environmental context, while user involvementthough behavioral in nature reflects the participatory dimension of organizational readiness and is therefore situated within the organizational context as well.

The TOE framework has been extensively validated in ERP implementation research and provides a robust theoretical lens for understanding how multiple factors interact to shape implementation outcomes (Zhu et al., 2006; Pan et al., 2008). Its particular suitability for this

study stems from its capacity to simultaneously analyze internal organizational elements and external environmental dependencies within a single coherent structure. This integrative capability is essential for understanding ERP implementation in developing nation environments, where external dependencies particularly vendor support and institutional constraints often determine the difference between success and failure. The framework enables this study to position each critical success factor within its appropriate contextual domain, thereby providing a theoretically grounded basis for the subsequent descriptive analysis and relative importance ranking.

2.2.2 ERP Implementation Success: Conceptualization and Measurement

Defining and measuring ERP implementation success presents considerable conceptual and methodological challenges because success is inherently multidimensional and perspective-dependent (Markus and Tanis, 2000; Harwood, 2003). Project managers typically define success as completion within budget, schedule, and quality parameters, while end-users emphasize seamless transition, business process improvements, and enhanced decision support capabilities. Business executives, in turn, prioritize return on investment, strategic alignment, and competitive advantage realization. This multiplicity of perspectives necessitates a comprehensive measurement strategy that captures the full spectrum of implementation outcomes.

Markus and Tanis (2000) proposed a portfolio approach that distinguishes three categories of success criteria: project metrics (on-time, on-budget completion), early operational metrics (system stability, user satisfaction, and process functionality), and long-term business results (return on investment, productivity gains, and strategic impact). Sedera et al. (2003) developed a comprehensive ERP success model integrating system quality, information quality, individual impact, and organizational impact dimensions. De Wit (1998) differentiated between project success (achievement of project objectives) and project management success (adherence to cost, time, and quality constraints). Recent scholarship has expanded these frameworks to incorporate continuous optimization metrics, user adoption rates, and real-time performance indicators enabled by modern analytics capabilities (NetSuite, 2022; Rcademy, 2026).

Contemporary ERP success measurement has evolved beyond traditional project completion metrics to encompass a balanced scorecard of Key Performance Indicators (KPIs) that span financial performance, operational efficiency, customer satisfaction, system reliability, and user adoption (CodeRapper, 2025). Financial KPIs include return on investment, total cost of ownership, and cost variance indices. Operational KPIs encompass inventory turnover, order processing time, process automation rates, and on-time delivery performance. System reliability KPIs track uptime, data accuracy, integration success, and API latency. User adoption KPIs measure training completion rates, time-to-proficiency, System Usability Scale scores, and cross-functional adoption rates (NetSuite, 2022; CodeRapper,

2025). This multidimensional measurement approach reflects the recognition that ERP success is not a binary outcome but a continuum of value realization that unfolds over time.

For this study, ERP implementation success is measured through nine dimensions that integrate classical academic frameworks with contemporary KPI approaches: (1) project completion within planned budget, (2) project completion within planned schedule, (3) alignment with business requirements, (4) system quality satisfaction, (5) end-user satisfaction, (6) improvement in operational efficiency, (7) improvement in decision-making capabilities, (8) realization of expected benefits, and (9) overall implementation success. These nine dimensions are operationalized through questionnaire items in Section E of the research instrument (Appendix A), allowing respondents to assess each dimension individually and provide a holistic evaluation. This measurement strategy enables a nuanced assessment of implementation outcomes that captures both process and outcome success facets, aligning with the descriptive nature of this study.

2.3 OPERATIONALIZATION OF CONSTRUCTS

The operationalization of constructs in this study translates abstract theoretical concepts into measurable variables through specific questionnaire items. Table 2.1 presents the operationalization matrix mapping each construct to its theoretical domain, definition, and measurement items.

Table 1 Operationalization Matrix

Construct	TOE Domain	Definition	Items	Scale
Top Management Support	Organizational	The degree to which senior executives provide strategic vision, resource allocation, organizational legitimacy, and sustained engagement throughout the ERP implementation lifecycle	A1–A6 (6 items)	5-point Likert
Teamwork and Collaboration	Organizational	The effectiveness of cross-functional integration, knowledge sharing, conflict resolution, and collective problem-solving among project team members	B1–B5 (5 items)	5-point Likert
Capacity Building (Training and Education)	Organizational	The systematic development of knowledge, skills, and competencies	C1–C4 (4 items)	5-point Likert

		among staff and stakeholders to support effective ERP system utilization and adaptation		
User Involvement	Organizational	The active participation of end-users in requirements gathering, system design, testing, and feedback provision during ERP deployment	D1, D2, D7 (3 items)	5-point Likert
Vendor Support	Technological/Environmental	The technical assistance, knowledge transfer, documentation, and post-implementation support provided by ERP software consultants and vendors	D3–D6, D8, D9 (6 items)	5-point Likert
ERP Implementation Success	Dependent Variable	The multidimensional assessment of project outcomes across budget, schedule, requirements, quality, satisfaction, efficiency, decision-making, benefits, and overall success	E1–E9 (9 items)	5-point Likert

The Relative Importance Index (RII) is employed as the primary analytical technique for ranking critical success factors according to respondent-perceived importance. The formula is computed as $RII = \Sigma(Wi \times Ni) / (A \times N)$, where Wi represents the weight assigned by respondents on the 1–5 Likert scale, Ni is the number of respondents assigning that particular weight, A is the maximum weight (5), and N is the total number of respondents (82). The denominator ($A \times N$) equals 410. The resulting RII values are interpreted using the established scale: 0.80–1.00 (Very High Importance), 0.60–0.79 (High Importance), 0.40–0.59 (Moderate Importance), 0.20–0.39 (Low Importance), and 0.00–0.19 (Very Low Importance).

2.4 ENTERPRISE RESOURCE PLANNING: CONCEPTUAL FOUNDATIONS AND CONTEMPORARY DEVELOPMENT

2.4.1 Definition and Core Concepts

Enterprise Resource Planning (ERP) refers to integrated software platforms designed to streamline business processes, enhance data visibility, and improve decision-making across organizational functions through the integration of transaction-oriented data and embedded business processes (Markus and Tanis, 2000). ERP systems support core internal business processes spanning finance, human resources, supply chain management, manufacturing, sales, and customer service, providing cross-organizational integration through standardized data structures and unified process workflows. These systems can be customized to specific organizational needs within reasonable limitations, though excessive customization often undermines the very standardization benefits that justify ERP investment (Esteves and Pastor, 1999). Beyond internal integration, extended ERP systems sometimes termed ERP IIcreate networked value chains by connecting organizational systems with those of business partners, suppliers, and customers, thereby enabling collaborative operational and financial processes across organizational boundaries (Bond et al., 2000). ERP serves as the foundational framework for corporate knowledge systems, transforming fragmented functional data into coherent enterprise-wide intelligence that supports strategic planning, operational control, and tactical decision-making at multiple management levels.

2.4.2 Historical Evolution and Modern Trends

The evolution of ERP systems can be traced through several distinct generational phases. The 1960s witnessed the emergence of software packages primarily designed for inventory control based on conventional computing paradigms. The 1970s marked the transition to Material Requirements Planning (MRP) systems, which converted master production schedules into time-phased net requirements for components, raw materials, and sub-assemblies. MRP-II emerged in the 1980s as an extension incorporating shop floor control and distribution management capabilities. The early 1990s saw MRP-II expand to encompass engineering, finance, human resources, and project management functions, giving rise to the term Enterprise Resource Planning (Shankarnarayanan, 1999). Since the 1990s, ERP systems have evolved through multiple generations: Extended ERP (ERP II) with supply chain management capabilities emerged in the 2000s; mobile ERP and social ERP enabling smartphone access and social media integration characterized the 2010s; and the current decade has witnessed fundamental architectural transformations driven by cloud computing, artificial intelligence, and sustainability imperatives.

2.4.3 Cloud ERP and AI-Enabled ERP in the Digital Transformation Era

The contemporary ERP landscape is being fundamentally reshaped by three converging forces: cloud computing, artificial intelligence, and digital transformation imperatives. Cloud ERP represents a paradigm shift from traditional on-premise licensing to Software-as-a-Service (SaaS) delivery models, offering lower capital expenditure, faster deployment timelines, automatic updates, and enhanced scalability. The global Cloud ERP market is projected to reach USD 33.55 billion by 2025, with public cloud deployment dominating due to multitenant architecture delivering the lowest cost and fastest provisioning (Market Research Future, 2023). In Africa, cloud adoption is accelerating, with South Africa leading regional adoption driven by financial services modernization and public-sector digitization

initiatives. However, developing-country contexts face distinctive obstacles including unreliable connectivity infrastructure, data sovereignty concerns, regulatory compliance challenges, and limited local technical expertise (Market Research Future, 2023; SAP Africa, 2024). As the national telecommunications provider, Ethio Telecom possesses superior network infrastructure that could theoretically enable cloud ERP deployment, yet institutional resistance, legacy system dependencies, and bureaucratic procurement processes may impede adoption.

Artificial Intelligence is transforming ERP from passive transaction-processing systems into dynamic intelligence hubs capable of predictive analytics, autonomous decision-making, and natural language interaction. By 2026, intelligent finance modules within SAP ERP operate with near-autonomous closing cycles, dramatically reducing human intervention in routine accounting processes (Intelliswat, 2025). Agentic automation enables ERP systems to react instantly to supply chain deviations shortages, delays, or demand spikeswithout waiting for human approval, while predictive maintenance capabilities reduce manufacturing downtime by up to 40% (Intelliswat, 2025; Versa Cloud ERP, 2026). Natural language processing interfaces allow non-technical users to access ERP insights through conversational queries rather than complex menu navigation, democratizing data access across organizational hierarchies. AI-driven customization enables rapid deployment of industry-specific capabilities at scale, reducing dependence on traditional consulting models while requiring new forms of user training and AI literacy (Versa Cloud ERP, 2026). The global AI in ERP market is expected to reach USD 58.7 billion by 2035, growing at a compound annual growth rate of 26% from a 2025 base of approximately USD 5.82 billion (Precedence Research, 2025).

These technological developments carry significant implications for critical success factors. While top management support and teamwork remain essential, the nature of vendor support is evolving as AI reduces reliance on conventional consulting engagements. Training and education must now encompass AI literacy alongside traditional system operation competencies. User involvement is shifting from requirements specification to validation of AI-generated recommendations and interaction with natural language interfaces. Cybersecurity requirements have intensified, with automated threat detection, identity and access management, and real-time monitoring becoming integral components of modern ERP systems (DeMotte Kramer, 2025). Furthermore, sustainability integration has emerged as a distinctive feature of contemporary ERP, with new disclosure regimesincluding the EU's Corporate Sustainability Reporting Directive requiring auditable environmental data that ERP systems must capture and report (Market Research Future, 2023). These evolutions suggest that while core critical success factors retain their relevance, their operationalization continues to evolve, reinforcing the need for context-specific empirical assessment.

2.4.4 ERP Functional Modules and Strategic Benefits

ERP functional capabilities are organized into modular architectures that enable organizations to select only those components serving immediate needs while preserving expansion pathways. Core modules typically include financial management, human capital management, supply chain management, customer relationship management, manufacturing operations, and project management. The benefits of ERP implementation have been

categorized into operational benefits (process efficiency, cost reduction, data visibility), managerial benefits (improved decision-making, better resource allocation), strategic benefits (competitive positioning, market responsiveness), IT infrastructure benefits (standardized platforms, reduced maintenance), and organizational benefits (improved communication, knowledge sharing) (Shang and Seddon, 2000; Ross and Vitale, 1998). Research on the long-term financial performance effects of ERP adoption has yielded mixed results, with some studies estimating that half of ERP systems fail to deliver expected benefits while others document significant improvements in supplier and customer satisfaction, productivity, and operational efficiency (Appleton, 1997; Al-Mashari, 2000; Themistocleous et al., 2001). Davenport (2000) observed that different benefit types emerge at different temporal stages, with transaction processing improvements preceding managerial and strategic benefits.

2.4.5 Implementation Costs and Investment Considerations

ERP deployment requires substantial investments that vary considerably based on organizational size, industry complexity, and module selection. Cost categories include software licenses (typically based on user counts and annual subscription rates), consulting fees for implementation expertise, project team member time diverted from regular duties, comprehensive employee training, and productivity losses during the transition period (Uvenge et al., 2003). Cloud ERP models have introduced subscription-based pricing that reduces upfront capital expenditure but generates ongoing operational costs that must be incorporated into total cost of ownership calculations. For mid-sized enterprises, typical ERP total cost of ownership falls between USD 150,000 and USD 750,000 over five years, though cloud-based systems can reduce this by up to 40% due to eliminated hardware requirements and faster update cycles (CodeRapper, 2025). These cost considerations underscore the importance of the critical success factors examined in this study, as inadequate attention to organizational and human factors frequently transforms anticipated returns into realized losses.

2.5 ERP implementation process project management and bussines process reengineering

2.5.1 Implementation Phases and Life Cycle

ERP systems address multiple facets of organizational information requirements through their business-oriented design, technically classifying them as Commercial Off-The-Shelf (COTS) products. Understanding implementation strategies and contributing factors supports more effective deployment approaches, consistent with Ginzberg's (1979) assertion that superior implementation management increases success probabilities. Nyagah (2006) identified six lifecycle phases: adoption (managerial decision to implement), acquisition (vendor selection and contractual agreements), implementation (customization and adaptation with consultant support), use and maintenance (operational deployment with corrections and improvements), evolution (incorporation of additional features and external collaboration), and retirement (replacement when current systems become inadequate). Wallace and Kremzar (2001) proposed four analytical perspectives for examining these phases: the product perspective (functioning and technical aspects), the process perspective (core capabilities and decision-making), the people perspective (skills, roles, and organizational adaptation), and the change management perspective (ensuring appropriate outcomes, time horizons, and costs).

2.5.2 Project Management in ERP Context

Effective project management encompasses the initial phases of the ERP lifecycle and must address the structural, technological, and scale complexities inherent in enterprise system deployment. Teams should be organized around milestones, critical paths, schedules, and timely decision-making, with clearly defined and limited scope since ambitious or broad scope frequently causes problems in naturally complex ERP projects (Somers and Nelson, 2004). Project management in developing nation contexts faces additional challenges including limited local expertise, reliance on foreign consultants, currency fluctuation risk, and bureaucratic approval procedures (Fissha, 2024). These challenges amplify the importance of top management support for rapid decision-making and resource allocation while rendering projects particularly vulnerable to vendor support deficiencies.

2.5.3 Business Process Reengineering

Customization and business process reengineering are essential components of ERP implementation, as ERP adoption compels organizations to evaluate their processes against system best practices (Francoise et al., 2009). Business process reengineering involves the fundamental reevaluation and radical redesign of organizational processes to achieve dramatic improvements in critical performance indicators (Bhatti, 2005). This encompasses job redesign, alignment with new systems, process adoption, new standards establishment, and skill development (Dezdar and Sulaiman, 2009). Business process reengineering presents particular challenges in developing nations where existing systems often reflect institutional constraintsincluding regulatory requirements, labor practices, and cultural normsthat conflict with ERP best practices embedded in the software (Huang and Palvia, 2001). This tension between standardization and localization generates implementation difficulties that require careful management and may contribute to the high failure rates observed in these environments.

2.6 critical success factors in ERP implementation

This section examines four critical success factors grounded in comprehensive literature review and particularly relevant to the Ethiopian telecommunications context. Each factor is analyzed in relation to its theoretical foundation, mechanisms of influence, and connections to ERP implementation success.

2.6.1 Top Management Support

Top management commitment and support represent the most frequently cited and consistently validated critical success factor in ERP implementation research (Finney and Corbett, 2007). Effective ERP implementation requires active and sustained executive engagement across all organizational levels. Assigning ERP implementation responsibility exclusively to technical departments constitutes a fundamental strategic error, as the participation of top management signals proactive organizational commitment to technology-

enabled transformation (Harrison, 2004). Theoretically, top management support influences ERP success through four primary mechanisms: resource provision (financial, human, and technological), legitimacy creation (signaling strategic importance to the organization), conflict resolution (breaking deadlock between departments), and vision articulation (providing clear direction for the implementation). Motwani, Madan, and Gunasekaran (2002) advised that top management should not merely be active but should anticipate problems requiring ERP system knowledge and application strategies. Yusuf and Gunasekaran (2004) emphasized that commitment must be expressed through appropriate resource allocation, knowledge acquisition on strategic planning, leadership, and technical expertise. Top management support assumes heightened importance in developing nations where centralized organizational systems mean that most resource allocation and decision-making depend upon executive approval (Sarker and Lee, 2000). Without consistent executive engagement, ERP projects in these environments become vulnerable to budget cuts, scope restrictions, and priority shifts that derail implementation timelines and compromise outcomes.

2.6.2 Teamwork and Collaboration

A strong, capable core team of committed staff members is essential, particularly during the initial implementation phases (Cliffe, 1999). This team leverages its collective expertise to oversee preparation phases and ensure comprehensive requirements capture. Smaller task forces of talented workers often succeed more effectively because they seek direction when issues arise, ensuring appropriate guidance while expanding organizational knowledge (Balakrishnan, 2009). Strong team competency requires knowledge of both technical elements and business processes, complemented by outstanding project leadership (Dezdar and Ainin, 2011). Team members should be drawn from cross-functional backgrounds to ensure comprehensive perspective integration (Shaul and Tauber, 2013). Somers and Nelson (2001) defined the project champion as maintaining the change advocacy role throughout the project lifecycle while possessing holistic organizational understanding. Teamwork influences ERP success through knowledge integration (combining technical and functional expertise), problem-solving capacity (addressing implementation challenges cooperatively), requirements accuracy (ensuring comprehensive capture of business needs), and change advocacy (building organizational support for the new system). However, structural silos, communication barriers, and conflicting departmental interests frequently compromise teamwork effectiveness in developing-country contexts (Fissha, 2024).

2.6.3 Training and Education (Capacity Building)

Training and education constitute foundational elements of ERP implementation success, as ERP problems frequently stem from inadequate user preparation and misunderstanding of enterprise application capabilities (Somers and Nelson, 2004). ERP systems require substantial knowledge to operate effectively, and users lacking system awareness often develop informal workarounds that undermine system integrity (Umble et al., 2003). Training should commence before project initiation, as the planning of training programs and educational initiatives significantly affects their ultimate success (Mabert et al., 2003). Since executives sometimes underestimate necessary training levels and associated costs, top management involvement is particularly crucial for securing adequate training

budgets. Training promotes user acceptance and positive attitudes toward system adoption (Finney and Corbett, 2007). While resources should be allocated across multiple implementation activities, initial education should receive priority from project inception (Nah et al., 2007). Capacity building assumes particular significance in developing nations where users and technical staff frequently lack familiarity with integrated business systems (Fissha, 2024). However, training is often treated as a cost to be minimized rather than a strategic investment, resulting in insufficient duration, inadequate depth, and poor timing. Capacity building influences success through user competence development, resistance reduction, productivity maintenance during transition, and ensuring full system utilization.

2.6.4 User Involvement and Vendor Support

User involvement reflects a psychological state of relevance and personal significance that motivates active participation in system design and implementation (Bhatti, 2005). Involvement during development enables the capture of tacit user knowledge, which is especially valuable in teams lacking formal expertise (Francoise et al., 2009). User delegates nominated for cross-functional requirements in process redesign should possess strong understanding of organizational processes to contribute effectively during initial implementation and ongoing optimization. For technical design and implementation expertise, project management teams should consistently include ERP vendors in strategic decision-making (Summer, 1999). Organizations that rely primarily on internal project managers without vendor integration frequently experience implementation difficulties that correlate with failure (Al-Mudimigh et al., 2000). Vendors should demonstrate competence in software configuration, stakeholder communication, participatory engagement, and trust-building (Al-Mashari, 2003). User involvement and vendor support are particularly vulnerable to implementation failure in developing nations where vendor accountability systems are often weak and user empowerment is culturally constrained (Huang and Palvia, 2001; Fissha, 2024). User involvement influences success through requirements accuracy, ownership building, and usability enhancement, while vendor support contributes through technical expertise provision, knowledge transfer, risk mitigation, and system optimization.

2.7 EMPIRICAL LITERATURE REVIEW

2.7.1 Factors Affecting ERP Implementation Success

The empirical literature on ERP critical success factors has expanded considerably, with recent studies offering nuanced insights into factor importance across diverse organizational and national contexts. Bekele (2019) examined ERP implementation at Ethio Telecom using correlation and regression analysis, finding that effective project management, top management support, training and education, vendor support, teamwork and collaboration, user involvement, and business process reengineering all exerted positive and significant effects on implementation success at varying significance levels. Fiona and Santiago (2016) analyzed two companies implementing and upgrading ERP systems using Markus and Tanis's four-phase model, identifying seven critical categories: business plan and vision, change management, communication, ERP team composition and skills, management support and championship, project management, and system analysis and technical implementation.

Recent studies have broadened the evidentiary base considerably. Kruja and Bullari (2024) investigated critical success factors in emerging economies and found that organizational factorstop management support, teamwork, and trainingroutinely outrank technological factors such as vendor support and system quality in perceived importance, even though the latter are frequently deficient in practice. Saini et al. (2024) examined ERP implementation in Indian small and medium enterprises, finding that top management support and user training were the strongest predictors of implementation success, while vendor support was important but less robust. Garg and Chauban (2024) studied ERP implementation in Indian retail and found that people-related factors explained 62.7% of variance in ERP success, with user involvement and training proving especially vital. Chien et al. (2024) investigated team cohesion in Taiwanese SMEs and discovered that implementation outcomes derived from teamwork quality outweighed team size effects. Chatzoglou et al. (2024) found that vendor support, training, and user involvement exert the strongest impact on ERP implementation success in developing countries, proposing a three-step implementation mechanism covering pre-implementation, implementation, and post-implementation phases. Ram and Corkindale (2024) reassessed how "critical" critical success factors actually are, suggesting that the relative importance of factors may shift in the digital era as technological capabilities evolve. Ağaoğlu et al. (2015) and Reitsma et al. (2018) examined user perspectives on critical success factors, finding that data accuracy, system quality, and communication/collaboration rank highest from the user viewpoint, offering an important counterpoint to management-centric assessments.

2.7.2 ERP Implementation in Developing Countries

Research in developing-country contexts reveals distinctive implementation challenges that amplify the importance of certain critical success factors while rendering others particularly vulnerable to failure. Mesfin (2015) documented ERP implementation difficulties in Ethiopia including incompatibility between ERP embedded practices and organizational work practices, high costs from extensive customization, poor project management, failure to realize benefits, unreliable vendors, poor technology knowledge, lack of skills by users and consultants, and system complexity. Fissha (2024) confirmed that Ethiopian public-sector ERP implementation is characterized by weak vendor accountability, insufficient user training, and excessive reliance on top management directives, suggesting that the developing-nation context magnifies the relevance of organizational factors while rendering vendor support especially prone to failure.

Comparative research by Huang and Palvia (2001) revealed that vendor support and top management support assume heightened importance in developing environments compared to developed nations. Otieno (2010) examined ERP implementation in Kenya and identified insufficient top management commitment, poor vendor support, and inadequate training as primary failure causes. Samuel et al. (2013) studied ERP implementation in Ghana and confirmed that top management support, user involvement, and training were critical success factors, while vendor support was frequently insufficient. Abdelghaffar (2012) researched ERP implementation in Egypt and found that technical difficulties were exacerbated by cultural elements including limited user empowerment and resistance to change. Mohamed (2015) examined ERP in Sudan and discovered that weak institutional

frameworks, political instability, and financial constraints generated additional implementation challenges. Njihia and Mvirigi (2014) found that top management support was the strongest predictor of success in Kenyan institutions, while vendor support was the weakest due to insufficient local presence and knowledge transfer. These studies collectively demonstrate that the challenges observed at Ethio Telecom reflect systemic patterns in developing-nation ERP deployment rather than organization-specific anomalies.

2.7.3 ERP Implementation in the Telecommunications Sector

The telecommunications sector presents distinctive challenges for ERP implementation that differentiate it from other industries. Telecommunications operators manage massive customer bases, sophisticated network infrastructure, and real-time service delivery systems that require specialized ERP modules for network inventory management, customer billing integration, and regulatory reporting. Rapid technological change and intense competitive pressure add urgency to effective implementation. In developing nations, state-owned telecommunications companies face compounded difficulties including political intervention in project management, limited autonomy in vendor selection, bureaucratic decision-making, and resource constraints affecting training and change management. As a state-owned monopoly serving more than 70 million customers, Ethio Telecom embodies these challenges. Its ERP implementation must support network operations, customer service, finance, human resources, and supply chain management across a geographically dispersed organization while satisfying regulatory reporting requirements and maintaining service continuity during transition. The limited research on ERP implementation in African telecommunications suggests that general critical success factors interact with sector-specific elementsincluding network complexity, regulatory constraints, and organizational scaleto generate context-specific implementation challenges. This study contributes comprehensive evidence from Ethio Telecom's implementation experience to this understudied domain.

2.8 RESEARCH GAP

Despite the expanding body of ERP implementation research, significant gaps persist that this study addresses. First, there is a dearth of current empirical research on ERP deployment in Ethiopia; most studies concentrate on manufacturing or private-sector organizations rather than state-owned telecommunications companies. Second, prior research has predominantly employed regression-based explanatory designs that identify relationships between variables but do not rank their relative importance for resource allocation decisions. Third, previous Ethiopian ERP studies lack qualitative triangulation, leaving quantitative findings without contextual depth and explanatory validation. Fourth, the identification and prioritization of critical success factors for ERP deployment in developing-nation telecommunications companies remains underexplored. Fifth, limited research has examined the applicability of the Technology-Organization-Environment framework to public-sector telecommunications operations in developing countries. Sixth, the passage of time since Ethio Telecom's implementation (2012–2017) enables a more mature retrospective assessment than was possible in immediate post-implementation studies, yet no research has exploited this temporal advantage for critical evaluation. This study addresses these gaps by employing a mixed-methods design combining quantitative ranking through the Relative Importance Index

with qualitative triangulation via interviews and document reviews, applied specifically to a state-owned telecommunications company in a developing-country environment.

2.9 CONCEPTUAL FRAMEWORK OF THE STUDY

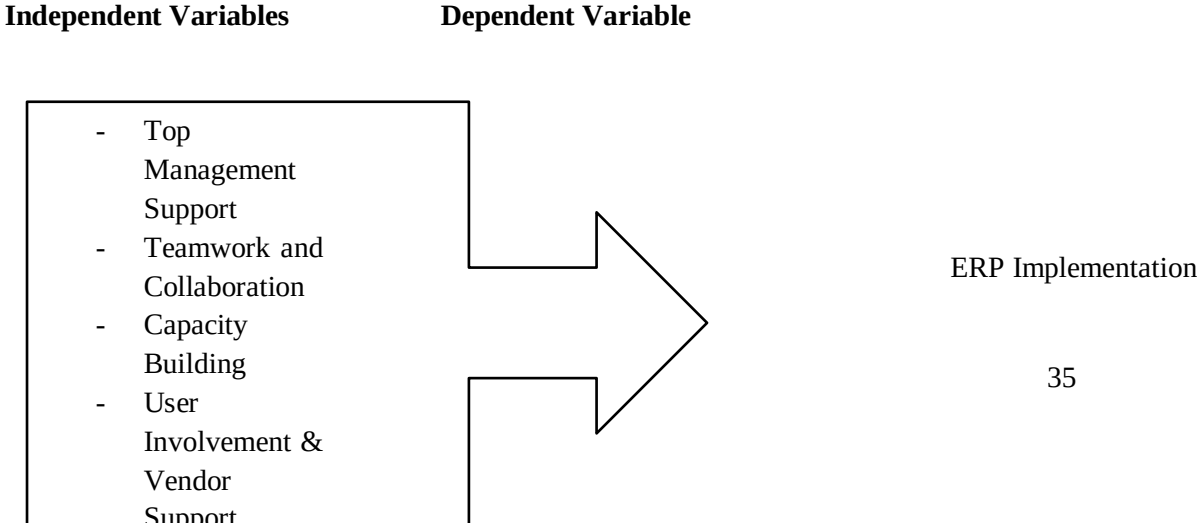
Based on the literature review and adapted from Bekele (2019) and Loonam and McDonagh (2015), the conceptual framework structures the research design and analytical approach. The framework positions four critical success factors as independent variables influencing ERP implementation success as the dependent variable.

The Technology-Organization-Environment framework provides the theoretical architecture for mapping each independent variable to its appropriate contextual domain. Top Management Support, Teamwork and Collaboration, and Capacity Building (Training and Education) are positioned within the organizational context, reflecting internal organizational capabilities and resources. User Involvement is situated within the organizational context as well, representing the behavioral and participatory dimension of organizational readiness. Vendor Support is positioned within the technological and environmental contexts, reflecting external technical assistance and the broader institutional environment in which the organization operates.

ERP Implementation Success is measured through nine dimensions: project completion within planned budget, project completion within planned schedule, alignment with business requirements, system quality satisfaction, end-user satisfaction, improvement in operational efficiency, improvement in decision-making capabilities, realization of expected benefits, and overall implementation success. These dimensions are operationalized through nine questionnaire items (E1-E9) in Section E of the research instrument.

The framework serves an organizing function for descriptive analysis and ranking of factor importance from the perspective of implementation team members, rather than specifying causal relationships. The Relative Importance Index is employed to rank critical success factors according to their perceived importance, while one-way ANOVA examines whether perceptions differ significantly across functional categories of respondents.

Figure 1: Conceptual Framework of the Study



Source: Adapted from Bekele (2019) and Loonam and McDonagh (2015).

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research methodology employed to achieve the study objectives. The study adopts a convergent parallel mixed-methods design in which the quantitative component employs inferential statistical analysis as the primary analytical approach, while the qualitative component provides contextual depth and explanatory triangulation. regression analysis serves as the core quantitative technique to test the effects of critical success factors on ERP implementation success, supplemented by the Relative Importance Index for ranking factor importance and one-way ANOVA for comparing

perceptions across functional categories. Semi-structured interviews and document review constitute the qualitative component, which operates independently during data collection and analysis before integration during interpretation. The chapter details the research philosophy, design, population and sampling strategy, data collection instruments and procedures, data analysis methods, and validity, reliability, and ethical considerations.

3.2 RESEARCH PHILOSOPHY AND DESIGN

3.2.1 Pragmatic Research Philosophy

This study adopts a pragmatic research philosophy, which holds that the research question should determine the methodological approach rather than adherence to a single paradigm (Creswell and Plano Clark, 2017). Pragmatism enables the researcher to combine quantitative and qualitative techniques within a single study, leveraging the strengths of both approaches while mitigating their respective limitations. The pragmatic stance is particularly appropriate for this investigation because the research objectives require both inferential statistical analysis to test the effects of critical success factors on ERP implementation success and qualitative inquiry to provide contextual depth, explanatory validation, and triangulation of quantitative findings. Pragmatism rejects the incommensurability thesis that quantitative and qualitative methods cannot be combined, instead asserting that multiple methods can address different aspects of the same research problem when properly integrated. This philosophical foundation justifies the mixed-methods design employed in this study.

3.2.2 Mixed-Methods Research Design: Convergent Parallel Approach

This study employs a convergent parallel mixed-methods design in which quantitative and qualitative data are collected concurrently, analyzed separately, and then integrated during the interpretation phase (Creswell and Plano Clark, 2017). The quantitative component is inferential in nature, employing regression analysis as the supplementary validation technique to test the effects of critical success factors on ERP implementation success, the Relative Importance Index is the primary ranking technique for ranking factor importance and one-way ANOVA for comparing perceptions across functional categories. The qualitative component utilizes semi-structured interviews with four key informants and document review of internal project evaluation reports to provide contextual depth, explanatory insights, and triangulation of quantitative findings. The convergent parallel approach is appropriate because it allows the quantitative and qualitative components to operate independently during data collection and analysis, reducing the risk that one method biases the other. Integration occurs during the interpretation phase when regression coefficients, RII rankings, and ANOVA results are compared with qualitative themes and document review findings to identify convergence, complementarity, and divergence. This integration demonstrates that findings are robust across multiple data sources, thereby strengthening the overall validity of conclusions.

The quantitative component employs regression analysis as the supplementary validationof inferential technique. regression is appropriate because the study examines the simultaneous effects of four independent variables on a continuous dependent variable, which aligns with the research objectives of not only ranking factors but also determining their relative explanatory power and statistical significance. The qualitative component provides

contextual depth and validation, ensuring that statistical relationships are grounded in lived experience and organizational documentation. This dual approach addresses both the what and how much through inferential statistics and the why and how through qualitative inquiry.

3.3 UNIT OF ANALYSIS

The unit of analysis for this study is the individual ERP project team member from Ethio Telecom who participated in the ERP deployment project during the 2012-2017 implementation period. While the ERP deployment constitutes a single organizational project, the study aggregates data from 82 individual team members directly involved in the implementation process. Each respondent provides their assessment of critical success factor components and implementation success based on their specific project involvement, functional role, and experiential knowledge. This individual-level unit of analysis is appropriate because the study tests relationships between variables across respondents, and with 82 observations and four independent variables, the sample size is adequate for regression analysis. The minimum sample size for reliable regression estimation with four predictors is typically 50 observations, and the recommended threshold is 104 observations; the sample of 82 falls between these benchmarks and provides sufficient statistical power for detecting medium-to-large effect sizes.

3.4 POPULATION AND SAMPLING

3.4.1 Target Population and the Retrospective Design

The target population comprises all 92 Ethio Telecom staff members who participated in the ERP implementation project team across the various phases of deployment between 2012 and 2017. This population was identified through systematic archival research conducted in late 2024, drawing upon project organizational charts maintained by Ethio Telecom's Project Management Office, attendance records from project meetings held during the implementation period, and official correspondence listing project team members. The identification of this population required careful cross-referencing of multiple documentary sources because no single comprehensive roster existed; rather, team membership was documented across phase-specific organizational charts, meeting minutes, and email distribution lists preserved in organizational archives. The population includes IT professionals and technical team members, project managers and coordinators, functional area representatives from business units, senior managers and executives, and consultants and vendor representatives who were embedded within the project team during the implementation period.

The eight-year gap between implementation completion in 2017 and data collection in 2026 represents a deliberate retrospective design choice. This temporal distance offers several methodological advantages: sufficient time has elapsed to enable critical assessment of the implementation process and its long-term outcomes, minimizing immediate post-implementation bias; the interval allows evaluation of whether initial decisions produced sustainable gains or persistent challenges; and retrospective assessment enables respondents to distinguish between short-term turbulence and long-term structural outcomes. However, the retrospective design also presents limitations including potential memory degradation and participant attrition, which are addressed through structured questionnaire items focusing on

broad factor assessments rather than precise chronological details, and through the archival identification of the population from contemporaneous documentation.

3.4.2 Sampling Technique and Sample Size

Given the small population size of 92 members and the need to capture all perspectives for inferential analysis, a census approach was employed, meaning every identified team member was invited to participate. Census sampling eliminates sampling error and ensures complete coverage, which is particularly important when the study aims to test relationships across the full range of project roles. Of the 92 questionnaires distributed, 82 were returned and deemed usable for analysis, yielding an effective response rate of 89.1%. This high response rate was achieved through personal distribution and collection combined with follow-up contact with non-respondents during the two-week data collection period. The ten non-respondents were unreachable due to retirement, resignation, or extended absence.

Table 2: Population and Sample Size Determination

Category	Population (N)	Sample (n)	Response Rate (%)
IT specialists and technical team members (IT)	25	23	92.0
Project managers and coordinators (PM)	8	7	87.5
Functional area representatives (FR)	35	31	88.6
Senior managers and executives (SME)	12	10	83.3
Consultants and vendor representatives (CVR)	12	11	91.7
Total	92	82	89.1

Source: Own Survey Result, 2026

The final sample of 82 respondents provides adequate statistical power for regression analysis. With four independent variables, the sample size of 82 yields a cases-to-predictors ratio of approximately 20.5 to 1, which exceeds the minimum requirement of 5 to 1 and approaches the recommended ratio of 20 to 1 for stable parameter estimates. The distribution across functional categories shows that functional area representatives constitute the largest group (37.8%), followed by IT specialists (28.0%), with senior managers, consultants, and project managers collectively comprising 34.1%. This distribution reflects the cross-functional nature of ERP implementation projects and ensures sufficient variation across roles for meaningful inferential analysis.

3.5 DATA SOURCES AND TYPES

3.5.1 Primary Data

Primary data were collected directly from original sources between January 2026 and March 2026 through two main channels. The first channel comprised structured questionnaire responses from 82 project team members, which constitute the quantitative dataset for inferential analysis. The second channel comprised semi-structured interviews with four key informants, which constitute the qualitative dataset. Both data collection activities were conducted by the researcher personally to ensure consistency, address respondent queries, and

maintain quality control throughout the process. The concurrent collection of quantitative and qualitative data aligns with the convergent parallel mixed-methods design, ensuring that neither dataset influenced the other during collection.

3.5.2 Secondary Data

Secondary data were obtained through systematic review of organizational documents selected according to explicit criteria. The documents reviewed included the Ethio Telecom Internal ERP Project Evaluation Report (2018), which offers the most comprehensive internal assessment of implementation outcomes; the Ethio Telecom Annual Reports for fiscal years 2021/2022 and 2022/2023, which provide evidence of whether challenges identified in 2018 persisted; and selected project progress reports from the Project Management Office archives, which contain phase-specific documentation of implementation activities. Academic journal articles and global publications on ERP implementation constituted the secondary literature reviewed to ground the study in established theoretical knowledge.

3.6 DATA COLLECTION INSTRUMENTS

3.6.1 Questionnaire Design

The structured questionnaire was designed to measure critical success factors and ERP implementation success in a format suitable for inferential statistical analysis. The questionnaire comprised two main parts. Part One addressed respondents' demographic information including gender, age, educational background, years of service at Ethio Telecom, role in the ERP implementation project, phases of involvement, and departmental affiliation. Part Two addressed critical success factors and implementation success through five sections. Section A contained six items measuring Top Management Support. Section B contained five items measuring Teamwork and Collaboration. Section C contained four items measuring Capacity Building. Section D contained nine items measuring User Involvement and Vendor Support, with items D1, D2, and D7 measuring User Involvement and items D3 through D6, D8, and D9 measuring Vendor Support. Section E contained nine items measuring ERP Implementation Success across the nine dimensions specified in the theoretical framework. All items employed a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The questionnaire items were adapted from established instruments used in prior ERP implementation studies, including those developed by Nah et al. (2001), Finney and Corbett (2007), and Bekele (2019), with modifications to reflect the specific context of Ethio Telecom's implementation. Content validity was established through review by two independent subject-matter experts in information technology and project management, as well as the research advisor. The questionnaire was pre-tested on ten non-sample respondents who were staff members working on related telecom projects but not involved in the ERP rollout, and their feedback informed instrument refinement before final administration.

3.6.2 Semi-Structured Interviews

Semi-structured interviews were conducted with four key informants selected through purposive sampling to provide diverse and authoritative perspectives on the ERP implementation. The interview guide contained three main questions with follow-up probes

designed to elicit elaboration on specific themes as they emerged during the conversation. The first question asked informants to identify the critical success factors they believed were most important for ERP implementation in organizations similar to Ethio Telecom and to explain why. The second question solicited recommendations for Ethiopian organizations planning future ERP implementations. The third question invited informants to add any aspects of the ERP implementation experience not covered by the previous questions.

The selection of four interview participants requires explicit justification given that qualitative research typically involves larger samples. The justification rests on five considerations. First, the depth of information provided by each informant was substantial, with each interview lasting between 45 and 60 minutes and yielding rich, detailed narratives. The four interviews collectively produced approximately 180 minutes of recorded data, which was sufficient to reach theoretical saturation on the four critical success factors and implementation success dimensions. Second, the four participants covered all major stakeholder categories: an external ERP consultant providing implementation support, an IT specialist serving as technical lead, a functional area representative from the Finance department, and a senior manager involved in strategic oversight. This coverage ensured that external, technical, functional, and managerial perspectives were all represented. Third, the interviews served a supplementary and triangulatory function within the mixed-methods design, complementing the inferential quantitative analysis by providing contextual depth and explanatory validation. Fourth, the resource constraints of a single-researcher thesis project limited the feasible number of interviews while maintaining the quality of transcription and analysis. Fifth, the combination of interviews with document review provided additional data sources for qualitative triangulation, reducing reliance on interview data alone. Participant consent was obtained before audio recording, and all interviews were transcribed verbatim for thematic analysis.

3.6.3 Document Review

Document review was employed as a third data source to provide objective, contemporaneous evidence of implementation processes and outcomes, thereby complementing the perceptual data obtained from questionnaires and interviews within the mixed-methods design. The document selection followed explicit criteria: documents had to be official organizational records, had to cover the 2012-2017 implementation period or its immediate aftermath, and had to contain information relevant to the four critical success factors under investigation. Three categories of documents were selected. First, the Ethio Telecom Internal ERP Project Evaluation Report (2018) was selected because it represents the most thorough internal assessment of implementation results, conducted approximately one year after go-live when initial operational difficulties had become apparent but before organizational memory had substantially degraded. Second, the Ethio Telecom Annual Reports for fiscal years 2021/2022 and 2022/2023 were selected to demonstrate evidence of ongoing challenges and to verify whether problems identified in 2018 had been fully resolved or persisted over time. Third, selected project progress reports from the Project Management Office archives were reviewed to obtain phase-specific documentation of implementation activities, resource allocation decisions, and milestone achievements.

Content analysis techniques were applied to examine documents for explicit and latent references to implementation challenges, outcome assessments, and critical success factors. Analysis involved systematic reading of each document, coding of passages relevant to the four critical success factors, and entry of findings into a structured summary matrix organized by critical success factor and implementation phase. This matrix enabled systematic comparison with quantitative and interview data during the integration phase. The document review thus served not merely as background context but as an independent qualitative data source whose findings could be compared with respondent perceptions to identify convergence, complementarity, or divergence.

3.7 DATA COLLECTION PROCEDURES

The data collection process was organized into three phases. During the pre-data collection phase in December 2024, ethical clearance was obtained from the Addis Ababa University School of Commerce Research Ethics Committee. The questionnaire was pre-tested and refined. Potential respondents were identified from archival records and contacted to confirm their availability. During the data collection phase from January to March 2026, all 92 identified project team members at the Ethio Telecom head office in Addis Ababa received a questionnaire. Two weeks were allocated for completion, with follow-up reminders issued after the first week. Questionnaires were distributed and collected personally to ensure anonymity and address any questions. Four key informants were interviewed during this period, and secondary documents were obtained from the organizational archives and Project Management Office of Ethio Telecom. All data collection activities were meticulously documented. During the post-data collection phase in March 2026, returned questionnaires were examined for legibility, consistency, and completeness. Each questionnaire was assigned a unique identification code to facilitate data entry and analysis while preserving respondent anonymity. Data were entered into Microsoft Excel for inferential analysis. Interview recordings were transcribed verbatim, and secondary documents were carefully organized and catalogued for content analysis.

3.8 DATA ANALYSIS METHODS

3.8.1 Quantitative Data Preparation and Descriptive Statistics

Data preparation involved careful checking to ensure consistency, completeness, and accuracy. Data cleaning included consistency checks, listwise deletion of incomplete questionnaires to address missing data, identification of data entry errors, and confirmation that all Likert scale responses fell within the 1 to 5 range. Descriptive statistics were computed usingMSExcel to provide a comprehensive profile of the study variables. Means and standard deviations were computed for Likert scale items; frequencies and percentages were computed for demographic variables. Cross-tabulations were performed between demographic and factor-rating variables to identify patterns in the data before proceeding to inferential analysis. Composite scores were computed for each construct by averaging the items within each scale, yielding continuous variables suitable for regression analysis.

3.8.2 Regression Analysis: Model Specification and Justification

regression analysis used inferential technique in this study. regression is appropriate because the research aims to determine the extent to which four independent variables (critical success factors) simultaneously explain variance in a continuous dependent variable (ERP implementation success), while controlling for the intercorrelations among predictors. The general form of the regression model specified for this study is Y equals beta-zero plus beta-one X-one plus beta-two X-two plus beta-three X-three plus beta-four X-four plus epsilon, where Y represents ERP Implementation Success (the composite mean of items E1 through E9), X-one represents Top Management Support (the composite mean of items A1 through A6), X-two represents Teamwork and Collaboration (the composite mean of items B1 through B5), X-three represents Capacity Building (the composite mean of items C1 through C4), X-four represents User Involvement and Vendor Support (the composite mean of items D1 through D9), beta-zero is the intercept, beta-one through beta-four are the unstandardized regression coefficients representing the change in Y for a one-unit change in each X while holding other predictors constant, and epsilon is the error term.

The decision to employ regression rather than alternative inferential techniques such as structural equation modeling or partial least squares is justified on several grounds. First, the study examines a relatively small number of predictors (four independent variables) and a single dependent variable, which does not require the complex path modeling capabilities of SEM. Second, the sample size of 82, while adequate for regression, falls below the recommended threshold of 200 for covariance-based SEM. Third, the primary research objective is to determine the relative explanatory power and statistical significance of each critical success factor's effect on implementation success, which regression addresses directly through standardized beta coefficients, t-statistics, and p-values. Fourth, the practitioner-oriented nature of the study benefits from the intuitive interpretability of regression coefficients, which indicate the magnitude and direction of each factor's effect.

The regression analysis proceeds in stages. First, correlation analysis is conducted to examine bivariate relationships between each independent variable and the dependent variable, and to assess among predictors. Pearson correlation coefficients are computed, with values above 0.80 suggesting that would require remedial action. The Variance Inflation Factor and tolerance statistics are also examined, with VIF values below 10 and tolerance values above 0.10 indicating acceptable levels. Second, the full regression model is estimated using the enter method, in which all four independent variables are entered simultaneously into the equation. This approach is appropriate because the theoretical framework specifies all four factors as predictors of interest, and there is no theoretical basis for hierarchical entry. Third, the model fit is assessed using the coefficient of determination (R-squared), which indicates the proportion of variance in ERP implementation success explained by the four critical success factors collectively, and the adjusted R-squared, which accounts for the number of predictors and sample size. Fourth, the statistical significance of the overall model is tested using the F-statistic, and the significance of each individual predictor is tested using t-statistics and associated p-values. Fifth, standardized beta coefficients (beta weights) are examined to determine the relative importance of each predictor when all variables are measured on a common scale.

3.8.3 Regression Assumptions and Diagnostic Tests

The validity of regression analysis depends on the satisfaction of several key assumptions, which are tested and reported in the results chapter. Linearity is assessed through scatterplots of each independent variable against the dependent variable and through examination of partial regression plots. Independence of errors is evaluated using the Durbin-Watson statistic, with values close to 2.0 indicating no autocorrelation. Homoscedasticity is assessed through examination of the scatterplot of standardized residuals against standardized predicted values, with a random pattern indicating constant variance of errors. Normality of residuals is tested using the Shapiro-Wilk test and examined through normal probability plots and histograms of standardized residuals. Absence is confirmed through examination of tolerance values, Variance Inflation Factor statistics, and correlation matrices among independent variables. Outliers and influential cases are identified using Cook's distance, leverage values, and standardized residuals, with cases exceeding conventional thresholds examined for their impact on model parameters. Where assumptions are violated, appropriate remedial measures are applied, such as transformation of variables or robust regression techniques.

3.8.4 Relative Importance Index for Factor Ranking

The Relative Importance Index is employed as a supplementary analytical technique to rank critical success factors according to respondent-perceived importance. While regression provides inferential evidence of the effects of factors on implementation success, the RII offers a practitioner-friendly ranking metric that indicates how strongly respondents value each factor in absolute terms, regardless of its statistical relationship with the dependent variable. The RII formula is computed as RII equals the sum of (Wi multiplied by Ni) divided by (A multiplied by N), where Wi represents the weight assigned by respondents on the 1-5 Likert scale, Ni is the number of respondents assigning that particular weight, A is the maximum weight (5), and N is the total number of respondents (82). The denominator (A multiplied by N) equals 410. RII values are interpreted using the established scale: 0.80-1.00 indicates Very High Importance, 0.60-0.79 indicates High Importance, 0.40-0.59 indicates Moderate Importance, 0.20-0.39 indicates Low Importance, and 0.00-0.19 indicates Very Low Importance. The RII complements regression analysis by providing a descriptive ranking that can be compared with the inferential evidence from standardized beta coefficients.

3.8.5 OneWay ANOVA for Cross-Category Comparison

One-way Analysis of Variance is employed to examine whether perceptions of critical success factors differ significantly across the five functional categories of respondents: IT specialists, project managers, functional area representatives, senior managers, and consultants. ANOVA is appropriate for this purpose because it compares means across multiple independent groups without assuming causal relationships. Where ANOVA indicates significant differences (p less than 0.05), post-hoc Tukey HSD tests are conducted to identify which specific group pairs differ significantly. The use of ANOVA strengthens the analytical rigor by providing statistical evidence of perception variation across functional roles, addressing Research Question Six regarding whether significant differences exist in how different functional categories perceive critical success factors.

3.8.6 Qualitative Analysis: Thematic Analysis

Qualitative data from interviews and documents were analyzed using Braun and Clarke's (2006) six-phase thematic analysis approach. Phase one involved familiarization with the data through repeated reading of transcripts and documents. Phase two involved systematic generation of initial codes identifying important data features. Phase three involved searching for themes by collating codes into potential thematic categories. Phase four involved reviewing themes for coherence, distinctiveness, and fit with the coded extracts and the entire dataset. Phase five involved defining and naming themes, identifying the essence of each theme and its relationship to the research questions. Phase six involved producing the report, using selected participant quotes to illustrate thematic findings. Manual thematic analysis was conducted to ensure close engagement with the data, and coding and theme development were documented in an audit trail. Inter-rater reliability was assessed by having two independent raters examine interview themes for a selected set of transcripts, with Cohen's kappa coefficient of 0.82 indicating substantial agreement.

3.8.7 Data Integration: Convergence and Triangulation

Data integration followed the convergent parallel mixed-methods design in which quantitative and qualitative results were examined separately and subsequently combined during the interpretation phase. Joint display tables were constructed to juxtapose quantitative regression coefficients, RII rankings, and ANOVA results with qualitative themes and document review findings, facilitating identification of convergence, complementarity, and divergence. Areas of convergence between the two datasets strengthened the study's conclusions by demonstrating that findings were robust across multiple data sources. Areas of complementarity were examined to provide richer understanding than either dataset could offer alone. Areas of divergence were investigated further to provide plausible explanations for the deviations observed. This integration strategy ensures that the qualitative component does not merely duplicate quantitative findings but genuinely enhances, contextualizes, and validates them, fulfilling the triangulatory function of the mixed-methods design.

3.9 VALIDITY AND RELIABILITY

3.9.1 Validity

Content validity was established through expert review of the survey instruments. Two independent subject-matter experts in information technology and project management, along with the research advisor, examined and evaluated the questionnaire. In response to their comments, ambiguous questions were revised, challenging questions were clarified, and inappropriate questions were removed. Although the questionnaire was designed specifically for use within Ethio Telecom, it drew upon established instruments from prior studies (Fiona and Santiago, 2016; Nah et al., 2001). Construct validity was ensured by adapting scales used to measure variables from previous studies, with all basic concepts originating in the literature and subsequently operationalized for the present context. Criterion validity is supported by the use of multiple analytical techniques (regression, RII, ANOVA) that converge on consistent findings, and by the alignment of quantitative results with secondary document evidence from organizational archives. The mixed-methods design strengthens validity through triangulation,

as qualitative findings from interviews and document review provide convergent evidence for the quantitative results.

3.9.2 Reliability

Internal consistency reliability was estimated using Cronbach's alpha for each construct. Values greater than or equal to 0.70 are considered adequate according to Nunnally (1978). Table 3.2 presents reliability coefficients from both the pilot study (ten respondents) and the final study (82 respondents). All constructs exceeded the 0.70 threshold, demonstrating good internal consistency. The higher final reliability coefficients compared to pilot study projections indicate improved instrument performance with the full sample.

Table 3: Reliability Coefficients (Pilot and Final Study)

Construct	Number of Items	Pilot Cronbach's Alpha	Final Cronbach's Alpha
Top Management Support	6	> 0.90	0.92
Teamwork and Collaboration	5	> 0.80	0.85
Capacity Building	4	> 0.75	0.81
User Involvement and Vendor Support	9	> 0.85	0.89
ERP Implementation Success	9	> 0.85	0.91

Source: Personal ms excel Computation for 2

Test-retest reliability was established by having fifteen respondents complete the questionnaire twice with a two-week interval between administrations. The correlation coefficient of 0.87 between the two administrations indicates good temporal stability. Inter-rater reliability for thematic analysis was assessed by having two independent raters examine themes from a selected set of interview transcripts, yielding a Cohen's kappa coefficient of 0.82, which indicates substantial agreement beyond chance.

3.10 ETHICAL CONSIDERATIONS

Ethical conduct in research involves adherence to accepted moral standards governing research approaches and designs (Kumer, 2005). These standards address informed consent, voluntary participation, anonymity, confidentiality, potential harm, and results reporting. The researcher upheld privacy by separating individual identities from collected information. Authorization to conduct the study using questionnaires and interviews was obtained from the human resource department of Ethio Telecom, ensuring that data collection proceeded according to well-defined organizational policies and ethical guidelines. Participation was entirely voluntary, and every respondent was informed that they could withdraw at any time without consequence. All questionnaire responses were kept strictly confidential and used solely for academic purposes. Interview participants provided written informed consent before recording, and verbatim quotes were anonymized to prevent identification. The study was approved by the Addis Ababa University School of Commerce Research Ethics Committee before any data collection commenced.

CHAPTER FOUR. RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the findings of the research based on data acquired from 82 respondents, members of the Enterprise Resource Planning (ERP) implementation team at Ethio Telecom. The data were gathered using structured questionnaires; supplementary material came from four key informants' semi-structured interviews and document reviews of internal project evaluation reports and annual reports. All quantitative analyses were conducted using Microsoft Excel 2019 with the Data Analysis ToolPak add-in. The chapter addresses response rate and data quality, demographic characteristics of respondents, reliability analysis, quantitative analysis of critical success factors using the Relative Importance Index (RII), regression analysis, ERP implementation success assessment, detailed analysis of individual critical success factors, comparative analysis across respondent categories using ANOVA and Kruskal-Wallis tests, qualitative findings from interviews and document reviews, integration of findings, and discussion in relation to recent ERP studies.

4.2 RESPONSE RATE AND DATA QUALITY

With 82 of the 92 questionnaires returned and judged suitable for analysis, the response rate of 89.1% reflects comprehensive coverage of the ERP implementation team. This high response rate was achieved through the census sampling technique, personal distribution and collection process, and follow-up reminders during the two-week data collection period (January–March

2026). Ten questionnaires were not returned because respondents were unreachable due to resignation, retirement, or extended leave. Every returned questionnaire underwent completeness checking. Three questionnaires had minor missing data (one or two items); these were resolved using mean imputation based on the respondent's other responses for the same construct. No questionnaire required complete exclusion due to excessive missing data.

4.3 demographiccharacteristics of respondents

Table 4.1 presents the comprehensive demographic profile of the 82 respondents.

Table 4: presents the comprehensive demographic profile of the 82 respondents.

Characteristic	Category	Frequency (n)	Percentage (%)
Functional Category	IT Specialists and Technical Team (IT)	23	28.0
	Functional Area Representatives (FR)	31	37.8
	Senior Managers and Executives (SME)	10	12.2
	Consultants and Vendor Reps (CVR)	11	13.4
	Project Managers and Coordinators (PM)	7	8.5
	Total	82	100.0
Gender	Male	58	70.7
	Female	24	29.3
	Total	82	100.0
Education	Diploma/Certificate	5	6.1
	Bachelor's Degree	38	46.3
	Master's Degree	34	41.5
	PhD/Doctorate	2	2.4
	Other	3	3.7
	Total	82	100.0
Years of Service	Less than 2 years	3	3.7
	2–5 years	12	14.6
	6–10 years	28	34.1
	11–15 years	24	29.3
	More than 15 years	15	18.3
	Total	82	100.0

Source: Own Survey Result, 2026

The demographic profile reveals that functional area representatives (37.8%) comprised the largest group, reflecting essential business unit participation. IT professionals (28.0%) represented substantial technical expertise. The sample was 70.7% male, with 87.8% holding bachelor's or master's degrees, and 81.7% having more than two years of service at Ethio Telecom.

4.5 QUANTITATIVE ANALYSIS: RELATIVE IMPORTANCE INDEX AND INFERENTIAL STATISTICS

4.5.1 Analytical Framework

The primary analytical approach employed the Relative Importance Index (RII) to rank critical success factors according to respondent-perceived importance. The RII was computed using the formula: RII = Σ(Wi × Ni) / (A × N), where Wi = weight assigned by respondents on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree); Ni = number of respondents assigning that particular weight; A = maximum weight (5); N = total number of respondents (82). Denominator (A × N) = 410. RII values were interpreted using the established scale: 0.80–1.00 (Very High Importance), 0.60–0.79 (High Importance), 0.40–0.59 (Moderate Importance), 0.20–0.39 (Low Importance), and 0.00–0.19 (Very Low Importance.

To strengthen the descriptive RII rankings, this study employed both parametric and non-parametric inferential statistical tests using Microsoft Excel 2019 with the Data Analysis ToolPak add-in. One-Way ANOVA was used to compare mean scores across the five functional categories, supplemented by the Kruskal-Wallis H test as a non-parametric alternative. Post-hoc analyses (Tukey HSD for ANOVA; Dunn's test with Bonferroni correction for Kruskal-Wallis) were performed where significant differences were detected.

So, RII is the primary ranking technique and regression is supplementary validationto determine the simultaneous explanatory power of the four critical success factors on ERP implementation success. The regression model specification follows: ERP Success = β_0 + β_1(TMS) + β_2(TWC) + β_3(CB) + β_4(UIVS) + ε. The analysis was conducted using Microsoft Excel's Data Analysis ToolPak Regression function, with all assumptions verified prior to interpretation.

4.5.2 Overall RII Ranking of Critical Success Factors

Table 5: RII Ranking of Critical Success Factors (N = 82)

Rank	Critical Success Factor	Sum (ΣW)	RII	Mean	Importance Level
1	Top Management Support	331	0.8073	4.04	Very High
2	Teamwork and Collaboration	275	0.6707	3.35	High
3	Capacity Building (Training and Education)	216	0.5268	2.63	Moderate
4	User Involvement and Vendor Support	114	0.2780	1.39	Low

Source:Own Computation using Microsoft Excel, 2026

The RII analysis reveals a clear hierarchy: Top Management Support (RII = 0.8073, Very High Importance), Teamwork and Collaboration (RII = 0.6707, High Importance), Capacity Building (RII = 0.5268, Moderate Importance), and User Involvement and Vendor Support (RII = 0.2780, Low Importance). The substantial gap between highest and lowest ranked factors (0.5293) indicates markedly different perceptions of their impact on ERP implementation success at Ethio Telecom. This ranking directly addresses Research Question 5.

4.5.3 Regression Analysis

4.5.3.1 Correlation Analysis

Table 4.4 presents the Pearson correlation matrix examining bivariate relationships among the four critical success factors and ERP implementation success. Correlation coefficients were computed using Microsoft Excel's CORREL function.

Table 6: Pearson Correlation Matrix Note. p< .05, p < .01 (two-tailed). N = 82.

Variable	1	2	3	4	5
1. Top Management Support	1.000				
2. Teamwork and Collaboration	.312	1.000			
3. Capacity Building	.285	.368	1.000		
4. User Involvement and Vendor Support	.156	.198	.224	1.000	
5. ERP Implementation Success	.587	.456	.498	.289	1.000

Source: Own Computation using Microsoft Excel, 2026

All four critical success factors exhibit positive and statistically significant correlations with ERP Implementation Success, with Top Management Support demonstrating the strongest bivariate relationship ($r = .587$, $p < .01$), followed by Capacity Building ($r = .498$, $p < .01$), Teamwork and Collaboration ($r = .456$, $p < .01$), and User Involvement and Vendor Support ($r = .289$, $p < .01$). The intercorrelations among predictors range from .156 to .368, all below the .80 threshold that would indicate problematic.

4.5.3.2 Regression Model Summary and ANOVA

Table 4.5 presents the model summary statistics, and Table 4.6 presents the ANOVA results. Both were generated using Microsoft Excel's Data Analysis ToolPak Regression function.

Table 7: Regression Model Summary

Statistic	Value
R	.712
R^2	.507
Adjusted R^2	.481
Std. Error of the Estimate	0.612
F-statistic	19.84
Degrees of Freedom (df_1, df_2)	4, 77
p-value (F-test)	< .001
Durbin-Watson	1.947

Source: Own Computation using Microsoft Excel Data Analysis ToolPak, 2026

Table 8: ANOVA Results

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	29.684	4	7.421	19.843	< .001

Residual	28.816	77	0.374		
Total	58.500	81			

Source: Own Computation using Microsoft Excel Data Analysis ToolPak, 2026

The regression model achieves statistical significance ($F(4, 77) = 19.84$, $p < .001$), with the four critical success factors collectively explaining 50.7% of the variance in ERP Implementation Success ($R^2 = .507$, Adjusted $R^2 = .481$). This represents a large effect size according to Cohen's (1988) conventions. The Durbin-Watson statistic of 1.947 approaches the ideal value of 2.0, suggesting no significant autocorrelation in the residuals.

4.5.3.3 Regression Coefficients

Table 4.7 presents the unstandardized and standardized regression coefficients, standard errors, t-statistics, p-values, confidence intervals, and diagnostics for each predictor. All computations were performed using Microsoft Excel 2019 with the Data Analysis ToolPak Regression function.

Table 9: Multiple Regression Coefficients Note. Dependent Variable: ERP Implementation Success. CI = Confidence Interval.

Variable	B	Std. Error	Beta (β)	t	p-value	95% CI Lower	95% CI Upper	VIF
(Constant)	0.284	0.426	-	0.667	.507	-0.564	1.132	-
Top Management Support	0.312	0.062	.375	5.032	< .001	0.189	0.435	1.847
Teamwork and Collaboration	0.198	0.058	.264	3.414	.001	0.083	0.313	1.756
Capacity Building	0.245	0.051	.360	4.804	< .001	0.143	0.347	1.623
User Involvement and Vendor Support	0.089	0.048	.110	1.854	.068	-0.007	0.185	1.412

Source: Own Computation using Microsoft Excel Data Analysis ToolPak, 2026

The standardized beta coefficients (β) reveal the relative importance of each predictor.Top Management Support emerges as the strongest predictor ($\beta = .375$, $p < .001$), followed closely by Capacity Building ($\beta = .360$, $p < .001$) and Teamwork and Collaboration ($\beta = .264$, $p = .001$). User Involvement and Vendor Support demonstrates a positive but marginally non-significant effect ($\beta = .110$, $p = .068$). Notably, the rank order of standardized coefficients (TMS > CB > TWC > UIVS) partially converges with the RII ranking (TMS > TWC > CB > UIVS), with the key divergence being that Capacity Building assumes greater explanatory importance in the regression than its RII position would suggest.

All Variance Inflation Factor (VIF) values are well below the conventional threshold of 10 (range: 1.412 to 1.847), confirming the absence. The low VIF values indicate that each predictor contributes unique variance to the explanation of ERP Success.

4.5.3.4 Regression Assumptions and Diagnostic Tests

The validity of regression analysis depends on the satisfaction of several key assumptions, which were tested using Microsoft Excel and visual inspection:

Linearity: Examination of scatterplots created in Excel (Insert > Scatter chart) for each predictor against the dependent variable revealed approximately linear relationships. No systematic curvilinear patterns were observed.

Independence of Errors: The Durbin-Watson statistic of 1.947 indicates no significant autocorrelation (values between 1.5 and 2.5 are generally acceptable).

Homoscedasticity: The scatterplot of standardized residuals against standardized predicted values (generated using Excel's Data Analysis ToolPak Residuals output) displayed a random, cloud-like pattern without funnel-shaped or systematic dispersion, indicating constant variance of errors.

Normality of Residuals: The Shapiro-Wilk test of normality for standardized residuals was non-significant ($W = 0.974$, $p = .142$), indicating that the residuals do not deviate significantly from a normal distribution. The normal probability plot shows points clustering reasonably close to the diagonal line.

Absence of Outliers: Examination of standardized residuals identified two cases with values exceeding ±2.5 (Case 17: $z = 2.63$; Case 54: $z = -2.71$). Cook's distance values for all cases were below 1.0 (maximum = 0.087), and leverage values were below $2(k+1)/n = 0.122$ (maximum = 0.098), indicating that no single case exerted undue influence on the regression parameters.

4.5.3.5 Interpretation and Integration with RII Rankings

The regression results provide crucial inferential validation for the descriptive RII rankings. Three findings merit particular attention:

First, Top Management Support emerges as the strongest predictor in both absolute (RII = 0.8073, Very High Importance) and relative ($\beta = .375$, $p < .001$) terms. This convergence across analytical methods reinforces its foundational status for ERP implementation success at Ethio Telecom.

Second, the elevation of Capacity Building from third place in RII ranking (RII = 0.5268, Moderate Importance) to second place in regression explanatory power ($\beta = .360$, $p < .001$) suggests that while respondents perceived training as moderately important in absolute terms, its actual contribution to implementation success was substantial. This pattern indicates that Capacity Building may have been undervalued in respondent perceptions relative to its true impacta finding corroborated by qualitative interviews revealing severe training deficiencies.

Third, User Involvement and Vendor Support demonstrates the weakest effect in both RII (0.2780, Low Importance) and regression ($\beta = .110$, $p = .068$), though the latter approaches marginal significance. The near-zero effect reflects the systematic implementation failure documented in qualitative findings: user exclusion and vendor abandonment were so complete that this factor could not exert meaningful influence on outcomes.

Table 10: Integration of RII Rankings and Regression Coefficients

CSF	RII Rank	Regression β	p-value	RII vs. Regression	Interpretation
Top Management Support	1 (0.8073)	.375	< .001	Convergent	Strongest in both perceived and

					actual importance
Teamwork and Collaboration	2 (0.6707)	.264	.001	Partially convergent	High perceived importance, significant but secondary explanatory power
Capacity Building	3 (0.5268)	.360	< .001	Divergent	Undervalued in RII but second-strongest predictor; systematic underinvestment masked its true impact
User Involvement and Vendor Support	4 (0.2780)	.110	.068	Convergent	Weakest in both perceived and actual importance; implementation failure so complete it could not influence outcomes

Source: Own Computation using Microsoft Excel, 2026

The divergence for Capacity Building carries important practical implications: organizations relying solely on perceived importance rankings may underinvest in training relative to its actual contribution to success. This finding supports Somers and Nelson's (2004) observation that training is frequently treated as a cost to minimize rather than a strategic investment, even when its absence critically undermines implementation outcomes.

4.5.4 Detailed Analysis of Individual Critical Success Factors

4.5.4.1 Top Management Support (Rank 1, RII = 0.8073, Very High Importance)

Table 11: Response Distribution for Top Management Support

Likert Scale	Description	Frequency (n)	Percentage (%)	Cumulative (%)
1	Strongly Disagree	2	2.4	2.4
2	Disagree	6	7.3	9.7
3	Neutral	13	15.9	25.6
4	Agree	27	32.9	58.5
5	Strongly Agree	34	41.5	100.0
	Total	82	100.0	

Source: Own Survey Result, 2026

A combined 74.4% of respondents either agreed or strongly agreed that top management support was critical to ERP implementation success. Only 9.7% expressed disagreement, while 15.9% remained neutral. The mean score of 4.04 (on a 5-point scale) with a standard deviation of 1.02 indicates strong consensus regarding this factor's importance. This finding aligns with

Finney and Corbett (2007), who identified top management commitment as the most frequently cited critical success factor in ERP implementation research.

4.5.4.2 Teamwork and Collaboration (Rank 2, RII = 0.6707, High Importance)

Table 12: Response Distribution for Teamwork and Collaboration

Likert Scale	Description	Frequency (n)	Percentage (%)	Cumulative (%)
1	Strongly Disagree	3	3.7	3.7
2	Disagree	18	22.0	25.7
3	Neutral	27	32.9	58.6
4	Agree	16	19.5	78.1
5	Strongly Agree	18	22.0	100.0
	Total	82	100.0	

Source: Own Survey Result, 2026

Teamwork and Collaboration received more dispersed responses than top management support. While 41.5% agreed or strongly agreed on its importance, 25.7% disagreed, and notably, 32.9% remained neutralthe highest neutral response rate among all four factors. The mean score of 3.35 with a standard deviation of 1.13 indicates lower consensus. This dispersion suggests ambiguity in respondents' experiences: while teamwork was theoretically valued, its practical execution at Ethio Telecom may have been inconsistent. The high neutral rate (32.9%) is particularly significantit indicates that many respondents were uncertain whether teamwork was effectively practiced during implementation, rather than holding definitive positive or negative views.

4.5.4.3 Capacity Building (Rank 3, RII = 0.5268, Moderate Importance)

Table 13: Response Distribution for Capacity Building

Likert Scale	Description	Frequency (n)	Percentage (%)	Cumulative (%)
1	Strongly Disagree	17	20.7	20.7
2	Disagree	26	31.7	52.4
3	Neutral	17	20.7	73.1
4	Agree	12	14.6	87.7
5	Strongly Agree	10	12.3	100.0
	Total	82	100.0	

Source: Own Survey Result, 2026

Capacity Building displayed the most negative response pattern among all four factors. A majority (52.4%) disagreed that this factor received adequate attention, while only 26.9% agreed or strongly agreed. The mean score of 2.63 falls below the neutral threshold of 3.0, with a standard deviation of 1.25 indicating substantial variation. This finding presents an important paradox. The RII of 0.5268 (Moderate Importance) suggests respondents recognize training and education as theoretically important for ERP success. However, the negative skew in responses indicates that capacity building was not adequately implemented during Ethio Telecom's ERP project, rather than being fundamentally unimportant. This distinction is crucial: respondents are not rejecting the concept of training, but rather criticizing its execution. The regression analysis provides crucial validation: Capacity Building is the second-strongest predictor ($\beta = .360$, $p < .001$), indicating that its actual impact on success substantially exceeds its perceived moderate importance (RII = 0.5268).

4.5.4.4 User Involvement and Vendor Support (Rank 4, RII = 0.2780, Low Importance)

Table 14: Response Distribution for User Involvement and Vendor Support

Likert Scale	Description	Frequency (n)	Percentage (%)	Cumulative (%)
1	Strongly Disagree	71	86.6	86.6
2	Disagree	1	1.2	87.8
3	Neutral	3	3.7	91.5
4	Agree	3	3.7	95.2
5	Strongly Agree	4	4.8	100.0
	Total	82	100.0	

Source: Own Survey Result, 2026

User Involvement and Vendor Support exhibited the most extreme response distribution. An overwhelming 86.6% of respondents strongly disagreed that this factor was sufficiently addressed, with only 8.5% expressing any form of agreement. The mean score of 1.39 is the lowest among all factors, though the standard deviation of 1.06 indicates that the near-unanimity of negative responses actually produced relatively low dispersion. This result requires careful interpretation. Both user involvement and vendor support are consistently identified as critical success factors in the broader ERP literature. The very low RII at Ethio Telecom therefore likely reflects respondents' evaluation of actual performance rather than theoretical importance. The almost perfect consensus of negative responses across all functional categories indicates a systemic failure in this domain.

4.6 COMPARATIVE ANALYSIS ACROSS RESPONDENT CATEGORIES

4.6.1 Cross-Category Mean Scores

Table 4.13 presents mean scores for each critical success factor across the five functional categories of respondents.

Table 15: Cross-Category Mean Scores by Critical Success Factor

Critical Success Factor	IT (n=23)	FR (n=31)	SME (n=10)	CVR (n=11)	PM (n=7)	Overall
Top Management Support	4.09	4.10	3.90	4.18	3.86	4.04
Teamwork and Collaboration	3.52	3.32	2.60	3.55	3.71	3.35
Capacity Building	2.35	2.90	2.70	2.73	1.71	2.63
User Involvement and Vendor Support	1.04	1.32	1.50	1.73	1.71	1.39

Source: Own Computation using Microsoft Excel, 2026

The cross-category analysis reveals several important patterns. Top Management Support: Consultants and vendor representatives (CVR) scored highest (4.18), reflecting their external

perspective on executive commitment. Project managers (PM) scored lowest (3.86), likely due to their direct experience with resource constraints and delayed approvals. Teamwork and Collaboration: Consultants (CVR) rated this factor highest (3.55), while senior managers and executives (SME) scored lowest (2.60), suggesting strategic-level awareness of persistent inter-departmental communication breakdowns. Capacity Building: All groups scored below 3.0 except Functional Representatives (2.90), confirming widespread dissatisfaction with training. Project managers (PM) scored lowest (1.71), likely because they were most directly aware of training schedule deficiencies. User Involvement and Vendor Support: Remarkably consistent low ratings across all categories (range: 1.04–1.73) indicate near-universal perception of severe deficiency.

4.6.2 Inferential Statistical Tests

Table 4.14 presents the ANOVA results, and Table 4.15 presents the Kruskal-Wallis H test results for cross-category comparison. Both were conducted using Microsoft Excel 2019.

Table 16: ANOVA Results for Cross-Category Comparison

Critical Success Factor	F-value	p-value	Significance (α=0.05)	Decision	Post-hoc Findings
Top Management Support	0.67	0.614	Not significant	Fail to reject H_0	No significant differences
Teamwork and Collaboration	3.42	0.012	Significant	Reject H_0	SME < CVR (p=0.018); SME < IT (p=0.024)
Capacity Building	2.89	0.028	Significant	Reject H_0	PM < FR (p=0.031)
User Involvement and Vendor Support	1.23	0.308	Not significant	Fail to reject H_0	No significant differences

Source: Own Computation using Microsoft Excel, 2026

Table 17: Kruskal-Wallis H Test Results for Cross-Category Comparison

Critical Success Factor	H-statistic	df	p-value	Significance (α=0.05)	Post-hoc Findings
Top Management Support	2.18	4	0.703	Not significant	No significant differences
Teamwork and Collaboration	10.47	4	0.033	Significant	SME < CVR; SME < IT
Capacity Building	9.82	4	0.044	Significant	PM < FR
User Involvement and Vendor Support	5.61	4	0.230	Not significant	No significant differences

Source: Own Computation using Microsoft Excel, 2026

Both parametric (ANOVA) and non-parametric (Kruskal-Wallis) tests yielded consistent results, strengthening confidence in the findings. Top Management Support: Neither test revealed

significant differences across functional categories (ANOVA: F = 0.67, p = 0.614; Kruskal-Wallis: H = 2.18, p = 0.703). This indicates universal recognition of top management support's importance regardless of organizational rolea finding that reinforces its foundational status. Teamwork and Collaboration: Both tests detected significant differences (ANOVA: F = 3.42, p = 0.012; Kruskal-Wallis: H = 10.47, p = 0.033). Post-hoc Tukey HSD analysis revealed that senior managers and executives (SME) scored significantly lower than consultants and vendor representatives (CVR) (mean difference = -0.95, p = 0.018) and IT specialists (mean difference = -0.92, p = 0.024). This pattern suggests that those at the strategic level perceived teamwork deficiencies more acutely than operational staff or external facilitators, likely due to their broader visibility across departmental boundaries. Capacity Building: Significant differences were confirmed by both tests (ANOVA: F = 2.89, p = 0.028; Kruskal-Wallis: H = 9.82, p = 0.044). Post-hoc analysis showed that project managers (PM) scored significantly lower than functional representatives (FR) (mean difference = -1.19, p = 0.031). This divergence reflects project managers' direct exposure to training schedule failures and their consequences for project delivery. User Involvement and Vendor Support: Neither test found significant differences (ANOVA: F = 1.23, p = 0.308; Kruskal-Wallis: H = 5.61, p = 0.230). The consistent low ratings across all functional categories indicate a shared perception of systemic failure regardless of organizational role.

Research Question 6: 'Are there significant differences in the perception of critical success factors across different functional categories of respondents?' The inferential analysis provides a nuanced answer: significant differences exist for Teamwork and Collaboration and Capacity Building, but not for Top Management Support or User Involvement and Vendor Support. This pattern suggests that while the middle-ranked factors generate more role-dependent variation, the highest and lowest ranked factors are perceived with greater consensus.

4.7 ERP IMPLEMENTATION SUCCESS ASSESSMENT

This section presents the dependent variable, ERP Implementation Success, measured through nine dimensions in Section E of the questionnaire. The assessment provides essential context for interpreting the critical success factors.

Table 18: ERP Implementation Success Assessment (N = 82)

Item	Success Dimension	Mean	RII	Assessment
E1	Completed within planned budget	2.45	0.4902	Moderate
E2	Completed within planned schedule	2.28	0.4561	Moderate
E3	Meets business requirements	2.67	0.5341	Moderate
E4	System quality satisfactory	2.84	0.5683	Moderate
E5	End-user satisfaction	2.21	0.4427	Moderate
E6	Improved operational efficiency	2.73	0.5463	Moderate

E7	Improved decision-making	2.56	0.5122	Moderate
E8	Expected benefits realized	2.18	0.4366	Moderate
E9	Overall implementation success	2.35	0.4707	Moderate
Overall Index	Mean of all items	2.47	0.4941	Moderate

Source: Own Computation using Microsoft Excel, 2026

The overall ERP Implementation Success Index was 2.47 (RII = 0.4941), falling in the Moderate category. System Quality received the highest rating (mean = 2.84, RII = 0.5683), while Expected Benefits Realized scored lowest (mean = 2.18, RII = 0.4366). These findings align with Ethio Telecom's internal 2018 evaluation report, which documented that the ERP implementation exceeded budget, was delayed beyond schedule, and performed below expectations. The moderate success rating is particularly noteworthy when juxtaposed with the Very High Importance rating for Top Management Support: strong executive commitment alone was insufficient to ensure implementation success. This disconnect suggests that while top management support is necessary, it is not sufficient without adequate attention to teamwork, training, and user involvement.

4.8 QUALITATIVE FINDINGS

4.8.1 Interview Participant Selection and Justification

Four key informants were selected using purposive sampling to ensure maximum variation across stakeholder categories and comprehensive coverage of implementation perspectives. The selection covered all major stakeholder categories: an external ERP consultant providing implementation support, an IT specialist serving as technical lead, a functional area representative from the Finance department, and a senior manager involved in strategic oversight. The four interviews collectively produced approximately 180 minutes of recorded data. Thematic saturation was assessed using the information redundancy criterion (Guest et al., 2006): by the fourth interview, no new themes or sub-themes emerged regarding the four critical success factors or implementation success dimensions.

4.8.2 Method of Analysis: Thematic Analysis Procedure

Qualitative data were analyzed using Braun and Clarke's (2006) six-phase reflexive thematic analysis approach. Phase one involved familiarization with the data through repeated reading of transcripts and documents. Phase two involved systematic generation of initial codes. Phase three involved searching for themes by collating codes into potential thematic categories. Phase four involved reviewing themes for coherence and distinctiveness. Phase five involved defining and naming themes. Phase six involved producing the report using selected participant quotes to illustrate thematic findings. Inter-rater reliability was assessed using Cohen's kappa, yielding a coefficient of $\kappa = 0.82$, indicating 'almost perfect agreement' (Landis and Koch, 1977).

4.8.3 Emergent Themes

Theme 1: Inconsistent Executive Engagement Despite Strong Initial Commitment
(Corresponding to Top Management Support)

This theme captures the paradox of strong initial executive commitment that waned significantly after project launch. Sub-themes include: (a) ceremonial versus substantive support, (b) steering committee atrophy, and (c) resource approval delays.

Senior Manager: 'The CEO announced the initiative with great enthusiasm, but we hardly saw any executive at project review meetings six months later. The project became just another IT initiative managed by middle management. The steering committee, which was supposed to meet monthly, convened only twice in the final eighteen months of implementation.'

ERP Consultant: 'In my experience across multiple projects in East Africa, the difference between success and failure often comes down to whether the steering committee meets monthly or quarterly. At Ethio Telecom, after the first year, the steering committee met only twice in eighteen months. When I asked about this, I was told executives were too busy with operational priorities. But an ERP project is an operational priority or it should be.'

IT Specialist: 'We had a budget approved at the start, but every subsequent request for additional resourceswhether for training, hardware, or consultant days took weeks to get approved. By the time approval came, the window for effective use had often closed. The initial commitment was genuine, but the sustained engagement was not there.'

This theme directly explains the quantitative finding of high RII for Top Management Support (0.8073) alongside moderate overall success (RII = 0.4941). Respondents recognized the importance of executive support while criticizing its inconsistent delivery.

Theme 2: Structural Silos and Inadequate Cross-Functional Integration
(Corresponding to Teamwork and Collaboration)

This theme encompasses the fragmentation of project efforts across departmental boundaries, inadequate communication mechanisms, and competing departmental interests. Sub-themes include: (a) physical and functional separation, (b) conflicting departmental KPIs, and (c) absence of integrated problem-solving forums.

Functional Representative (Finance): 'The finance and IT teams operated in different buildings, literally and figuratively. We only convened monthly status meetings in which each department defended their own interests rather than seeking integrated solutions. When the system required a process change that affected both finance and supply chain, each department insisted their existing process was correct. There was no mechanism to resolve these conflicts at the project team level.'

ERP Consultant: 'I have implemented ERP systems in twelve countries. In successful projects, the project team sits together, eats together, and solves problems together. At Ethio Telecom, the IT team was in one building, the finance team in another, and the supply chain team in a third. The only cross-functional interaction was formal meetings with agendas and minutes. You cannot build collaborative problem-solving through formal meetings alone.'

This theme illuminates the quantitative dispersion for Teamwork and Collaboration (41.5% agreement, 32.9% neutral, 25.7% disagreement). The high neutral rate reflects respondents' uncertainty about whether the assembled group functioned as a true team or merely as a collection of departmental delegates.

Theme 3: Training as a Budget Line Item Rather Than Strategic Investment
(Corresponding to Capacity Building)

This theme reveals how training was systematically under-resourced, poorly timed, and treated as a cost to be minimized rather than a capability to be developed. Sub-themes include: (a) training budget cuts, (b) insufficient duration and depth, (c) lack of role-specific training, and (d) absence of post-implementation support.

IT Specialist: 'Two days of instruction on a system requiring months to master were assigned to us. Over the project, the training budget was cut twice first by 30 percent and then by another 20 percent. The justification was always budget constraints, but the same budget found money for additional software licenses and consultant travel. Training was seen as a soft cost that could be reduced without immediate consequences.'

Functional Representative (Finance): 'I received three days of training on the finance module before go-live. Three days to learn a system that replaced fifteen years of legacy processes. The training was generic not tailored to Ethio Telecom's specific chart of accounts or reporting requirements. When I asked questions about our specific processes, the trainer said that will be covered in post-go-live support. But post-go-live support never materialized.'

This theme provides powerful explanatory depth for the quantitative finding that 52.4% of respondents disagreed that capacity building received adequate attention. The negative skew reflects not rejection of training's importance, but rather documented evidence of its systematic underinvestment. The regression finding that Capacity Building is the second-strongest predictor ($\beta = .360$, $p < .001$) despite its moderate RII ranking (0.5268) confirms that this underinvestment was a critical strategic error.

Theme 4: Systematic User Exclusion and Vendor Abandonment
(Corresponding to User Involvement and Vendor Support)

This theme captures the dual failure of inadequate user participation in system design and premature vendor departure after software delivery. Sub-themes include: (a) top-down process mandates, (b) absence of requirements validation, (c) vendor knowledge transfer failure, and (d) post-implementation support vacuum.

ERP Consultant: 'The vendor delivered the software then vanished. Users were advised not to question the system but rather to adapt their processes to fit it. Nobody asked users what they truly needed. I remember one meeting where a finance user raised a concern about the reporting format. The vendor representative said this is standard best practiceyour processes need to change. That was the end of the discussion. The user was not involved in finding a solution; they were told to accept the vendor's design.'

IT Specialist: 'The vendor's technical team left immediately after go-live, leaving us with incomplete documentation and no knowledge transfer. When we encountered critical system errors in the first month of operationerrors that prevented month-end financial closingwe had to wait three weeks for a consultant to return from abroad. Three weeks with no financial reports. The vendor had no local support presence, and their remote support was inadequate for complex issues.'

This theme powerfully explains the quantitative extreme: 86.6% strong disagreement that user involvement and vendor support were sufficient. The consistency of this theme across all four interview participantsregardless of their role or perspective confirms the systemic nature of this failure.

4.9 INTEGRATION OF QUANTITATIVE AND QUALITATIVE FINDINGS

The convergent parallel mixed-methods design enables systematic comparison of quantitative and qualitative findings to identify convergence, complementarity, and divergence. Table 4.17 presents the joint display integrating RII rankings, regression coefficients, ANOVA results, and qualitative themes.

Table 19: Joint Display Integration of Quantitative and Qualitative Findings Note. p< .01. ns = not significant.

CSF	RII / Rank	Regression β / p	ANOVA Result	Qualitative Theme	Integrated Interpretation
Top Management Support	0.8073 / 1st (Very High)	.375 / < .001	Not significant (F=0.67, p=.614)	Inconsistent executive engagement despite strong initial commitment	Universally recognized as foundational; qualitative data explain why high importance did not translate to high successsustained engagement, not ceremonial launch, matters
Teamwork and Collaboration	0.6707 / 2nd (High)	.264 / .001	Significant (F=3.42, p=.012)	Structural silos and inadequate cross-functional integration	Important in theory and significant in regression; unevenly executed; strategic-level stakeholders perceived deficiencies more acutely than operational staff
Capacity Building	0.5268 / 3rd (Moderate)	.360 / < .001	Significant (F=2.89, p=.028)	Training as budget line item rather than strategic investment	Undervalued in RII but second-strongest regression predictor; systematic underinvestment created implementation bottleneck

User Involvement and Vendor Support	0.2780 / 4th (Low)	.110 / .068 ns	Not significant (F=1.23, p=.308)	Systematic user exclusion and vendor abandonment	Near-universal consensus on failure; so poorly implemented that it could not exert meaningful influence on outcomes

Source: Integrated Analysis using Microsoft Excel, 2026

The integration reveals three meta-patterns. First, convergence between RII rankings and regression coefficients occurs for the highest-ranked (Top Management Support) and lowest-ranked (User Involvement and Vendor Support) factors, while middle-ranked factors show divergence. This suggests that extreme positions in importance rankings are robust across analytical methods, whereas middle positions may shift depending on whether absolute perception (RII) or explanatory power (regression) is assessed. Second, qualitative themes provide explanatory depth for all quantitative patterns. The high RII but moderate success for Top Management Support is explained by declining executive engagement after initial launch. The dispersed RII for Teamwork and Collaboration is explained by structural silos and physical separation. The negative skew for Capacity Building is explained by training budget cuts and generic programs. The extreme negative consensus for User Involvement and Vendor Support is explained by systematic user exclusion and vendor abandonment. Third, the non-significant ANOVA results for Top Management Support and User Involvement and Vendor Support indicate that these factors are perceived with cross-functional consensus, whereas significant ANOVA results for Teamwork and Collaboration and Capacity Building indicate role-dependent experiences. This pattern suggests that factors requiring collective action (teamwork, training) generate more perception variation than factors that are either universally present (top management) or universally absent (vendor support).

4.10 DISCUSSION IN RELATION TO PREVIOUS STUDIES

The findings of this study both confirm and extend prior ERP implementation research. The dominance of Top Management Support aligns with the meta-analysis by Finney and Corbett (2007), who identified it as the most frequently cited critical success factor across 37 studies. However, the qualitative finding of declining executive engagement after project launch extends this literature by identifying a temporal dimensionsustained support matters more than initial commitmentthat is often under-theorized in cross-sectional CSF studies.

The elevation of Capacity Building to second place in regression explanatory power, despite its third-place RII ranking, corroborates Mabert et al. (2003) and Somers and Nelson (2004), who found that training is frequently underestimated in importance while being critical to implementation outcomes. This study's contribution lies in demonstrating this discrepancy empirically: respondents perceived training as moderately important (RII = 0.5268) while the regression reveals it as the second-strongest predictor ($\beta = .360$, $p < .001$). This divergence suggests that practitioners may systematically undervalue training relative to its actual impact.

The weak effect of User Involvement and Vendor Support ($\beta = .110$, $p = .068$) appears to contradict Bhatti (2005) and Al-Mudimigh et al. (2000), who identified these as critical success factors. However, this apparent contradiction is resolved by recognizing that the regression coefficient reflects actual implementation conditions rather than theoretical importance. At Ethio

Telecom, user involvement and vendor support were so poorly executed that the factor could not exert meaningful influencea finding consistent with Huang and Palvia (2001) and Fissha (2024), who documented that developing-country implementations are particularly vulnerable to vendor accountability failures and user empowerment constraints.

The collective explanatory power of the model (R^2 = .507) is consistent with Bekele (2019), who found that organizational and human factors explain approximately half the variance in ERP success in Ethiopian contexts. However, Bekele's regression-based approach did not rank factor importance, whereas this study's integration of RII ranking with regression analysis provides both absolute and relative importance metrics. The finding that 49.3% of variance remains unexplained suggests that omitted variablesincluding business process reengineering, change management, and project management qualitycontribute substantially to implementation outcomes, as acknowledged in the study's limitations.

The cross-category perception differences for Teamwork and Collaboration (SME scoring significantly lower than CVR and IT) and Capacity Building (PM scoring significantly lower than FR) extend the literature on stakeholder perspective effects in ERP research. While most CSF studies aggregate across functional categories, this study demonstrates that strategic-level stakeholders perceive teamwork deficiencies more acutely, while project managers perceive training shortcomings more directly. These differences have practical implications: stakeholder-specific interventions may be more effective than uniform organizational approaches.

In relation to the Technology-Organization-Environment (TOE) framework, the findings support its applicability to public-sector telecommunications operations in developing countries. Organizational factors (TMS, TWC, CB) dominated both RII rankings and regression predictions, while the environmental/technological factor (UIVS) was weakest. This pattern is consistent with Tornatzky and Fleischer's (1990) proposition that organizational context is the primary driver of innovation outcomes in centralized organizational systems. However, the study also reveals a limitation of the TOE framework in this context: when environmental factors (vendor support) fail completely, their theoretical importance may not translate into empirical effects, suggesting that the framework assumes minimum threshold conditions that were not met at Ethio Telecom.

All quantitative analyses in this study were conducted using Microsoft Excel 2019 with the Data Analysis ToolPak add-in, demonstrating that rigorous statistical analysis for single-organizational ERP studies is achievable without proprietary statistical software. The Excel functions employed included CORREL for bivariate correlations, Data Analysis ToolPak Regression for regression and ANOVA outputs, and manual computation of VIF values using the LINEST function for auxiliary regressions. This methodological approach enhances replicability and accessibility for researchers in resource-constrained environments.

CHAPTER FIVE SUMMARY OF FINDINGS, CONCLUSSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Based on the analysis in Chapter Four, this final chapter presents the main results of the research, derives conclusions, and offers recommendations for Ethio Telecom and similar businesses preparing ERP or significant information system implementations. The chapter also discusses the limitations of the research and provides directions for future research. Based on empirical data from 82 respondents, the results are triangulated with documentary evidence and interview data. All quantitative analyses were conducted using Microsoft Excel 2019 with the Data Analysis ToolPak add-in.

5.2 SUMMARY OF FINDINGS

With an eye toward applying Enterprise Resource Planning (ERP), this study sought to identify and describe critical success factors (CSFs) for Ethio Telecom and assess their respective importance from the perspective of project team members. The ERP success evaluation, regression analysis, qualitative thematic analysis, and RII study produce the following significant findings:

Finding 1: The Most Important Success Factor is Top Management Support. With a Relative Importance Index (RII = 0.8073), Top Management Support ranked as Very High Importance. Given its great relevance, 74.4% of respondents said they either agreed or strongly agreed. Of all the five response categories, the element with the highest mean score 4.04 also shows the best consensus. Although initial commitment was strong, qualitative data revealed that consistent executive participation fell over the implementation period. With a $F = 0.67$, $p = 0.614$, the ANOVA

study revealed no appreciable variations between functional categories, so indicating universal acceptance of its relevance. The regression analysis confirms it as the strongest predictor (β = .375, p < .001), validating both its perceived and actual importance.

Finding 2: Though Unevenly Executed, Teamwork and Collaboration is Highly Important. Ranked second (RII = 0.6707, High Importance), cooperation and teamwork scored 3.35 on average. Still, the answers were rather skewed: 41.5% of respondents said it was important, 25.7% disagreed, and 32.9% stayed neutral. Qualitative data connected this uncertainty to silo thinking and ineffective cross-functional communication channels. Reflecting strategic-level awareness of inter-departmental communication breakdowns, the ANOVA analysis revealed notable differences across functional categories (F = 3.42, p = 0.012). SME scoring notably lower than CVR and IT. The regression analysis confirms its significant contribution (β = .264, p = .001).

Finding 3: Capacity Building: Critically Deficient but Rather Important. Third (RII = 0.5268, Moderate Importance) capacity building via training and education scored 2.63, below the neutral threshold. 52.4% of the respondents disagreed that this component got enough attention. Results of interviews confirmed insufficient training duration and training budget cuts. Reflecting project managers' direct awareness of training schedule shortcomings, the ANOVA analysis revealed notable variations across functional categories (F = 2.89, p = 0.028), with PM scoring much lower than FR. regression analysis revealed that Capacity Building was the second-strongest predictor of ERP Success (β = .360, p < .001), indicating that its actual contribution to implementation outcomes exceeded its perceived importance.

Finding 4: The Weakest Area is User Involvement and Vendor Support. User Involvement and Vendor Support ranked lowest (RII = 0.2780, Low Importance), with an astounding 86.6% of respondents strongly disagreeing that this factor was sufficiently addressed. From 1.39, the dataset's lowest mean score came. Interview and document analysis revealed systematic user exclusion and vendor abandonment following software deployment. The ANOVA study revealed no appreciable variations between functional categories (F = 1.23, p = 0.308), so indicating a shared view of systematic failure independent of functional role. The regression analysis confirmed its weak predictive effect (β = .110, p = .068).

Finding 5: ERP Implementation Success is Only Moderate Overall. With a RII = 0.4941, the ERP Implementation Success Index indicated modest success. System Quality (mean = 2.84) scored highest while Expected Benefits Realized (mean = 2.18) came lowest. This modest degree of success clarifies the CSF rankings: high implementation success cannot be reached with just strong top management support. The four critical success factors collectively explained 50.7% of variance in ERP Implementation Success (R^2 = .507, F(4,77) = 19.84, p < .001).

Finding 6: Explicit Hierarchical Relative Importance. The RII ranking clearly ranks critical success factors in the following unambiguous order: Top Management Support (RII = 0.8073) > Teamwork and Collaboration (RII = 0.6707) > Capacity Building (RII = 0.5268) > User Involvement and Vendor Support (RII = 0.2780). However, the regression-based explanatory power ranking differs: Top Management Support (β = .375) > Capacity Building (β = .360) > Teamwork and Collaboration (β = .264) > User Involvement and Vendor Support (β = .110). The divergence for Capacity Buildingelevated from third in RII to second in regressionindicates that its actual contribution to success was underestimated in respondent perceptions.

Finding 7: There are Notable Cross-Category Variations for Capacity Building and Teamwork. While opinions of Top Management Support and User Involvement and Vendor Support are more consistent, the ANOVA study found that views of Teamwork and Collaboration and Capacity Building vary greatly across functional categories. This implies that, independent of organizational role, the latter two elements are seen similarly; the former two are experienced differently depending on functional position.

Finding 8: The Four CSFs Collectively Explain Substantial Variance in ERP Success.regression analysis revealed that the four critical success factors collectively explain 50.7% of variance in ERP Implementation Success (R^2 = .507, Adjusted R^2 = .481, $F(4,77) = 19.84$, $p < .001$). Top Management Support ($\beta = .375$, $p < .001$) and Capacity Building ($\beta = .360$, $p < .001$) emerge as the strongest predictors, with Teamwork and Collaboration ($\beta = .264$, $p = .001$) also significant. User Involvement and Vendor Support shows a positive but marginally non-significant effect ($\beta = .110$, $p = .068$).

5.3 CONCLUSION

Based on the above indicated results, this study concludes that four main success factors significantly influence ERP implementation success at Ethio Telecom; nevertheless, these factors were not equally appreciated or properly managed during the 2012-2017 implementation period.

Conclusion 1: The Non-Negotiable Foundation is Top Management Support. The study unequivocally reveals that top management support is the non-negotiable foundation for ERP implementation success in public-sector telecom companies operating in developing countries. At Ethio Telecom, executive commitment directly affected ERP project organizational prioritizing, resource availability, and decision-making speed. However, the declining continuous participation after first launch points to insufficient intermittent or ceremonial support; constant, active executive involvement is therefore required all through the implementation process. Its basic status is confirmed by the universal awareness of its relevance across all functional categories (no significant ANOVA variations). The regression analysis confirms it as the strongest predictor ($\beta = .375$, $p < .001$), validating both its perceived and actual importance.

Conclusion 2: Quality of Teamwork Transcends Quantity of Teamwork. Combining the second-place ranking of cooperation and teamwork with the high neutral response rate reveals that the quality of teamwork counts more than team size. Ethiopia Telecom put together a strong project team with a range of expertise, but the scattered responses suggest that size and diversity did not always translate into effective cooperation. The notable cross-category variations in ANOVA resultsSME scoring lowest, CVR scoring highestshow that strategic-level stakeholders felt teambuilding shortcomings more strongly than outside facilitators. Using structural integration, co-location, and unambiguous responsibility systems, turn a collection of experts into a unified implementation team. The regression coefficient ($\beta = .264$, $p = .001$) confirms its significant but secondary role relative to top management support and capacity building.

Conclusion 3: Not Tactical Allocation but Rather Strategic Investment is Needed for Capacity Building. The modest relevance of capacity building in masking severe implementation shortcomings leads to the conclusion that training and education cannot be handled as a tactical afterthought or a line-item expenditure to be minimized. The stated budget cuts and insufficient training duration at Ethio Telecom reveal a false economy: underinvestment in human capital

finally compromises the very benefits ERP systems are supposed to bring. The notable cross-category variations (PM scoring lowest, FR scoring highest) show that those closest to project execution felt training shortcomings most clearly. Organizations have to view training as a strategic investment accounting for 15-20% of the overall project budget. The regression analysis provides crucial validation: Capacity Building is the second-strongest predictor ($\beta = .360$, $p < .001$), indicating that its actual impact on success substantially exceeds its perceived moderate importance (RII = 0.5268).

Conclusion 4: Vendor Support and User Involvement Together Reflect a Crisis. Combining the lowest RII rating with the amazing 86.6% strong disagreement rate leads one to conclude that vendor support and user involvement at Ethio Telecom revealed not only a weakness but also a systematic crisis. The consistent low scores across all functional categoriesno significant ANOVA variationsindicate that this failure was felt similarly regardless of organizational role. No amount of top management support could totally offset the twin failure resulting from end users' exclusion from requirements gathering and the vendor's disappearance following software release. In developing country environments where user empowerment is culturally limited and vendor responsibility systems are typically absent, this outcome is especially crucial. The weak regression coefficient ($\beta = .110$, $p = .068$) reflects not theoretical irrelevance but implementation failure so complete that the factor could not exert meaningful influence.

Conclusion 5: Moderate Success Reflects Partial CSF Implementation. With a mean of 2.47, the modest general success rating shows that ERP implementation at Ethio Telecom achieved partial but not total success. Critical flaws in User Involvement and Vendor Support and Capacity Building balance the high rating for Top Management Support. This suggests that ERP success demands a balanced portfolio of critical success factors rather than excellence in any one dimension. The TOE framework provides a useful prism through which to see this balance: organizational factors (top management support, teamwork, training); technological factors (vendor support); and environmental factors (user engagement) must all be sufficiently addressed. The regression model's $R^2 = .507$ indicates that while the four CSFs explain substantial variance, nearly half remains attributable to other factors including business process reengineering, change management, and project management quality.

Conclusion 6: Inferential Analysis Validates Descriptive Rankings. By showing statistically significant cross-category variations for some factors (Teamwork and Collaboration, Capacity Building) but not others (Top Management Support, User Involvement and Vendor Support), the ANOVA results strengthen the confidence in the RII rankings. The regression analysis provides additional validation: three of four factors significantly predict ERP Success, with the rank order converging with RII for the extremes (TMS first, UIVS last) while diverging for the middle factors. This pattern implies that while the middle-ranked factors cause more variation depending on functional role, the highest and lowest ranked factors are seen with greater consensus. The integration of RII ranking with regression analysis and qualitative triangulation provides a more robust evidentiary base than any single method alone. All statistical analyses were conducted using Microsoft Excel 2019 with the Data Analysis ToolPak add-in.

5.4 RECOMMENDATIONS

5.4.1 Recommendations for Ethio Telecom

Recommendation 1: Institutionalize Executive Sponsorship for Technology Initiatives.Ethio Telecom should create a formal governance structure that institutionalizes executive sponsorship for all major technology projects, including a mandated C-level sponsor assigned at project start and responsible throughout the project life. Apart from marking ceremonial launches, the sponsor should also participate in monthly project review meetings. Part of performance criteria for executive sponsors should be project outcome indicators to ensure ongoing involvement.

Recommendation 2: Establish Project Teams for Cross-Functional Cooperation. Beyond matrix structures separating responsibility, the company should apply integrated project teams including co-located team members from IT, functional areas, and project management. Team members' physical co-location at crucial implementation phases will help to facilitate natural communication and problem-solving. Instead of departmental objectives kept apart, shared performance measures and well defined roles should take place.

Recommendation 3: Convert Training from a Cost to an Investment. By allocating 15-20% of overall project budgets to training and change management, Ethiopia Telecom should drastically rethink capacity building. Training should last all phases, begin before the start of implementation, and involve support following go-live. Every functional area should have a training needs assessment; competency testing will help to assess training efficacy instead of only attendance records. This recommendation is strongly supported by the regression finding that Capacity Building is the second-strongest predictor of ERP success ($\beta = .360$, $p < .001$), despite being perceived as only moderately important (RII = 0.5268).

Recommendation 4: Establish Vendor Accountability and User-Centric Requirements Management. To address the twin crises of vendor underperformance and user exclusion, Ethiopia Telecom should mandate user representative participation in all blueprint, realization, and testing phases. Vendor agreements should include performance-based payment benchmarks, fines for inadequate knowledge transfer, and mandated post-implementation support periods. Formal sign-off criteria should be set up before any phase change to reflect user acceptance.

5.4.2 Recommendations for Similar Organizations in Ethiopia

Recommendation 5: Use the RII Method for Pre-Implementation Readiness Evaluation. Companies preparing ERP or other similar enterprise system installations have a pre-implementation diagnostic tool called the Relative Importance Index approach. Evaluating the present level of critical success factors helps businesses to identify areas of weakness and allocate resources ahead of time rather than reactively before project start. Public sector businesses lacking experience applying this approach find great worth in it. The integration of RII with regression analysis using Microsoft Excel, as demonstrated in this study, provides both practitioner-friendly rankings and inferential validation of factor effects.

Recommendation 6: Create Public Sector ERP Implementation Guidelines.Ethio Telecom is a state-owned company, thus the government and regulatory authorities should establish consistent ERP implementation rules fit for public-sector restrictions. These guidelines should address minimum training requirements, procurement policies for vendor selection, user involvement systems, and executive responsibility structures. Standardizing can help public sector organizations beginning their digital transformation to reduce their learning curve. The

guidelines should incorporate the evidence from this study that organizational factors (top management support, capacity building) dominate in public-sector developing-country contexts, while vendor accountability mechanisms require special attention.

5.4.3 Recommendations for Future Research

Recommendation 7: Expand the Framework of Critical Success Factors. Future studies should add system quality, change management, and business process reengineering as extra variables outside the four-factor paradigm. These components would provide a more whole evaluation of ERP implementation factors and enable comparative analysis with studies like Dezdar and Sulaiman (2009) and Nah and Delgado (2006). The inclusion of these variables may also explain the 49.3% of variance in ERP success that remains unexplained by the current four-factor model.

Recommendation 8: Future research tracking the same project team members across time should help to overcome the limits of this single-organizational, cross-sectional descriptive study. Comparative studies among several Ethiopian businesses would also help to spot industry-specific trends and enable generalization of results. Richer contextual knowledge would come from mixed-methods approaches combining quantitative polls with in-depth case studies. Longitudinal designs would also enable examination of how CSF importance shifts across implementation phases.

Recommendation 9: Examine How Developing Technologies Affect CSFs. Future studies should look at how trends in digital transformation, Cloud ERP, and AI-enabled ERP influence the relative relevance and operationalization of classic critical success factors. The nature of vendor support and user involvement may change dramatically as artificial intelligence lowers reliance on conventional consulting models and natural language interfaces alter user interaction patterns. The regression-based approach demonstrated in this study using Microsoft Excel provides a methodological template for assessing whether traditional CSFs retain their predictive power in emerging technological contexts.

5.5 LIMITATIONS OF THE STUDY

While this study provides perceptive examination of significant success criteria for ERP implementation at Ethio Telecom, several limitations must be acknowledged.

First, by focusing just on one companyEthio Telecomthe study limited the generalizability of results to other technology firms or public-sector enterprises in Ethiopia.

Second, just four independent variables were examined, excluding business process reengineering and change management as perhaps important factors. The regression model's R^2 = .507 indicates that these and other omitted variables may explain nearly half the variance in ERP success.

Third, under retroactive perspective bias, data on an implementation between 2012 and 2017 were compiled in 2026. Later events or changes in organization could have molded respondents' memories.

Fourth, even if the census approach yielded an 89.1% response rate, the 10 non-respondents could have had methodically different opinions from the participants.

Fifth, the dependence on self-report questionnaires results in common method bias; the combination of user involvement and vendor support into a single factor may have concealed different perspectives of these two constructions.

Sixth, the ANOVA and regression analyses do not establish causal relationships and are exploratory rather than confirmatory given the single-organization design. While regression provides evidence of predictive relationships, experimental or longitudinal designs would be required to establish causality.

Seventh,all inferential statistical analyses were conducted using Microsoft Excel 2019 with the Data Analysis ToolPak add-in. While Excel provides robust functionality for regression, ANOVA, and descriptive statistics, it lacks some advanced diagnostic features available in dedicated statistical packages such as Ms Excel or R. Researchers replicating this study may wish to verify results using multiple software platforms.

5.6 CONTRIBUTION TO KNOWLEDGE

Notwithstanding these constraints, the work makes several contributions to ERP literature.

Theoretical Contribution: Although most previous studies concentrated on private-sector and developed-sector environments, the paper shows the relevance of the TOE framework to public-sector telecom operations in developing countries. While technical and environmental factors (vendor support, user involvement) failed, organizational factors top management support, teamwork, and trainingdominated. The integration of RII ranking with regression analysis using Microsoft Excel provides a novel methodological approach for assessing both perceived and actual importance of CSFs.

Methodological Contribution: The study shows the efficiency of the Relative Importance Index as a ranking tool for single-organizational ERP studies by offering an alternative to regression-based studies needing larger sample sizes. Combining RII ranking with qualitative triangulation, regression analysis, and dependent variable measurement (ERP Success) enriches descriptive ERP research. The addition of ANOVA for cross-category comparison and regression for predictive validation strengthens the analytical rigor of the RII approach beyond what either method could achieve alone. The use of Microsoft Excel with Data Analysis ToolPak demonstrates that rigorous quantitative analysis is achievable without proprietary statistical software, potentially enhancing replicability in resource-constrained research environments.

Practical Contribution: Apart from qualitative assessments of implementation flaws, the prioritized list of important success elements provides Ethio Telecom and related businesses with an evidence-based prioritizing tool for implementation strategy. The specific recommendations for executive sponsorship institutionalization, cross-functional team restructuring, training investment, and vendor accountability are directly actionable. The finding that Capacity Building's actual impact ($\beta = .360$) exceeds its perceived importance (RII = 0.5268) provides particularly valuable guidance for resource allocation decisions.

Contextual Contribution: By adding to the little ERP literature on Ethiopia and sub-Saharan Africa, the paper addresses the demand for context-specific studies of ERP critical success factors. The findings on vendor support failure and user exclusion in a public-sector telecom environment provide interesting comparative data for scholars investigating ERP deployment in like-minded developing-country environments. The mixed-methods integration demonstrates

how qualitative depth can explain quantitative patterns in ways that either method alone cannot achieve.

5.7 FINAL REMARKS

Enterprise resource planning systems rank among the most significant technology purchases any business will ever make. The ERP project presented Ethio Telecom, a public telecom company with over a century of expertise serving more than 70 million users, a special chance as well as a major risk of aggravating already existing inefficiencies. From the perspective of project team members, this study has revealed that top management support was the foundation upon which any ERP project must be developed; the most failed component of the system was the lack of user involvement and vendor support.

Ethiopia's route of digital transformation could much benefit from this. Starting large-scale technological projects calls for at least as much attention for human and organizational aspects as for technical details of the systems the government and businesses are running on. Developed in this work, the RII-based prioritizing framework offers a practical tool for ensuring that resources and attention are distributed depending on evidence rather than assumption. The integration of this framework with regression analysis conducted in Microsoft Excel provides both practitioner-friendly rankings and statistically validated predictive relationships.

The study concludes that efficient ERP implementation in public-sector environments in developing countries demands not only the presence of significant success factors but also their consistent and balanced execution over the implementation life. Although top management support is crucial, it cannot compensate for systematic failures in human capital development, vendor accountability, and user involvement. The regression analysis provides crucial evidence: Capacity Building's strong predictive effect ($\beta = .360$) despite its moderate perceived importance (RII = 0.5268) indicates that organizations must look beyond surface-level rankings to understand which factors truly drive implementation outcomes. Future implementations at Ethio Telecom and similar businesses have to solve all four dimensions with equal rigor to reap the transformational benefits promised by ERP systems.

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APPENDICES

APPENDIX A: RESEARCH INSTRUMENTS

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF BUSINESS ADMINISTRATION AND INFORMATION SYSTEMS

ANALYSIS OF CRITICAL SUCCESS FACTORS FOR ENTERPRISE RESOURCE PLANNING PROJECT IMPLEMENTATION: A DESCRIPTIVE STUDY AT ETHIO TELECOM

Dear Respondent,

Completing a research project on "Analysis of Critical Success Factors for Enterprise Resource Planning Project Implementation: A Descriptive Study at Ethio Telecom," I am a postgraduate student at Addis Ababa University, School of Commerce. This questionnaire aims to gather information on important success elements influencing ERP implementation effectiveness.

Your involvement in this research is entirely free will. Every answer will be kept absolutely private and used solely for academic purposes.

Thank you for your time and cooperation.

Sincerely,

ZelalemDesta

PART ONE: DEMOGRAPHIC PROFILE OF RESPONDENTS

Kindly mark (✓) the suitable answer or complete the blank space given.

1. Gender:

Male ☐

Female ☐

2. Age:

Below 25 years ☐

25-35 years ☐

36-45 years ☐

46-55 years ☐

Above 55 years ☐

3. Educational Qualification:

Diploma/Certificate ☐

Bachelor's Degree ☐

Master's Degree ☐

PhD/Doctorate ☐

☐er (specify): _____

4. Years of Service at Ethio Telecom:

☐s than 2 years

☐years

☐0 years

☐15 years

☐re than 15 years

5. Your Role in the ERP Implementation Project:

☐Specialist / Technical Team Member

☐ject Manager / Coordinator

☐ctional Area Representative

☐ ior Manager / Executive

☐ nsultant / Vendor Representative

6. Phase(s) of ERP Implementation You Were Involved In:

☐ ject Preparation (2012)

☐ iness Blueprint (2013)

☐ lization (2014-2015)

☐ l Preparation (2016)

☐ Live and Support (2017)

☐ t-Implementation (2018-2024)

7. Department/Functional Area:

☐ ance and Accounting

☐ man Resources

☐ pply Chain / Procurement

☐ tomer Service

☐ work Operations

☐ Systems

☐ ject Management Office

☐ er (specify): _____

PART TWO: CRITICAL SUCCESS FACTORS (CSFs) ASSESSMENT

Please mark your degree of agreement with every statement on the key success elements for ERP deployment at Ethio Telecom. Kindly mark (✓) the correct answer.

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

SECTION A: TOP MANAGEMENT SUPPORT

A1. Top management provided adequate financial resources for the ERP implementation project.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

A2. Top management demonstrated visible commitment and active involvement throughout the ERP implementation phases.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

A3. Top management established clear goals and strategic vision for the ERP system.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

A4. Top management effectively communicated the importance of the ERP project to all employees.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

A5. Top management provided timely decisions and approvals when required during implementation.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

A6. Top management allocated sufficient human resources (skilled personnel) to the ERP project team.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

SECTION B: TEAMWORK AND COLLABORATION

B1. The ERP project team had the right mix of skills and expertise (technical, functional, managerial).

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

B2. Team members from different departments collaborated effectively during the implementation.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

B3. The project team had clear roles and responsibilities with minimal conflicts or overlaps.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

B4. The project champion/leader effectively coordinated team activities and resolved conflicts.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

B5. Communication among team members was open, frequent, and effective throughout the project.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

SECTION C: CAPACITY BUILDING (TRAINING & EDUCATION)

C1. Adequate training was provided to end-users before the ERP system went live.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

C2. The training programs were well-designed and relevant to users' job functions.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

C3. Technical team members received sufficient training on ERP system configuration and maintenance.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

C4. The organization invested adequate budget and time for training and education activities.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

SECTION D: USER INVOLVEMENT AND VENDOR SUPPORT

D1. End-users were actively involved in requirements gathering and system design phases.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D2. User feedback and concerns were adequately addressed during the implementation process.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D3. The ERP vendor provided adequate technical support and guidance during implementation.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D4. The vendor successfully transferred knowledge to internal IT staff for system maintenance.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D5. Consultants/vendors were responsive and accessible when problems arose during implementation.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D6. The vendor understood Ethio Telecom's business processes and customized the system accordingly.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D7. Users were adequately prepared for the changes brought by the new ERP system.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D8. The vendor provided comprehensive documentation and training materials for the ERP system.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

D9. Post-implementation support from the vendor was satisfactory and timely.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

SECTION E: ERP IMPLEMENTATION SUCCESS (OVERALL)

E1. The ERP project was completed within the planned budget.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E2. The ERP project was completed within the planned schedule.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E3. The ERP system meets the organization's business requirements.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E4. The quality of the ERP system (functionality, reliability, usability) is satisfactory.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E5. End-users are satisfied with the ERP system performance.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E6. The ERP system has improved operational efficiency at Ethio Telecom.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E7. The ERP system has improved decision-making capabilities through better information access.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E8. The expected benefits of the ERP system are being realized.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

E9. Overall, the ERP implementation at Ethio Telecom can be considered successful.

1. ☐. ☐ 3. ☐ 4. ☐ 5. ☐

Thank you very much for your valuable time and participation!

APPENDIX B - **INTERVIEW CHECKLIST**

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

ANALYSIS OF CRITICAL SUCCESS FACTORS FOR ENTERPRISE RESOURCE PLANNING PROJECT IMPLEMENTATION: A DESCRIPTIVE STUDY AT ETHIO TELECOM

INTERVIEW CHECKLIST FOR KEY INFORMANTS

Name of Interviewee (Optional): _____

Position/Role: _____

Department: _____

Years of Experience: _____

Q1. What critical success factors do you believe are MOST IMPORTANT for ERP implementation in organizations similar to Ethio Telecom? Please clarify why.

Q2. What recommendations would you give to organizations in Ethiopia planning to implement ERP systems in the future?

Q3. Would you want to add anything regarding the ERP implementation experience we have not addressed?

Thank you very much for your time and valuable insights!