

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS
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DIGITAL TRANSFORMATUON AND IT'S IMPACT ON MANAGEMENT EFFICIENCY IN ETHIOPIAN COMMERCIAL BANKS: A CASE STUDY OF COMMERCIAL BANK OF ETHIOPIA

BY

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DIGITAL TRANSFORMATION AND ITS IMPACT ON MANAGEMENT EFFICIENCY IN ETHIOPIAN COMMERCIAL BANKS: A CASE STUDY OF COMMERCIAL BANK OF ETHIOPIA

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Declaration

I declare that this thesis entitled **'Digital Transformation and Its Impact on Management Efficiency in Ethiopian Commercial Banks: A Case Study of Commercial Bank of Ethiopia'** is my original work, prepared under the guidance of my advisor (Dr. Abera Legesse). All sources of materials used for this thesis have been duly acknowledged. This thesis has not been submitted to any other institution to get a degree or certificate.

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List of Abbreviations and Acronyms

A. Abbreviations and Acronyms

AI ---------- Artificial Intelligence
AMP----------Automation of Managerial Processes
ANOVA----------Analysis of Variance
API ----------Application Programming Interface
BI ----------Business Intelligence
CBE---------- Commercial Bank of Ethiopia
CBS----------Core Banking System
DA---------- Data Analytics
DCT---------- Digital Communication Tools
DPP----------Digital Payment Platforms
EF----------Environmental Factor
ETB----------Ethiopian Birr
IBM ---------- International Business Machines
IT ----------Information Technology
ME ----------Management Efficiency
MIS----------Management Information Systems
MSE---------- Mean Square Error
NBE---------- National Bank of Ethiopia
PRISMA----------Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RBV---------- Resource Based View
SME---------- Small and Medium Enterprises
SPSS----------Statistical Package for the Social Sciences
T24----------Temenos T24 Core Banking System
TOE---------- Technology Organization Environment Framework
VIF---------- Variance Inflation Factor

B. Statistical Symbols

B----------Standardized Beta Coefficient
B----------Unstandardized Beta Coefficient
R---------- Pearson Correlation Coefficient
R---------- Multiple Correlation Coefficient
R^2---------- Coefficient of Determination
F----------F-statistic (ANOVA)
t----------t-statistic
p----------Probability Value (Significance Level)
n----------Sample Size

N---------- Total Population Size
e---------- Margin of Error
α----------Cronbach's Alpha (Reliability Coefficient)
df----------Degrees of Freedom
SD----------Standard Deviation
M----------Mean

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ABSTRACT

Digital transformation has become an essential priority for modern banking institutions, as it reshapes how organizations operate and how managerial activities are carried out. Despite significant investments in digital technologies within Ethiopian commercial banks, there remains limited understanding of how these technologies influence internal management efficiency. This study examines the effect of digital transformation on management efficiency at the Commercial Bank of Ethiopia, with particular attention to how different digital tools support managerial performance.

This study adopts a mixed-methods approach, combining quantitative and qualitative techniques to provide a comprehensive understanding of the research problem. Data were collected from managerial employees through structured questionnaires and supported by interviews to capture deeper insights. The research focuses on key dimensions of digital transformation, including core banking systems, digital payment platforms, communication tools, data analytics, and automation of managerial processes, and evaluates their relationship with management efficiency.

The findings indicate that digital transformation positively contributes to management efficiency, particularly in areas such as decision-making, coordination, and overall managerial productivity. Automation of managerial processes and communication tools emerged as especially influential in improving efficiency, while data analytics showed more limited practical impact in the current organizational context. In addition, the results suggest that environmental conditions do not significantly alter the relationship between digital transformation and management efficiency, indicating that the benefits of digital tools are relatively consistent across different operational settings.

The study concludes that digital transformation plays a critical role in enhancing managerial efficiency within the banking sector, particularly when supported by effective implementation of automation and communication systems. It further highlights the importance of strengthening organizational capabilities to fully utilize advanced digital tools such as data analytics. The findings provide practical insights for bank management and policymakers seeking to improve organizational performance through digital transformation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The global banking industry demonstrates that digital transformation is reshaping how financial institutions create value, conduct operations, and deliver services (Vial, 2019). Moreover, the significant evidence may suggest that this change has emerged as a key priority for financial institutions worldwide. Furthermore, the results could indicate that integrating critical technologies including cloud computing, big data, artificial intelligence (AI), blockchain, and mobile platforms into banking operations may reshape organizational performance (Gomber et al., 2018). Considering these findings, this study might suggest that a significant benefit of digital transformation appears to be its potential to improve efficiency across all organizational levels. This Research shows efficiency links technology to outcomes. However, the evidence may suggest that management efficiency indicated by faster decision-making, smoother communication, and wiser resource use, could demonstrate measurable gains when supported by digital tools (Bloom & Van Reenen, 2007). Additionally, these findings might indicate that digital technologies could support these gains by automating tasks, providing real-time data, and making coordination across organizations easier (Bharadwaj et al., 2013). Therefore, these results may suggest that in developing economies, how fast banks go digital depends on whether they have the right technology and whether their people are ready for the change (Teka, 2020). The research going to give that evidence demonstrates rapid national development, like Ethiopia has shown a clear commitment to using technology to grow its economy and make financial services available to more people. Moreover, the significant findings could suggest that Ethiopia's Digital Ethiopia 2030 strategy appears to focus on using technology to support the broader economy and expand access to financial services (Melesse et al., 2025). Furthermore, the evidence may indicate that the National Bank of Ethiopia has highlighted the expansion of instant payments and digital financial services as part of its Digital Payments Strategy, which could demonstrate to build a more interoperable financial ecosystem (Kyriacou, 2025). At the same time, the results might suggest that Ethiopian commercial banks have responded to these national efforts by investing heavily in digital infrastructure. A clear example of this is Telebirr and various mobile banking apps may demonstrate how quickly digital financial services are

being adopted, processing billions of birr and serving millions of customers (Kyriacou, 2025). Evidence shows adoption extends beyond technology. However, the study might suggest that the success of digital transformation could appear to extend beyond mere technology acquisition, also involving how managers carry out planning, organizing, leading, and controlling more efficiently (Warner & Wäger, 2019). Given that evidence demonstrates scale and reach, the findings may indicate that the Commercial Bank of Ethiopia (CBE) with over 34,000 employees, more than 1,940 branches, and over 800,000 account holders could represent a significant example of how digital transformation and management efficiency interact. Moreover, the results might suggest that CBE's major modernization efforts, including the implementation of the Temenos T24 core banking system and IBM Power servers, appear to have yielded important operational improvements. Additionally, the evidence could indicate that transfers that previously required up to four days are now completed in just ten minutes a 99% improvement and that branch transactions supported daily may have increased by 150%, reaching nearly 500,000. Results show gaps remain understudied. Furthermore, the findings might suggest that how digital transformation affects management efficiency in Ethiopian banks could appear to remain insufficiently understood, despite these notable gains. Therefore, the evidence may indicate that management efficiency reflecting how productively managers perform their roles appears critical in converting technology investments into better organizational performance (Kane et al., 2015). In light of the significant findings, the study might suggest that this dynamic could demonstrate particular importance in the Ethiopian context, were traditional, manual management processes may appear to limit the benefits that digital tools could otherwise bring.

1.2 Statement of the Problem

Although the digital transformation of Ethiopia’s banking sector has attracted academic attention, existing research has primarily focused on customer-oriented aspects, such as technology adoption, service quality, and customer satisfaction (Tiwari, 2021; Ayinadis et al., 2023; Andaregie et al., 2024). Existing research has examined factors influencing e-banking adoption and digital payment penetration, as well as the impact of digital platforms on bank performance (Tessema & Prasad, 2024). However, there remains a significant gap in understanding how digital transformation affects internal management efficiency including the speed, quality, and productivity with which managers perform their functions. The limited existing research on the organizational level of digital transformation in Ethiopian banks reveals concerning findings. (Melesse et al., 2025) assessed the digital innovation readiness

of Ethiopian financial institutions and found that overall readiness was less than ideal, with managers generally perceiving their organizations as more prepared for digital transformation than their employees. This perception gap suggests potential inefficiencies during implementation and management, highlighting the need for a deeper exploration of management efficiency. Specifically, in a study on the CBE, (Yared Abebe, 2024) assessed the impact of digital transaction migration on organizational performance in the Kirkos region, finding that while digital transactions significantly improved efficiency and effectiveness, overall adoption rates remained low relative to total transaction volume account holders. This study recommends developing marketing strategies to encourage the adoption of digital channels but does not explore how management efficiency changes as a result of digitalization measures.

Studies from around the world have shown that going digital can make managers work more efficiently by cutting out repetitive tasks, improving how information moves around, helping teams make smarter decisions, and making coordination much easier (Brynjolfsson & McAfee, 2014; McAfee & Brynjolfsson, 2012). However, these benefits do not arise automatically; rather, they depend on whether organizations can properly adapt management processes and develop managerial capabilities to effectively utilize digital tools (Westerman et al., 2014). In Ethiopia, banks have long been run in a very traditional way with strict management hierarchies and a heavy reliance on manual processes. This is exactly why it matters so much to understand what digital transformation is doing to the way managers work and how efficiently they can do their jobs. In addition to this Dynamic capabilities' theory (Teece et al., 1997) basically says that successful organizations are the ones that know how to adapt pulling together the right resources and reshaping how they operate whenever things around them change. On the other hand, Managerial efficiency theories (Drucker, 2012; Bloom & Van Reenen, 2007) give us a practical way to think about and measure how productive managers are. The problem is that very few studies have combined these two ideas and tested them in the real world particularly within the Ethiopian banking sector. That gap is what this research sets out to fill.

On the other hand, digital transformation sounds good in theory, but Ethiopian bank managers are learning just how messy it can be in practice. They are suffering from confusion over what digital documents are legally valid, to staff who are slow to change, to the difficulty of overhauling processes without disrupting daily operations the challenges are real and layered. Staying compliant with regulations while navigating all this only adds to the pressure (Khalifa, 2025)."None of this is simple and it shows why digital transformation in Ethiopian banking is much harder in practice than it looks on

paper. Without a clear understanding of how digital transformation impacts managerial efficiency, banks risk investing heavily in technology without achieving corresponding improvements in managerial productivity and organizational effectiveness. Therefore, this study aims to address the following research questions: Although Ethiopian commercial banks (particularly the CBE) have invested heavily in digital technologies, there remains a limited empirical understanding of how these technological changes alter management efficiency, as well as which organizational factors facilitate or hinder efficiency gains.

1.3 Research questions

Based on the problem stated in this study, the researcher develops the following research questions:

1. How does digital transformation (Core Banking System, Digital Payment Platforms, Digital Communication Tools, Data Analytics and Business Intelligence, Automation of managerial processes) affect management efficiency at CBE?

2. How do environmental factors influence the relationship between digital transformation and management efficiency at the Commercial Bank of Ethiopia?

1.4 Research Objectives

1.4.1 General objectives

The general objective of this study is to examine the impact of digital transformation on management efficiency at the Commercial Bank of Ethiopia.

1.4.2 Specific Objectives

1. To examine the effect of core banking systems on management efficiency at CBE.
2. To assess the impact of digital payment platforms on management efficiency at CBE.
3. To evaluate the influence of digital communication tools on management efficiency at CBE.
4. To analyses the effect of data analytics and business intelligence on management efficiency at CBE.
5. To examine the impact of automation of managerial processes on management efficiency at CBE.

6. To examine the moderating effect of environmental factors on the relationship between digital transformation and management efficiency at CBE.

1.5 Significance of the study

1.5.1 Practical Significance

This study provides empirical evidence on how digital transformation affects specific four dimensions of management efficiency which are decision-making, resource utilization, coordination, and productivity. by addressing the call for more context-specific research on digital transformation outcomes in emerging economies (Bharadwaj et al., 2013).

The findings may also contribute to refining theoretical models of organizational efficiency in digitally transforming organizations.

For banking executives and managers at CBE and other Ethiopian commercial banks, this study offers actionable insights into how digital transformation can enhance management efficiency. It identifies specific areas where efficiency improvements are achievable, highlights successful practices, and reveals common pitfalls that limit efficiency gains. and also the finding can inform decisions about technology investments, management training, process redesign, and organizational change initiatives for more improvement in managerial productivity.

1.5.2 Policy Significance

This research provides for the National Bank of Ethiopia and other regulatory bodies, what digital transformation delivers and fails to deliver in terms of internal management capacity as organizational evidence. How ever Most current regulatory frameworks evaluate transformation through customer-facing indicators. But after this study that internal management efficiency deserves equivalent attention, particularly as the Digital Ethiopia 2030 strategy will be implemented. And also, these findings may support the development of more comprehensive assessment frameworks and capacity building guidelines.

1.5.3 Methodological Significance

In this study mixed-methods approach will be employed here, combining quantitative measurement of efficiency dimensions with qualitative exploration of how those efficiency changes happen in practice. This demonstrates a research design capable of capturing the complexity of organizational transformation. And, for future researchers it helps to examining how technology reshapes management in similar developing economy banking contexts.

1.5.4 Academica significance

This study contributes to the academic literature on digital transformation initiatives and management efficiency by addressing important gaps and it will extend existing theoretical and empirical understanding within the banking sector.

First, prior studies on digital transformation in banking particularly in the Ethiopian context have predominantly focused on customer-oriented outcomes such as technology adoption, service quality, and customer satisfaction. (Teka, 2020; Tiwari, 2021; Ayinadis et al., 2023) While these studies provide valuable insights, they largely overlook internal organizational outcomes, especially how digital transformation affects management efficiency. This creates a clear gap in understanding how digital technologies influence managerial performance within organizations.

Second, this study addresses this gap by examining the relationship between digital transformation and management efficiency at the managerial level. Unlike previous research, it focuses on how specific components of digital transformation such as core banking systems, digital payment platforms, digital communication tools, data analytics, and automation of managerial processes affect key dimensions of management efficiency, including decision-making, resource utilization, coordination, and managerial productivity. (Brynjolfsson & McAfee, 2014; Bharadwaj et al., 2013) In doing so, the study provides a more comprehensive and multidimensional analysis of efficiency in a digital context.

Third, the study contributes to theory by integrating concepts from digital transformation with management efficiency theories and applying Specifically, it examines the moderating role of environmental factors in shaping the relationship between digital transformation and management efficiency. This extends the application by demonstrating how external conditions influence the effectiveness of digital initiatives at the managerial level.

Finally, the study provides context-specific evidence from Ethiopia, focusing on the Commercial Bank of Ethiopia as a case study. Given the limited empirical research on digital transformation in developing countries, particularly at the organizational and managerial level, this research enhances the generalizability and relevance of existing theories in emerging economy contexts. (Melesse et al., 2025) It also offers a foundation for future academic research on digital transformation and management efficiency in similar institutional environments.

1.6 Scope and limitation of the Study

The researcher is amid to focus on CBE alone. This limits direct generalizability to other Ethiopian banks, but CBE has, highly scaled history of digital investment and organizational complexity that make it an unusually rich site for examining how transformation plays out within a single institution. In addition to this CBE has more than 34,000 employees, 1,940-plus branches, and decade-long digital transformation journey since the Temenos T24 implementation in 2012 offer a lot of managerial experience that smaller institutions simply cannot provide.

Geographically, the researcher concentrates on headquarters and selected branches in Addis Ababa. This reflects the centralized character of CBE's management structure and the concentration of digital initiative implementation in the capital, though it means that the experiences of managers in rural and regional branches are not captured.

The researcher aims to explore the management efficiency base on four dimensions those are decision making efficiency, resource utilization efficiency, coordination and communication efficiency, and managerial productivity. These dimensions were selected based on their prominence in management literature and their direct relevance to digital transformation contexts.

Temporally, this study covers the period from 2012, when CBE implemented the T24 core banking system, to 2026, this timing allowing examination of transformation effects across approximately a decade of digital evolution (Teece et al., 1997).

1.7 Organization of the Study

This thesis is structured into five chapters. Chapter One is introduction of the study it include the background of the research, the statement of the problem, which will be resolved by the research, research questions which the research will seek answers to, objectives of the research, importance of the research, scope of the research, limitations of the research, and organization of the research and what

significance the research will have on different sectors generally The importance of Chapter one was to set the scene for the research and to prove the need for the research.

Chapter Two presents the literature review. Given the interdisciplinary nature of the subject, the review draws on theoretical frameworks as well as empirical studies to build the conceptual foundation for the research. which provides the organizational lens for understanding how banks build and reconfigure capabilities to leverage digital tools effectively. The chapter proceeds to review both global and Ethiopian empirical evidence on digital transformation in banking and concludes with the identification of research gaps and the presentation of the conceptual framework that guides this study.

Chapter Three presents the methodology for research. This chapter described the research design, the target population of the research, the sampling technique and methods of determining sample size, the data collection instruments used in the research, and the procedures followed to conduct the research. This chapter was also explained the types of analysis that were used to analyse the data collected during the research, to include statistical procedures such as descriptive statistics, correlation analysis, and regression analysis and conclude with a discussion on the reliability and validity of the research, as well as ethical issues that were considered in conducting the research.

Chapter Four presents the data analysis and findings. Begins with a description of the demographic profile of respondents, followed by descriptive statistics for the key variables. The chapter then moves to reliability analysis using Cronbach's Alpha, and regression assumption checks covering multicollinearity, normality, homoscedasticity, independence of residuals, and linearity. Following these tests, the chapter presents the results of multiple regression analysis. Pearson's correlation analysis and the PROCESS Macro regression will be used to analyses the moderating role of environmental factors then reported each set of results is discussed in relation to the study's hypotheses, and tables and figures are used throughout to support the interpretation of findings.

Chapter Five draws together the discussions, conclusions, and recommendations that emerge from the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

On this chapter the researcher is going to review theoretical and empirical literature relevant to the study of digital transformation and its impact on management efficiency. The review is organized based on (Asres Abitie, 2019), who emphasizes that a literature review should be organized around concepts and issues rather than authors, that critically discuss concepts, theories, and methodologies, and synthesize findings to establish the importance of one's research and identify gaps in existing knowledge.

This chapter begins by reviewing theoretical foundations including the Dynamic Capabilities theory and management efficiency theories. It then examines the concept of digital transformation in the banking sector, followed by a review of literature on management efficiency and its dimensions in digital contexts. On this chapter empirical studies on digital transformation in Ethiopian banking are critically evaluated, and research gaps are identified. Finally, The chapter concludes with a conceptual framework which shows the researcher variable clearly in order to guide the study.

2.2 Theoretical Foundations

2.2.1 Management Efficiency Theory

Management efficiency may suggest that its central role in organizational thought extends back to the early twentieth century. Moreover, the significant findings of classical theorists including (Frederick, 1911), (Henri, 1916), and (Max Weber, 1947) could indicate that efficiency represented the primary organizational goal. Furthermore, the evidence may demonstrate that the key principles of specialization, standardization, and hierarchical coordination appeared to support maximum output from available inputs. Given that the results establish that these foundational frameworks shaped subsequent inquiry, the study might indicate that their influence could remain relevant today. Efficiency defines core concerns in management literature.

Modern conceptualizations could indicate that (Peter Drucker's, 2012) distinction between efficiency and effectiveness may suggest important theoretical implications. However, the findings demonstrate that management efficiency specifically concerns the optimal utilization of managerial resource time, attention, cognitive effort, and organizational resources to achieve organizational objectives with minimal waste. In light of the significant evidence, the results might indicate that managers' time and attention appear to be scarce resources requiring judicious allocation. Therefore, the study could demonstrate that (Peter Drucker's, 2012) emphasis on managerial efficiency may suggest that this scarcity shapes critical organizational outcomes. Drucker's framework links efficiency to resource allocation.

Moreover, (Bloom and Van Reenen, 2007), in their influential research on management practices across firms and countries, may suggest that three broad areas could demonstrate relevance to management efficiency. Thus, the significant findings might indicate that monitoring, targets, and incentives appear to represent the key dimensions of efficient managerial practice. Notwithstanding the results of earlier frameworks, the evidence could suggest that variation in management efficiency demonstrates significant differences in firm performance across countries and industries. Additionally, the study may indicate that these important findings appear to support a multidimensional conceptualization of the evidence. Research shows efficiency variation affects firm performance.

Furthermore, drawing on management efficiency literature, the study could indicate that four key dimensions appear to emerge as significant. However, Decision-Making Efficiency may suggest that the speed and quality of decisions made by managers demonstrate that efficient decision making minimizes time lags between problem identification and solution implementation while ensuring decisions remain well informed and appropriate (Brynjolfsson & McAfee, 2014). In light of the key findings, Resource Utilization Efficiency might indicate that how effectively managers utilize available resources including their own time, staff time, financial resources, and technology could demonstrate important implications for objectives (Bloom & Van Reenen, 2007). Therefore, the significant evidence may suggest that efficient resource utilization appears to minimize waste and maximize output from given inputs. Evidence shows utilization efficiency affects outputs.

Coordination and Communication Efficiency could indicate that the effectiveness with which managers coordinate activities across individuals and units may suggest that the efficiency of information exchange appears critical. Moreover, the findings might demonstrate that efficient coordination could

minimize duplication, conflicts, and delays in collaborative work (Malone & Crowston, 1994). Additionally, Managerial Productivity may suggest that the output or results achieved per unit of managerial input could indicate that higher managerial productivity appears to support more significant results with the same or fewer managerial resources (Drucker, 2012). Given that the key evidence demonstrates that these four dimensions could provide a significant framework, the study might indicate that their integration appears to support comprehensive assessment of management efficiency. Results show dimensions link to managerial productivity.

2.2.2 Dynamic Capabilities Theory

The theory of dynamic capabilities, originating from the work of Teece, Pisano, and Shuen (1997), expands upon the Resource-Based View (RBV) by explaining how organizations acquire and maintain competitive advantage in rapidly changing environments. Dynamic capabilities are defined as "an organization's ability to integrate, construct, and reconfigure internal and external capabilities to respond to a rapidly changing environment" (Teece et al., 1997). The theory outlines three core activities: those are

Perception: it means identifying and evaluating opportunities and threats in the external environment. Based on our context of digital transformation, it involves identifying technological trends that may affect management efficiency and competitors' moves.

Seizing Opportunities: it is mobilizing resources to seize opportunities and create value. In the study context this includes investing in new technologies, redesigning management processes, and developing management capabilities to leverage digital tools to enhance efficiency.

Transformation: it is generally continuously updating and restructuring organizational assets and structures. In our context this involves continuously adopting management practices in response to evolving technological and environmental conditions to maintain efficiency.

Generally, The Dynamic Capabilities Theory is particularly relevant to this study because enhancing management efficiency through digital transformation requires banks to continuously adjust their management processes and develop new management capabilities. As noted by (Bharadwaj et al., 2013), intangible resources such as data analysis capabilities, managers digital literacy, and management practices are crucial for realizing the efficiency gains derived from digital investments.

This theory also helps to explain why some banks can achieve significant improvements in management efficiency through digital transformation while others can't. this implies that Success depends not only on the acquisition of technology, but also on the ability to develop organizational capabilities to integrate technology with management processes, learn from experience, and continuously adapt (Warner & Wäger, 2019).

2.2.3 Integration of Theoretical Frameworks

This study integrates dynamic capabilities theory with management efficiency theory in order to provide a comprehensive analytical perspective. Dynamic capabilities theory explains the processes through which organizations adjust their management practices to achieve efficiency gains. While Management efficiency theory provides a conceptual framework for defining and measuring dimensions of efficiency. This integrative approach addresses a limitation identified in the literature although many studies link digital transformation investments with performance improvements, there is a limitation of empirical research on how organizations achieve efficiency gains at the managerial level (Tan & Sousa, 2022). This study views managerial efficiency as a key outcome of digital transformation and analyses the factors that facilitate or constrain efficiency gains, thereby helping organizational adaptation processes during banks digital transformations.

2.3 Digital Transformation in the Banking Sector

2.3.1 Conceptualizing Digital Transformation

According to the literature digital transformation may be far more than simple digitization or the adoption of technologies. Based on research sources converge on defining it as a profound, organization-wide shift, driven by digital technologies, that fundamentally alters value creation paths, business processes, and organizational practices (Vial, 2019; Warner & Wäger, 2019).

Furthermore, the evidence could indicate that this definition emphasizes that digital transformation is not primarily about technology but about organizational change enabled by technology. Considering these findings, the study might demonstrate that understanding this distinction appears critical to analyzing how transformation unfolds in practice. Digital transformation in banking shows core integration patterns across operations.

Based on this broad framing the significant literature on banking could indicate that, digital transformation encompasses the integration of core technologies such as cloud computing, big data analytics,

artificial intelligence (AI), blockchain, and open application programming interfaces (APIs) into every facet of operations, from back-end risk management to front-end customer engagement (Gomber et al., 2018).

Moreover, the key distinction between "doing digital" and "being digital" may suggest that many banks initially focused on the former, launching mobile apps or online portals as additive channels. However, the results could demonstrate that true transformation requires re-architecting the business model itself, fostering a culture of agility, data-centric decision-making, and ecosystem partnerships (Kane et al., 2015). Given that the evidence demonstrates these structural requirements, the findings might indicate that additive digital channels appear insufficient for genuine organizational transformation.

2.3.2 Digital Transformation Drivers in Banking

Several factors drive digital transformation globally and in Ethiopia:

Thus, the significant findings on changing customer expectations could suggest that customers increasingly expect seamless, instant, and personalized banking experiences across multiple channels. Moreover, the results may indicate that in Ethiopia, platforms such as Telebirr have demonstrated the demand for digital financial services, processing trillions of birrs in transactions and serving more than 30 million users (Kyriacou, 2025). Furthermore, the evidence could demonstrate that rapid developments in mobile technology, cloud computing, artificial intelligence, and data analytics create new possibilities for banking services. In light of these technological advancements, the important data might indicate that Ethiopian banks are adopting various technologies, with CBE implementing Temenos T24 for core banking, Cloudflare CDN for content delivery, and WooCommerce for e-commerce. Competition drives modernization across the Ethiopian banking sector.

Additionally, the significant evidence on competitive pressures could suggest that competition from fintech companies, other banks, and non-traditional players drives digital innovation in Ethiopia. Moreover, the findings may indicate that the emergence of new banks like Tsedey Bank, which built an entirely new technology stack from the ground up, creates competitive pressure on established banks to modernize. Notwithstanding these competitive dynamics, the key evidence on regulatory frameworks could demonstrate that the National Bank of Ethiopia's Digital Payments Strategy and the partnership between EthSwitch and Mastercard illustrate supportive regulatory developments (Kyriacou, 2025). Given that the results demonstrate these enabling conditions, the evidence might suggest that

financial inclusion objectives also appear central, as Tsedey Bank's ability to serve over 14 million customers across urban and rural Ethiopia demonstrates this potential.

2.3.3 Digital Transformation and Efficiency in Banking

Literature shows digital transformation enhances banking efficiency through multiple mechanisms.

Thus, the significant findings on process automation could indicate that automating routine tasks reduces manual effort, minimizes errors, and accelerates process completion times. Moreover, the evidence may suggest that in management contexts, automation of reporting, data compilation, and routine approvals can free managerial time for higher-value activities (Brynjolfsson & McAfee, 2014). Furthermore, the important results on information accessibility could demonstrate that digital systems make information more readily available to managers, reducing time spent searching for data and enabling faster, better-informed decisions (McAfee & Brynjolfsson, 2012). In light of the findings on communication enhancement, the evidence might indicate that digital communication tools such as email, messaging platforms, and video conferencing enable faster, more flexible communication across organizational boundaries, reducing coordination delays (Hinds & Kiesler, 2002). Efficiency gains from digital tools are not automatic.

Additionally, the significant evidence on analytical capabilities could suggest that data analytics tools enable managers to derive insights from large volumes of data, improving the quality of decisions and resource allocation (Bharadwaj et al., 2013). However, the key results may indicate that research also cautions that efficiency gains are not automatic, as digital tools can create information overload, increase interruptions, and require significant time for learning and adaptation (Westerman et al., 2014). Therefore, the findings could demonstrate that realizing efficiency improvements requires thoughtful integration of technology with management processes and development of managerial capabilities. Given that the evidence demonstrates these important conditions, the significant results might suggest that collaboration platforms appear to facilitate teamwork across locations and time zones, enhancing coordination efficiency (Malone & Crowston, 1994).

2.3.4 Digital Transformation in Ethiopian Banking: Empirical Evidence

Empirical research links digital adoption to key outcomes in Ethiopian banking.

Notwithstanding this theoretical framing, the findings on Ethiopian banking could indicate that (Teka, 2020) examined factors affecting bank customers' usage of electronic banking products in Ethiopia,

finding that perceived usefulness and facilitating conditions significantly influence adoption. Moreover, the significant evidence may suggest that (Tiwari, 2021) investigated e-banking adoption determinants at CBE, identifying infrastructure, security, trust, and perceived ease of use as critical factors. Furthermore, the important results could demonstrate that (Ayinaddis et al., 2023) examined the effect of electronic banking service quality on customer satisfaction and loyalty, finding that reliability, responsiveness, and system availability significantly influence outcomes. Thus, the evidence might indicate that (Andaregie et al., 2024) conducted a nationally representative analysis of digital payment adoption determinants, identifying mobile ownership, internet access, and ATM/debit card access as significant infrastructural enablers. Organizational studies show mixed digital readiness across Ethiopian institutions. However, the key findings at the organizational level could suggest that (Tessema and Prasad, 2024) studied the effect of digital platforms on commercial bank performance in Addis Ababa, finding positive impacts on operational efficiency. Additionally, the results may indicate that (Hordofa, 2024) examined the macro-level relationship between digital transformation and financial stability in Ethiopia, identifying both opportunities and risks associated with digitalization. In light of these significant findings, the evidence could demonstrate that (Melesse et al., 2025) assessed digital innovation readiness among Ethiopian financial institutions, finding that overall readiness is unsatisfactory and that managers generally perceive their organizations as more prepared than employees do. Given that the results demonstrate this important perception gap, the findings might suggest that this gap appears to have significant implications for how digital initiatives are implemented and managed.

2.4 Management Efficiency in banking sector

2.4.1 Conceptualizing Management Efficiency

No studies directly examine digital transformation's impact on management efficiency. Notwithstanding these empirical contributions, the significant evidence could indicate that none of these studies directly examine the impact of digital transformation on management efficiency. Moreover, the findings may suggest that this gap underscores the need for research specifically focused on how digital technologies affect managerial performance in Ethiopian banks. Furthermore, the key results could demonstrate that management efficiency refers to the optimal utilization of managerial resources time, effort, attention, and organizational resources to achieve organizational objectives with minimal waste (Drucker, 2012). Thus, the evidence might indicate that this conceptualization encompasses how effectively managers perform their core functions: planning, organizing, leading, and

controlling. Efficiency differs from effectiveness in focus and operational meaning. However, the important findings on efficiency versus effectiveness could suggest that effectiveness concerns doing the right things achieving appropriate goals and objectives while efficiency concerns doing things right, achieving objectives with minimal waste of resources (Drucker, 2012). Additionally, the significant results may indicate that both are important, but this study focuses specifically on efficiency and how digital transformation enables managers to accomplish their functions more productively

2.4.2 Dimensions of Management Efficiency

Considering these conceptual foundations, the evidence could demonstrate that the study conceptualizes management efficiency across four interrelated dimensions based on management literature.

Decision-Making Efficiency:

Given that the findings demonstrate these important dimensions, the results might suggest that decision-making efficiency appears to encompass two components: speed and quality. Decision speed and quality show measurable impacts from digital transformation.

Moreover, the significant evidence on decision speed could indicate that the time elapsed between problem identification and decision implementation, and that in dynamic environments, faster decision-making enables organizations to respond quickly to opportunities and threats (Brynjolfsson & McAfee, 2014). Furthermore, the findings suggest that decision quality refers to the accuracy, appropriateness, and effectiveness of decisions. Therefore, the key results could demonstrate that digital transformation can enhance both dimensions by providing managers with real-time data, analytical tools, and collaborative platforms that support faster, better-informed decisions (McAfee & Brynjolfsson, 2012). Notwithstanding these important benefits, the evidence might indicate that key indicators of decision-making efficiency include time required to make routine and strategic decisions, accuracy of decisions, confidence in decision quality, and utilization of data in decision-making.

Resource Utilization Efficiency:

Resource utilization efficiency links directly to digital transformation outcomes. Thus, the significant findings on resource utilization efficiency could suggest that it concerns how effectively managers use available resources in their own time, staff time, financial resources, and technology to accomplish objectives. Moreover, the evidence may indicate that efficient resource utilization minimizes waste and

maximizes output from given inputs (Bloom & Van Reenen, 2007). Furthermore, the important results could demonstrate that digital transformation can enhance resource utilization efficiency by automating routine tasks, freeing managerial time for higher-value activities. Given that the findings demonstrate these significant possibilities, the key evidence might suggest that providing better information for resource allocation decisions appears central to realizing these efficiency gains.

Resource utilization efficiency may suggest that organizations could demonstrate meaningful gains through flexible work arrangements that optimize human resource allocation. Moreover, the findings indicate that reducing duplication of effort through better coordination could support overall operational performance. Key indicators of resource utilization efficiency include time spent on routine versus strategic activities, the ability to allocate staff to appropriate tasks, and minimization of duplicated effort. Furthermore, the evidence may suggest that effectiveness of budget utilization and reduction in time spent searching for information represent significant markers of resource efficiency. Efficiency indicators show budget use and information access matter.

Coordination and Communication Efficiency:

Coordination efficiency refers to the effectiveness and smoothness with which managers coordinate activities across individuals, teams, and organizational units to achieve aligned outcomes (Malone & Crowston, 1994). However, the evidence may suggest that communication efficiency, as defined by Hinds & Kiesler (2002), could indicate that the speed, clarity, and effectiveness of information exchange represent critical dimensions of organizational performance. Given that digital transformation demonstrates broad applicability, the findings might indicate that digital communication tools enabling instant, asynchronous, and location-independent communication could support significant coordination gains. Considering these results, collaboration platforms that facilitate joint work on documents and projects appear to provide important infrastructure for the evidence of improved cross-functional efficiency.

Digital tools show coordination and communication improve together. Project management tools may suggest that visibility into task progress and dependencies could demonstrate meaningful operational value for the results of cross-team alignment. Moreover, the findings indicate that information systems ensuring all relevant parties have access to needed information might support the evidence of reduced coordination friction. Key indicators of coordination and communication efficiency include time re-

quired to communicate information to relevant parties, clarity and accuracy of communicated information, and effectiveness of cross-departmental collaboration. Thus, the significant evidence could suggest that frequency of coordination breakdowns or misunderstandings, alongside ease of coordinating activities across locations, appear to represent critical measures of the results of digital transformation efforts.

Managerial Productivity:

Managerial productivity refers to the output or results achieved per unit of managerial input, including time, effort, and resources expended (Drucker, 2012). Higher managerial productivity means achieving more significant results with the same or fewer managerial resources. Digital transformation can enhance this productivity in several ways: it enables managers to handle more tasks or more complex tasks simultaneously, improves the quality of outputs from managerial work, reduces the time required to produce given outputs, and allows managers to leverage technology to multiply their overall impact. The level of managerial productivity can be measured through key indicators such as the number of tasks or projects completed within given timeframes, the quality of outputs produced, the achievement of performance targets, the ability to handle increased responsibility or complexity, and the overall sense of accomplishment and effectiveness among managers.

2.4.3 Factors Influencing Management Efficiency

Literature identifies several factors that influence management efficiency, many of which are relevant to digital transformation contexts:

Information Quality and Accessibility: Managers' efficiency depends heavily on having timely, accurate, and relevant information for decision making and coordination (McAfee & Brynjolfsson, 2012). Digital systems can dramatically improve information quality and accessibility, but only if properly designed and implemented.

Skill and Capability: Managerial efficiency depends on managers' skills in using digital tools, analysing data, and adapting their practices to leverage technology effectively (Westerman et al., 2014). Digital literacy and continuous learning are increasingly important for management efficiency.

Organizational Structure: The structure of the organization hierarchy, centralization, departmentalization affects how efficiently managers can coordinate activities and make decisions

(Malone & Crowston, 1994). Digital transformation may enable or require structural changes that affect efficiency.

Culture and Mindset: Organizational culture that values efficiency, continuous improvement, and data driven decision-making supports management efficiency (Kane et al., 2015). Conversely, cultures resistant to change may limit efficiency gains from digital transformation.

Technology Design and Integration: The design of digital systems and how well they integrate with each other and with management processes affects their impact on efficiency. Poorly designed or fragmented systems can reduce efficiency by creating additional work and confusion (Bharadwaj et al., 2013).

2.5 Empirical Studies on Digital Transformation and Management Efficiency

2.5.1 Global Evidence

Research on digital transformation and organizational efficiency may suggest that international evidence has grown substantially in recent years. (Brynjolfsson and McAfee, 2014), in their extensive research on the digital economy, demonstrate that digital technologies could significantly enhance productivity and efficiency when combined with organizational changes. Moreover, the findings may suggest that simply digitizing existing processes yields limited gains, as the evidence indicates that true efficiency improvements require reimagining processes to leverage digital capabilities. Thus, the significant results could indicate that organizational adaptation remains a critical condition for realizing the full benefits of digital investment.

Research shows data-driven decision-making links to higher productivity. (McAfee and Brynjolfsson, 2012) specifically examined data-driven decision-making and found that firms adopting data-driven decision-making achieve 5-6% higher productivity than expected based on other investments and information technology usage. Furthermore, the significant findings may suggest that analytical capabilities appear essential for management efficiency, given that the evidence demonstrates that technology alone may not account for the observed performance differences. Considering these findings, the results could indicate that organizations investing in analytical infrastructure might realize more substantial efficiency gains than those focusing solely on operational digitization. However, the key evidence may suggest that the relationship between analytical capability and efficiency appears to require careful contextual consideration.

Findings show digital intensity and transformation intensity affect performance outcomes. (Westerman et al., 2014) studied digital transformation in large organizations and identified two distinct approaches: digital intensity (investment in technology) and transformation management intensity (investment in leadership and organizational change). Additionally, the significant findings could indicate that organizations achieving both high digital intensity and high transformation management intensity which they termed "digital masters" might demonstrate substantially stronger financial performance than others. Notwithstanding these results, the evidence may suggest that management efficiency improvements appear to require both the technology investment and the organizational adaptation that the significant study identifies. Therefore, the key findings could demonstrate that neither dimension alone appears sufficient to produce the efficiency outcomes that the research associates with digital mastery.

Evidence shows transformation affects efficiency through process and structural change. (Vial, 2019) conducted a comprehensive literature review, developing a framework that identifies eight building blocks of digital transformation and their impacts on organizations. Moreover, the significant framework may suggest that digital transformation could affect organizational efficiency through changes in processes, structures, and practices, as the evidence demonstrates that multiple organizational dimensions appear implicated. Considering these findings, the results might indicate that the relationship between digital transformation and efficiency appears more complex than earlier research had suggested. Furthermore, the key evidence could demonstrate that a comprehensive theoretical framework appears necessary to capture the full scope of the significant organizational changes involved.

Findings show efficiency advantages from digital initiatives remain transient. (Tan and Sousa, 2022) examined the "digital Red Queen effect," finding that efficiency advantages from digital initiatives are often transient, requiring continuous adaptation. However, the significant findings may suggest that developing dynamic capabilities appears more important for sustained efficiency improvements than focusing on one-time technology implementations. Thus, the evidence could indicate that organizations relying on static digital investments might fail to maintain the efficiency gains that the key results associate with continuous adaptation. Notwithstanding this finding, the results might demonstrate that the relationship between dynamic capability development and sustained efficiency appears to represent a critical but underexplored dimension of the significant literature.

2.5.2 Evidence from Developing Countries

Research from developing countries may suggest that contextually relevant insights could provide important evidence for understanding digital transformation in non-Western settings. (Faiz, 2023) examined determinants of digital technology adoption in innovative firms, identifying adoption costs, perceived usefulness, and technology readiness as significant factors affecting adoption and subsequent efficiency gains. Moreover, the findings could indicate that these key factors appear to shape the relationship between digital investment and efficiency outcomes in ways that the evidence from developed-country contexts may not fully capture. Therefore, the significant results might suggest that adoption costs and technology readiness appear to function as critical mediators in the developing-country adoption process.

Findings show cost and readiness shape adoption and operational efficiency. (Mogollón-Claudett et al., 2023) studied digital marketing technology adoption in SMEs, finding that cost, technological readiness, and perceived usefulness influence adoption decisions, and that successful adoption leads to improved operational efficiency. Furthermore, the evidence may suggest that these key findings appear consistent with the broader developing-country literature, given that the significant results demonstrate that adoption barriers could moderate the relationship between digital investment and efficiency. In light of these findings, the results might indicate that supporting conditions for technology adoption appear as important as the technology investment itself for realizing the efficiency gains that the evidence associates with successful digital transformation. However, the significant findings from Kenyan and Nigerian banks could demonstrate that infrastructure limitations, skill gaps, and regulatory constraints appear to represent important boundary conditions (Ngugi & Karim, 2021; Adeoye & Lawal, 2022). Research shows African banking context links transformation to efficiency with notable challenges

2.5.3 Evidence from Ethiopian Banking

The systematic literature review by (Biruk and colleagues, 2026) on technological factors and digital marketing adoption in Ethiopian banks may suggest that the most comprehensive synthesis of recent evidence appears to highlight both enabling and constraining conditions. Moreover, the significant review, applying PRISMA methodology to peer-reviewed research from 2020 to 2025, could indicate that reliable internet connectivity, platform reliability, adequate technological infrastructure, and network robustness appear essential but insufficient conditions for adoption and efficiency gains. Thus,

the findings might demonstrate that managerial perceptions of usefulness such as performance expectancy, return on investment, and strategic alignment appear to function as critical mediators that could determine whether digital initiatives enhance efficiency. Notwithstanding these enabling factors, the key evidence may suggest that the relationship between infrastructure adequacy and efficiency outcomes appears to require additional organizational and managerial conditions. Findings show digital literacy, government support, and telecom development enable efficiency gains.

The review also highlighted that digital marketing may suggest enhanced operational speed, customer satisfaction, and marketing efficiency, given that the evidence demonstrates that social media platforms could play a vital role in customer engagement. Furthermore, the significant findings might indicate that the importance of digital literacy training for both employees and customers appears critical for maximizing digital benefits, as the key results demonstrate that human capability development could represent a necessary complement to technological investment. Considering these findings, the evidence may suggest that government support and telecom infrastructure development appear to function as significant enablers of the efficiency outcomes that the results associate with successful digital transformation. Therefore, the significant results could indicate that the relationship between external enablers and organizational efficiency appears to represent an important dimension of the Ethiopian banking context. Evidence shows low adoption limits efficiency gains at CBE branch level.

At CBE specifically, (Yared Abebe, 2024) found that digital transaction migration significantly enhances efficiency and effectiveness at the branch level but noted that overall adoption remains low relative to total account holders. Moreover, the significant finding may suggest that management efficiency in promoting and supporting digital adoption could appear as a critical constraint on realizing the broader efficiency gains that the evidence associates with digital transformation. Thus, the findings might demonstrate that the relationship between adoption promotion and efficiency outcomes appears to require more focused empirical attention than the existing literature has provided. However, the key evidence could indicate that the significant gap between technical capability and actual adoption might represent an important organizational efficiency challenge at CBE.

2.6 literature Gaps

The literature review may suggest that several significant gaps appear to limit the current understanding of digital transformation and management efficiency in Ethiopian banking. Furthermore, the findings could indicate that

Gap 1: limited focus on management efficiency appears evident in that existing research has predominantly examined customer-facing aspects, including technology adoption, service quality, and customer satisfaction, with the evidence demonstrating limited attention to internal management efficiency. Studies by (Teka, 2020), (Tiwari, 2021), and (Ayinaddis et al., 2023) it might demonstrate that this customer center focus appears to have left decision-making efficiency, resource utilization, coordination, and managerial productivity underexplored. Therefore, the significant results suggest that researchers are going to examine how digital transformation affects the key internal management dimensions appears necessary to address the evidence gap.

Gap 2: lack of multidimensional efficiency, this given that efficiency is often treated as a unidimensional concept. Moreover, the study's significant approach examining efficiency as decision-making efficiency, resource utilization efficiency, coordination efficiency, and managerial productivity could indicate that a more comprehensive understanding appears possible through the systematic application of multiple efficiency dimensions. Thus, the key findings might demonstrate that this multidimensional framework appears to provide a more theoretically grounded basis for examining the relationship between digital transformation and management efficiency.

Gap 3: the organizational capability black box appears to represent a significant limitation in the existing evidence, given that studies correlating digital investments with performance improvements provide limited empirical insight into how Ethiopian banks develop the specific organizational capabilities needed to realize management efficiency gains. Furthermore, the key results from (Melesse et al., 2025) could indicate that readiness gaps and perception differences between managers and employees appear to have been identified, but the significant processes through which banks build capabilities for efficiency improvement might remain underexplored. Notwithstanding these important contributions, the evidence may suggest that unpacking the capability development processes appears critical for understanding the relationship between digital investment and the efficiency outcomes that the findings associate with successful transformation. Therefore, the significant results could demonstrate that this gap appears to represent a priority area for future empirical research.

Gap 4: single case depth appears to reflect that most existing studies on Ethiopian banking have provided breadth but limited depth on organizational dynamics within specific institutions. Moreover, the significant evidence could indicate that (Yared Abebe, 2024) conducted a case study of CBE's Kirkos District but focused on transaction migration and performance outcomes rather than

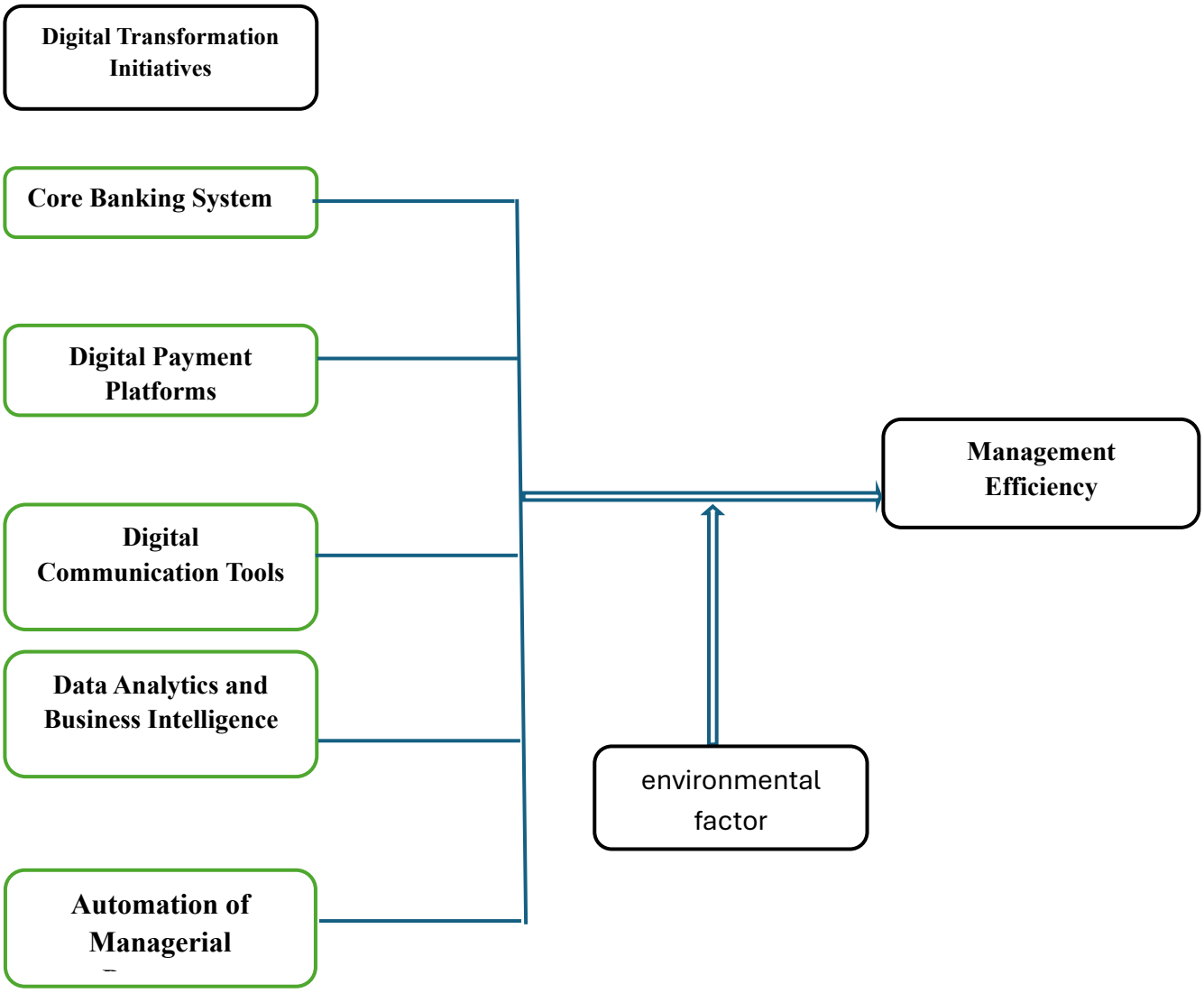
management efficiency, which might demonstrate that in-depth case research examining management efficiency within Ethiopia's largest bank appears lacking. Thus, the key findings may suggest that the relationship between organizational depth and theoretical contribution appears to require case research that could examine how digital transformation shapes management efficiency within a specific institutional context. Furthermore, the results might indicate that the absence of this depth appears to represent a critical gap in the evidence base that the significant study aims to address.

Gap 5: Dynamic Capabilities theory and management efficiency theories have been applied separately in technology adoption research. Moreover, the significant findings could indicate that their integrated application to understand management efficiency changes in digital transformation contexts might appear less studied, as the key results that studies have not fully leveraged these frameworks to examine how technological, organizational, and environmental factors interact to shape efficiency outcomes. Therefore, the evidence may suggest that this theoretical gap appears to limit the explanatory power of existing research on the relationship between digital transformation and management efficiency. Notwithstanding these limitations, the findings might demonstrate that integrating these theoretical perspectives could provide a more comprehensive understanding of the significant efficiency outcomes that the evidence associates with digital transformation.

2.7 Conceptual Framework

The conceptual framework presented the relationships between digital transformation initiatives and management efficiency at the Commercial Bank of Ethiopia with this relationship moderated by environmental factors.

Figure 2.1 CONCEPTUAL FRAMEWORK: DIGITAL TRANSFORMATION AND MANAGEMENT EFFICIENCY



source; self-prepared (2026)

This study conceptualizes digital transformation as the independent variable and management efficiency as the dependent variable, each comprising multiple dimensions. The following sections may suggest that the key dimensions of digital transformation and management efficiency considered in this research could demonstrate meaningful analytical coherence.

Independent Variables: Digital Transformation Initiatives

Core Banking System is defined as the foundational technology infrastructure that supports core banking operations, including account management, transaction processing, and customer data management.

The Specific Elements of Core Banking Systems at CBE are: Temenos T24 core banking system implementation (since 2012); IBM Power servers and infrastructure upgrades; and system integration across banking functions. However, the significant findings from prior research may suggest that core banking systems could demonstrate considerable capacity to enhance management efficiency by providing a single source of truth for customer and transaction data, reducing the time managers spend reconciling information from multiple sources, and enabling real-time access to operational data for decision-making (Bharadwaj et al., 2013). Furthermore, the integration of core systems might indicate that manual data handling and the associated errors could appear substantially reduced, freeing managerial time for higher-value activities. Moreover, the evidence may support that this reduction in reconciliation effort could demonstrate a meaningful contribution to overall efficiency gains. Systems show core functions linked.

Digital Payment Platforms, are technologies that enable electronic financial transactions, including mobile banking, digital transfers, and payment processing systems. The Specific Elements of Digital Payment Platforms at CBE are mobile banking applications; integration with Tele birr and other payment platforms; and digital fund transfer systems. Considering the significant evidence, digital payment platforms could indicate that management efficiency may appear primarily enhanced through reduced transaction processing time, automated reconciliation, and decreased need for manual oversight of routine financial operations. Additionally, the key results might suggest that managers in operations and branch management roles could demonstrate reduced time spent monitoring and approving routine transactions, allowing focus on exception handling and strategic activities (Gomber et al., 2018). Thus, the findings may indicate that this reallocation of managerial attention could appear particularly important in high-volume banking environments. Given that evidence demonstrates reduced manual oversight, digital platforms might support broader strategic capacity. Platforms show efficiency gains clearly.

Digital Communication Tools are technologies that facilitate electronic communication and information sharing among managers and employees. The Specific Elements of Digital Communication Tools at CBE are email systems; internal messaging platforms; collaboration software; and video

conferencing capabilities. Notwithstanding the variation across organizational contexts, the significant evidence may suggest that digital communication tools could demonstrate direct and measurable effects on coordination and communication efficiency. However, the key findings might indicate that these tools could appear particularly effective in reducing the time required to disseminate information and enabling asynchronous communication across time zones and locations, facilitating quick queries and responses, and supporting virtual meetings that reduce travel time and scheduling delays (Hinds & Kiesler, 2002). Therefore, the results may suggest that these tools demonstrate support for more flexible and responsive managerial communication. Furthermore, the evidence might indicate that information overload could appear as a critical risk if these tools are not managed properly, highlighting the importance of organizational context. Tools show coordination improved.

Data Analytics and Business Intelligence are systems and tools that enable collection, analysis, and visualization of data to support decision-making and performance monitoring.

The Specific Elements of Data Analytics and Business Intelligence at CBE are reporting dashboards; performance analytics tools; and customer data analysis capabilities. Given that the significant evidence demonstrates strong theoretical support, data analytics capabilities may suggest that the important relationship between timely, accurate data and decision-making efficiency could appear well-established in the literature (McAfee & Brynjolfsson, 2012). Moreover, the findings might indicate that these tools could demonstrate considerable capacity to enable faster, better-informed decisions and reduce time spent searching for information. Additionally, the key evidence may suggest that analytics tools could appear particularly valuable in supporting resource allocation decisions by providing visibility into performance patterns and areas requiring attention. Considering these results, the study might indicate that data-driven decision support could demonstrate a strong positive impact on overall management efficiency. Analytics show decisions faster.

Automation of Managerial Processes refers to digital systems that automate routine managerial tasks and workflows, reducing manual intervention. The Specific Elements of Automation of Managerial Processes at CBE are automated approval workflows; digital document management systems; e-reporting and dashboard automation; and digital forms and request processing. Nevertheless, the significant evidence may suggest that process automation could demonstrate a direct and measurable effect on resource utilization efficiency by reducing the time managers spend on routine administrative tasks. Thus, the key findings might indicate that automation of approvals, document handling, and

reporting could appear to free managerial time for more strategic activities, potentially increasing managerial productivity (Brynjolfsson & McAfee, 2014). Furthermore, the results may suggest that the extent of efficiency gains could demonstrate considerable dependence on the scope of automation and how well automated processes are integrated with managerial workflows. Moreover, the evidence might indicate that this integration dimension could appear as a critical moderating factor in determining the overall impact of automation on management efficiency. Automation shows productivity gains depend on integration scope.

Moderating Variables: Environmental Factor

This study recognizes that the relationship between digital transformation initiatives and management efficiency is direct but somehow it is moderated by environmental factors. These factors can either enhance or constrain the efficiency gains realized from digital investments.

Specific environmental Factors include.

Table 2.1 specific environmental factors

Factor	Description	Expected Moderating Effect
Technology Maturity	The stability and refinement of implemented technologies	More mature, stable technologies are likely to yield greater efficiency gains as they require less troubleshooting and workaround
System Usability & Reliability	Ease of use and dependability of digital systems	Systems that are user-friendly and reliable are more likely to be adopted and used effectively, enhancing efficiency gains

Management Skills & Digital Literacy	The ability of managers to effectively use digital tools and interpret digital information	Higher digital literacy enables managers to leverage digital tools more effectively, enhancing efficiency gains
Organizational Culture	Shared values, beliefs, and norms regarding technology, change, and efficiency	A culture that embraces innovation and values efficiency strengthens the positive impact of digital initiatives
Regulatory Requirements	Banking regulations, data protection rules, and compliance obligations	Supportive regulations enable efficiency gains; restrictive or unclear regulations may constrain what can be done efficiently
Telecom & Digital Infrastructure	Quality of national telecommunications and internet infrastructure	External infrastructure quality affects the reliability and speed of digital tools, particularly for branch operations
Readiness for Change	Organizational preparedness and openness to adopt new ways of working	Higher readiness for change facilitates smoother adoption of digital tools and associated practice changes
Competitive Pressure	Intensity of competition from other banks and fintech providers	Higher competitive pressure may motivate more effective utilization of digital tools for efficiency

Training & Support	Availability and quality of training programs and technical support	Adequate training and support enable managers to use digital tools effectively, realizing intended efficiency gains

Source; self-prepared (2026)

Dependent Variables: Management Efficiency Dimensions

Decision-Making Efficiency, Decision-Making Efficiency is the speed with which decisions are made and the quality of decisions resulting from managerial processes. Decision speed refers to the time elapsed between problem identification and decision implementation

Resource Utilization Efficiency, the effectiveness with which managers utilize available resources time, human capital, financial resources to accomplish objectives.

Coordination and Communication Efficiency, The speed, clarity, and effectiveness of information exchange and activity coordination across individuals and organizational units

Managerial Productivity is the output or results achieved per unit of managerial input (time, effort, and resources expended).

2.8 Research hypothesis

By addressing the gaps identified in various studies on management efficiency, this research aims to explore the effect of the digital transformation on management efficiency at the Commercial Bank of Ethiopia. The study will formulate the following research hypotheses

Core banking systems enable banks to integrate operations across branches and provide real-time access to financial data. (Aladwani, 2000, DeLone, 1992, and McLean, 1992) show that information system quality and integration significantly improve managerial efficiency. Their work emphasizes that timely, accurate, and accessible information enhances managerial decision-making. In banking contexts, centralized systems reduce duplication of tasks, improve transaction speed, and enhance coordination across branches, leading to improved managerial efficiency.

From the reasoning outlined above, the following hypothesis is proposed.

H_1:

Core banking system implementation has a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

Digital payment platforms streamline financial transactions and reduce dependence on manual processes. (Donner and Tellez, 2008) indicates that digital financial services enhance operational efficiency by lowering transaction costs and increasing service speed. Similarly, Laudon and Laudon, 2005) highlight that digital transaction systems improve organizational efficiency through automation and process simplification. In the context of banking, digital payment platforms reduce workload, minimize errors, and allow managers to focus on higher-level decision-making tasks.

From the reasoning outlined above, the following hypothesis is proposed.

H_2:

Digital payment platforms have a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

Digital communication tools improve the flow of information within organizations. According to (Daft and Lengel, 1986) effective communication systems reduce uncertainty and improve managerial efficiency. In addition, (Robbins and Judge, 2017) argue that efficient communication enhances coordination and managerial effectiveness.

In banking institutions, improved communication facilitates faster decision-making, better coordination among departments, and reduced delays in operations.

From the reasoning outlined above, the following hypothesis is proposed.

H_3:

Digital communication tools have a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

Data analytics and business intelligence (BI) systems enable organizations to convert raw data into actionable insights. (Davenport and Harris, 2007) found that firms using analytics outperform others in decision-making and operational efficiency. Likewise, (Chen, Chiang and Storey, 2012) emphasize that data-driven decision-making enhances organizational performance. In banking, analytics tools support risk assessment, performance monitoring, and strategic planning, thereby improving management efficiency.

From the reasoning outlined above, the following hypothesis is proposed.

H_4:

Data analytics and business intelligence have a significant positive effect on management

efficiency at the Commercial Bank of Ethiopia

Automation reduces manual intervention in routine processes and improves operational speed. According to (Hammer and Champy, 1993) process automation leads to significant improvements in efficiency, cost reduction, and service quality. Similarly, (Turban et al, 2015) argue that automation enhances productivity by reducing human error and processing time. In banking operations, automation of reporting, approvals, and monitoring allows managers to allocate more time to strategic decision-making.

From the reasoning outlined above, the following hypothesis is proposed.

H_5:

Automation of managerial processes has a significant positive effect on management

efficiency at the Commercial Bank of Ethiopia.

Environmental factors such as regulatory environment, competitive pressure, training and support, and telecom infrastructure influence the effectiveness of digital technologies. The Technology Organization Environment framework (Tornatzky, L., & Fleischer, M. 1990) suggests that technological adoption and its outcomes depend on both internal and external environmental conditions. Empirical studies how organizational readiness, infrastructure, and external pressure significantly shape the impact of technology on performance. (Zhu and Kraemers,1995) Thus, even when digital systems are implemented, their effectiveness in improving management efficiency depends on the surrounding environment.

From the reasoning outlined above, the following hypothesis is proposed.

H_6:

Environmental factors (regulatory environment, competitive pressure, Training & Support and telecom infrastructure) have significant moderating effect on the relationship between digital transformation and management efficiency at the Commercial Bank of Ethiopia.

CHAPTER THREE

RESEARCH METHODS

3.1 Introduction

This chapter presents the methodology to examine the relationship between digital transformation initiatives and management efficiency dimensions at the Commercial Bank of Ethiopia (CBE). In this chapter the research design, data collection methods, sampling procedures, and analytical techniques are carefully selected. In particular, the methodology is structured to allow empirical testing of how the five dimensions of digital transformation core banking systems, digital payment platforms, digital communication tools, data analytics, and automation affect management efficiency, and also whether environmental factors have a direction to influence this relationship.

3.2 Research Approach

For this study the researcher uses **mixed-methods approach**. This approach is particularly appropriate because it enables the study to capture both quantitative relationships between variables and qualitative insights into how these relationships manifest in practice within CBE. The quantitative component focuses on measuring the relationship between digital transformation variables (CBS, DPP, DCT, DA, AMP) and management efficiency using structured data. In contrast, the qualitative component explores how managers experience these digital tools in their day-to-day activities, providing deeper understanding of how efficiency improvements occur.

3.3 Research Design

This study employs an explanatory cross-sectional research design to examine the impact of independent variables (CBS, DPP, DCT, DA, AMP) on the dependent variable (management efficiency) and evaluate whether environmental factors moderate these relationships.

The cross-sectional nature of the design allows the study to capture data from multiple managerial levels and branches at a single point in time, reflecting the current state of digital transformation within CBE.

3.4 Target Population, Sample Size, and Sampling Techniques

3.4.1 Target population

In research, the term “population” refers to the group of individuals or items that share certain characteristics and are relevant to the study. It represents the total set from which participants are selected (Yalew, 2018).

Thei study focuses on Addis Ababa because it is the centre of strategic decision making and digital transformation activities at CBE.

CBE was selected as the case for this study for several interconnected reasons. First, its significance as Ethiopia's largest commercial bank with over 34,000 employees and more than 1,940 branches nationwide (Recent Reports, 2023–2024) means that its experience with digital transformation carries system-wide implications for understanding management efficiency across the banking sector. Second, CBE has undertaken substantial technology modernization since 2012, including the implementation of the Temenos T24 core banking system, making it a rich and relevant case for examining digital transformation in practice. Third, as a researcher affiliated with Addis Ababa University, access to CBE's headquarters and branches in Addis Ababa was practically feasible, supporting the data collection process. Finally, existing research on CBE, such as studies by Yared Abebe (2024) and Tiwari (2021), provides a baseline understanding of the institution and identifies areas requiring further investigation particularly regarding management efficiency which this study seeks to address. The study focuses on 9 selected branches of the Commercial Bank of Ethiopia in Addis Ababa, including Headquarters, these selected branches vary across several important dimensions relevant to the study, including level of digital transformation adoption, transaction volume, strategic role, customer profile, and technological maturity. This variation is essential because it enables the study to capture diverse managerial experiences and contexts, thereby providing a more comprehensive understanding of how digital transformation influences management efficiency across different organizational settings. (John W. Creswell ,2018)

Those branches are, 1 (Bole Airport branch, 2 Merkato branches , High-income customers, represents advance technological maturity) 3 (Piasa Arada branch, Older business district ,Mix of manual and digital operation shows transaction state) 4 (Mexico square branch mix of Government corporate transactions, and business clients shows Central high-mobility area Balanced digital + traditional usage) 5 (Sarbet branch, Moderate to high transaction volume Likely to have steady digital usage, not extreme)

6 (Kazanchis branch, it is one of the most strategic business districts Represents high digital intensity) , 7 (Saris branch, Industrial/logistics zone it has different customer profile (business-heavy) this branch helps to test efficiency in non-commercial hub settings) and 8 (Tewodros branch, A high-volume, mixed-technology environment), (CBE Report 2023). Headquarters is included due to its central role in strategic decision-making and digital initiative implementation.

The target population of this study comprises managerial employees, who actively interact with digital transformation systems, including core banking systems, digital payment platforms, communication tools, and data analytics systems. This focus ensures that respondents: Possess relevant experience with digital technologies, meaningfully assess their impact on management efficiency, these individuals are directly involved in managerial functions such as decision-making, coordination, and resource allocation, Therefore, they are considered the most appropriate population for examining the impact of digital transformation on management efficiency.

Due to the absence of publicly available exact data on the number of managerial staff at branch level, the population size is estimated based on organizational structure and prior studies (Tiwari, 2021; Yared Abebe, 2024).

In headquarter there will be up to 150 managers including Vice Presidents, Directors, Department Heads, Division Managers, and for the rest 9 branches there will be 8 managers including District Manager, Branch Managers, Operations Manager, Credit Manager, Customer Service Manager, retail manager, interest free manager, According to Yamane's formula our N will be 222

The sample size will be determined using Yamane's formula:

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

Where:

n = sample size

N = population size

e = margin of error (0.05)

$n = 222 / (1 + 222(0.05)^2)$

$n = 222 / (1 + 222(0.0025))$

$n = 222/ (1 + 0.56)$

n = 222/ 1.56

n = 143

To account for non-response and incomplete questionnaires, the sample size will be increased by 20%, resulting in a target of approximately 172 respondents. Proportionate allocation will be used to distribute the sample across strata based on the estimated number of managers in each stratum.

3.4.2. Sampling techniques and sample size

Sampling Techniques and sample size Sampling involves selecting specific elements from larger population to represent the entire population (Ofosu-Boateng, 2020). This study employs a judgmental (purposive) sampling technique, which is a non-probability sampling method.

Judgmental sampling involves the deliberate selection of participants based on their knowledge, experience, and relevance to the research objectives (Creswell & Creswell, 2018). This approach is appropriate for this study because the research specifically targets managers who Have direct experience with digital transformation initiatives, are actively involved in decision-making, coordination, and resource management, can provide informed and relevant responses regarding management efficiency. To ensure diversity and representation, respondents were selected across: Different managerial levels (top, middle, lower) in different branches with varying levels of digital transformation. And, for qualitative interviews, the researcher uses the same technique to select information rich participants who can provide deep insights into digital transformation and management efficiency.

Participants in the interviews were selected based on a few practical considerations. First priority was given to managers who are directly involved in, or at least familiar with, digital transformation activities within the bank. This was important to ensure that the responses reflect actual experience rather than general opinions.

In addition, managers with longer work experience, particularly those with around ten years or more at CBE, were considered, as they are more likely to provide a broader view of how digital transformation has developed over time. Participants were also chosen from roles where digital systems are likely to influence day-to-day operations and management practices. Finally, only those who were willing to take part in more detailed discussions were included in the interview.

The study included a total of seven participants for the interviews. This group was selected from different levels of the organization to capture different perspectives. One senior-level manager was included to provide a strategic viewpoint, while three middle-level managers were selected to explain how digital initiatives are implemented and coordinated. In addition, three lower-level managers were included to share their experiences related to daily operations and efficiency.

Although the number of participants may seem relatively small, qualitative studies usually place more emphasis on the depth and relevance of information rather than the size of the sample. In this case, the aim was to collect detailed insights from individuals who are directly involved in the processes being studied, which was considered more important than having many participants.

3.5 Method of data collection tools and source of data

3.5.1 Source of Data

Primary data source;

Managers at Various Levels: This includes top-level executives (vice presidents, directors), middle level managers (department heads, division managers), and lower-level managers (branch managers, team leaders, supervisors). This multi-level approach enables examination of how digital transformation impacts management efficiency across the organizational hierarchy, addressing the perception gap identified by Melesse et al. (2025) and capturing variation in efficiency experiences at different levels.

Secondary data for this study was drawn from a range of credible and relevant sources. These included CBE's annual reports, strategic plans, and policy documents, as well as regulations and guidelines issued by the National Bank of Ethiopia. Industry reports and publications on the Ethiopian banking sector were also consulted, alongside previous research studies conducted on CBE and the broader Ethiopian banking industry. Additionally, publicly available information on CBE's technology initiatives was reviewed, and where accessible, internal reports on digital transformation progress and related metrics were incorporated to enrich the overall understanding of the subject.

3.5.2 Data Collection Instruments

This study uses both quantitative and qualitative data collection instruments to analyse so a structured questionnaire will be developed to collect quantitative data from manager. The questionnaire items

were developed based on the study's conceptual framework and adapted from established literature to ensure validity and reliability.

Items measuring **core banking systems and digital platforms** were adapted from studies by Bharadwaj et al. (2013) and Gomber et al. (2018).

Items related to **data analytics and decision-making efficiency** were adapted from McAfee and Brynjolfsson (2012) and Davenport and Harris (2007).

Measures of **management efficiency dimensions** were adapted from Bloom and Van Reenen (2007) and Drucker (2012).

Items for **digital communication and coordination efficiency** were adapted from Hinds and Kiesler (2002).

Environmental factors were adapted from the **TOE framework** (Tornatzky & Fleischer, 1990).

Measures of **Data Analytics and Business Intelligence** were adapted from McAfee & Brynjolfsson (2012) and Davenport & Harris (2007)

Items measured **Automation of Managerial Processes** were adapted from Brynjolfsson & McAfee (2014) and Turban et al. (2015)

In addition, a semi-structured interview guide will be designed to collect qualitative data from senior executives, department heads, and presidents. The guide will consist of open-ended questions aimed at exploring participants' experiences, perceptions, and insights regarding management efficiency. This approach allows for flexibility in probing deeper into key issues and provides rich, detailed information to complement the quantitative findings.

3.6 Data Analysis

In this study after collecting the questionnaires, the responses will check to make sure they were complete and consistent. In cases where there were missing or unclear responses removing the hole will be taken as an action. The final dataset was then coded and entered in SPSS (Version 27) for analysis.

Then begin with, descriptive statistics are used to get a general understanding of the data. This included looking at basic information about the respondents, as well as summarizing key variables. Frequencies and percentages were mainly used for demographic data, while mean values and standard deviations helped show how responses were distributed across the different items.

To make sure the measurement scales were reliable, Cronbach's Alpha was calculated. A value around 0.70 or higher was taken as an acceptable level. This is discussed below on reliability and validity part In addition, correlation analysis was carried out to explore how the main variables were related to each other and whether those relationships were positive or negative.

For further analysis, multiple regression was used to examine how the different aspects of digital transformation are associated with management efficiency. A moderation analysis was also included to see whether environmental factors change the strength of this relationship.

And also, to know the direction of moderating effect on management efficiency will made analysis with process by Andrew(version 4.0).

Finally, the results were interpreted using values such as beta coefficients, R-square, and significance levels. At the same time, some basic assumptions required for regression analysis such as normality and the absence of multicollinearity were checked to ensure that the results are reasonably reliable.

3.7 Validity and Reliability

The validity and reliability of the study were carefully considered during the design and data collection process. In terms of validity, the questionnaire was developed based on existing literature and previously used measurement approaches. The aim was to ensure that the questions reflect the key concepts of the study, such as digital transformation, environmental factors, and management efficiency. Before the final data collection, a pilot test was carried out to check whether the questions were clear and easy to understand. Based on the feedback, some adjustments were made to improve clarity. In addition, more than one item was used to measure each concept, and factor analysis was conducted to confirm whether the items were properly grouped.

Reliability was also examined to check the consistency of the responses. For this purpose, Cronbach's Alpha was used, with a general threshold of 0.70 as a reference point. The results showed that the scales were reasonably consistent and suitable for further analysis.

3.8 Ethical Considerations

This research adhered to the ethical guidelines prescribed by Addis Ababa University and national research ethics standards for studies involving human participants. Ethical clearance was obtained from the Addis Ababa University College of Business and Economics Research Ethics Committee prior to data collection. All participants were provided with clear information about the purpose of the research,

the procedures involved, potential risks and benefits, and their rights as participants. Written or verbal consent was obtained before participation, and for interview participants, a signed consent form was used. Participants were also informed that their involvement was entirely voluntary and that they were free to withdraw at any time without facing any penalty or negative consequences. To protect privacy, anonymity was maintained for all survey respondents by ensuring that no identifying information was collected, while confidentiality was assured for interviewees by removing any identifying details from transcripts and reports. All data was stored securely with password protection, and access was limited to the researcher and supervisor only. Data was retained solely for the duration necessary to complete the research and was securely destroyed upon completion. Findings were reported honestly, accurately, and completely, without any manipulation, falsification, or misrepresentation, and all limitations of the study were openly acknowledged. Overall, the research was guided by the principle of beneficence, aiming to generate knowledge that benefits CBE, the broader banking sector, and academic understanding, while keeping potential risks to participants minimal and well-managed

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and interpretation of the data collected to examine the impact of digitalization on management efficiency at Commercial Bank of Ethiopia, a case study on CBE. The data was collected from managers of the bank through questionnaires and interviews, since the study employed a mixed research approach involving both quantitative and qualitative methods. After the data collection process, the responses were organized, coded, analysed, and interpreted in line with the objectives of the study and the literature reviewed in the previous chapters.

The chapter includes descriptive statistics, correlation analysis, and regression analysis to examine the relationship between independent and dependent variables. As stated in the methodology section, questionnaires were the primary instrument used to collect quantitative data, while interviews were conducted to support the qualitative aspect of the study. A total of 172 questionnaires were distributed to the respondents, and 148 properly completed questionnaires were returned and used for the final analysis, while the remaining questionnaires were excluded due to incomplete responses. In addition, interview responses obtained from selected top managers were analysed and incorporated to support the quantitative findings.

The response rate was calculated to ensure that the collected data were reliable and representative of the target population.

Response Rate (%) = (Number of Completed Questionnaires Returned ÷ Total Number of Questionnaires Distributed) × 100

= (148÷ 172) × 100

= 86.1%

An 86.1% response rate is generally considered very good. In most surveys, a response rate above 50-60% is regarded as acceptable, while 70% or more is considered excellent (Groves & Couper, 1998). Therefore, a response rate of 86.1% indicates that a large proportion of the sample has provided feedback, making the data likely reliable and representative of the entire sample

4.2. Descriptive statics

Demographic information about respondents is shown below

Table 4.1 Demographic information of the respondent

Variable	Category	Frequency	Percent
GENDER	MALE	85	57.4
	FEMALE	63	42.6
AGE	Under 30 years	3	2
	30-39 years	45	30.4
	40-49 years	53	35.8
	50 years and above	47	31.8
HIGHEST EDUCATION QUALIFICATION	Bachelor's Degree	3	2
	Master's Degree	134	90.5
	PHD	11	7.4
MANAGEMENT LEVEL	Top Level	11	7.4
	Middle Level	70	47.3
	Lower Level	67	45.3
EXPERIENCE IN CBE	Less than 5 years	7	4.7
	5-10	53	35.8

	11-15	43	29.1
	More than 15 years	45	30.4
Years of experience on current management level	Less than 2 years	48	32.4
	2-5	26	17.6
	6-10	50	33.8
	More than 10	24	16.2

source: survey results (2026)

Table 4.1 presents the demographic characteristics of the respondents included in the study. The findings show that most respondents were male employees, accounting for 56.4%, while female respondents represented 42.6%. In terms of age, most respondents were between 40–49 years (35.8%), followed by those aged 50 years and above (31.8%), indicating that the study involved mature and experienced employees.

Regarding educational qualification, most respondents held master's Degrees (90.5%), showing that the respondents were academically qualified to provide reliable information for the study. Concerning management level, most respondents were middle-level managers (47.3%) and lower-level managers (45.3%), while a smaller proportion were top-level managers (7.4%).

With respect to work experience in Commercial Bank of Ethiopia, many respondents had between 5–10 years of experience (35.8%), followed by those with more than 15 years of experience (30.4%). Similarly, regarding years of experience at the current management level, most respondents had between 6–10 years of experience (33.8%) and less than 2 years of experience (32.4%). Overall, the demographic results indicate that the study involved qualified and experienced respondents capable of providing relevant information regarding digitalization and management efficiency.

4.3 Analysis of Dependent, Independent, Moderator variables

Table 4.2 Analysis of variables

	N	Minimum	Maximum	Mean	Std. Deviation
core banking system	148	2.20	5.00	3.8378	.58941
digital payment platform	148	2.20	5.00	3.7649	.58215
digital communication tool	148	2.75	5.00	3.8716	.56956
data analytics	148	2.50	5.00	3.8243	.60078
automation of manage-rial	148	2.20	5.00	3.8338	.57399
management efficiency	148	2.17	5.00	3.6824	.59993
environmental factor	148	1.38	5.00	3.4806	.66779

source: survey results (2026)

Based on table 4.2 **core banking system (CBS)** has the average score of 3.84 out of 5.00 tells us that the majority of the 148 CBE managers leaned toward agreement when asked about the role of core banking systems in their work. To put this in perspective, a score of 3.00 would represent a neutral position neither agreeing nor disagreeing so 3.84 sits clearly on the agreeable side without reaching full agreement (5.00).

The minimum score of 2.20 means that even the least satisfied respondent did not go all the way down to 1.00 (strongly disagree), which suggests that no one in the sample completely dismissed the importance of core banking systems. On the other end, the maximum of 5.00 shows that some respondents were fully convinced of its importance.

The standard deviation of 0.59 is relatively small, meaning that most respondents answered within a close range of each other. In practical terms, this means that most responses were likely within a close range, roughly between 3.25 and 4.43. This relatively narrow spread suggests that many CBE managers share a similar view, particularly in recognizing the importance of the core banking system in supporting their work

Digital Payment Platform (DPP) With the lowest means of all five constructs at 3.76, digital payment platforms received the least favourable ratings though still clearly on the positive side. This might reflect the fact that digital payment platforms are still relatively newer or less fully integrated into daily

managerial operations at CBE compared to other systems, leading some managers to be more cautious or reserved in their assessments.

The minimum of 2.20 and maximum of 5.00 mirror the CBS pattern, and the standard deviation of 0.58 is the second smallest in the group, meaning respondents were quite consistent in their moderate to positive ratings. The lower mean is therefore not a result of wild disagreement among respondents rather; the group simply rated this construction a bit lower than the rest.

Digital Communication Tool (DCT) This construction stands out for two reasons. First, it has the highest mean of all five at 3.87, meaning respondents on average viewed digital credit and technology most favorably. Second, its minimum score of 2.75 is the highest minimum across all constructs meaning not a single respondent rated it as low as 2.20 or below. This is a strong indicator that there is a floor of positive perception around digital credit technology even the most skeptical respondents still gave it a moderately positive rating.

The standard deviation of 0.57 the lowest in the group, confirms that responses were the most tightly clustered around the mean for this construct. In other words, CBE managers are the most unified in their positive view of digital credit and technology compared to any other area measured in this study.

Data Analytics (DA) scored a mean of 3.82, placing it in the middle of the five constructs. What makes this construct slightly different from the others is its standard deviation of 0.60 the highest among all five. While the difference is small, it is meaningful: it tells us that opinions about data analytics were slightly more divided than opinions about the other constructs.

This could reflect the reality on the ground data analytics is a relatively advanced capability that not all managers may be equally exposed to or comfortable with. Some managers who actively use data-driven decision making may have rated it very highly, while others who have limited experience with analytics tools may have been less convinced. The minimum of 2.50 supports this, as it is higher than CBS and DPP but lower than DCT, suggesting a moderate level of scepticism exists in a small portion of the sample.

Automation of Managerial Processes (AMP) Automation of managerial processes received a mean of 3.83 sitting almost exactly in the middle of the group alongside data analytics. Respondents rated automation positively, and with a standard deviation of 0.57, their responses were quite consistent. The minimum of 2.20 is shared with CBS and DPP, and the maximum reaches 5.00, showing the full range of opinions exists but is balanced toward the positive end.

The results suggest that while managers recognize the value of automation, there may still be a segment of the sample like those in more traditional or less technology-driven roles who have mixed feelings. This is not unusual in banking environments where automation is still being rolled out gradually and its benefits may not yet be uniformly felt across all management levels.

Management Efficiency (ME) All 148 managers responded to this construct, with scores ranging from 2.17 to 5.00 and an average of 3.68 out of 5.00. This means managers generally agree that management efficiency is positively influenced, though the rating is slightly lower compared to the five digital technology constructs which averaged around 3.83. The standard deviation of 0.60 indicates moderate consistency respondents were reasonably aligned in their views, though slightly more spread out than the other constructs, suggesting a small portion of managers were less convinced about the impact on management efficiency.

Environmental Factor as a Moderator Variable As a moderator variable, environmental factor does not directly cause or produce management efficiency instead, it **influences the strength and direction of the relationship** between the five digital banking technologies (CBS, DPP, DCT, DA, AMP) and management efficiency.

The mean of 3.48 suggests that the environmental conditions surrounding CBE managers such as government regulations, economic stability, infrastructure availability, and organizational culture are **moderately present and influential**, but not overwhelmingly so. In other words, the environment plays a role, but it does not completely dominate the relationship between technology and efficiency.

The standard deviation of 0.67 the highest in the study is particularly important for a moderator variable. It tells us that **managers experience very different environmental conditions** depending on their branch, region, or management level. This variation is desirable in a moderator variable because it means the environment affects some managers more strongly than others, which is precisely what a moderator is expected to do.

The minimum of 1.38 further confirms that **for some managers, environmental conditions are genuinely unfavourable** poor infrastructure, weak regulatory support, or limited resources which likely weaken the positive impact of digital technologies on their efficiency. Meanwhile, managers at the maximum of 5.00 operate in highly supportive environments where the same technologies produce stronger results.

4.4 Reliability test

To determine the internal consistency of the questions used in the survey, the scale of Cronbach alpha was used. Cronbach alpha ranges from between 0 and 1. George and Mallery (2003), provides a general guideline that the closer the reliability coefficient is to 1, the better the reliability of the measurement. Anything above 0.7 is considered acceptable. Below is the measurement for the reliability of the variables used.

Table 4.3 Internal consistency table (reliability test)

Variable	Cronbach's Alpha	Number of items
Core banking system	.801	5
Digital payment platform	.773	5
Digital payment platform	.725	4
Data analytics and business intelligence	.728	4
Automation of managerial	.777	5
Management efficiency	.827	6
Environmental factor	.887	8

source: survey results (2026)

As shown in tables 4.3, the 37-item scale exhibited acceptable internal reliability, achieving a Cronbach's alpha of >0.7 which is above the acceptable level. Therefore, we can conclude that the items used were reliable and consistent.

4.5 Regression Model

There are some lists of assumptions that must be tested before doing regression analysis. These are tested below.

4.5.1 Multicollinearity

Multicollinearity checks whether independent variables are too highly correlated with each other detected by calculating the VIF (variance inflation factor). VIF result of below 0.10 indicates that multicollinearity is a problem. And VIF values above ten indicate collinearity issues. (Sarstedt & Mooi, 2019). But as shown in table 4.4 the VIF is not above 10 or below 0.10. Therefore, the results show there is no multicollinearity with the variables.

Table 4.4 multicollinearity test

Model		Collinearity Statistics	
		Tolerance	VIF
1	core banking system	.650	1.539
	digital payment platform	.662	1.512
	automation of manger process	.600	1.667
	data analytics	.740	1.350
	digital communication tool	.680	1.470

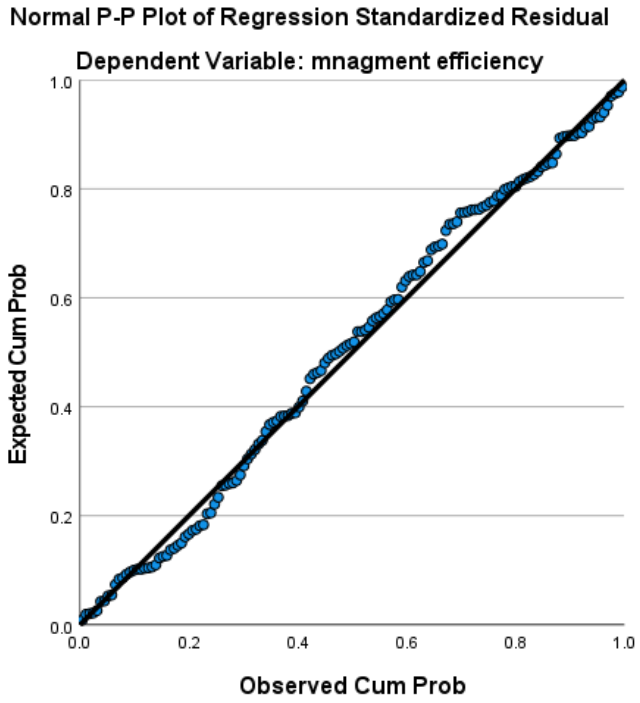
a. Dependent Variable: management efficiency

source: survey results (2026)

4.5.2 Normality

A **normality test** checks whether the data follows a normal distribution. The normality of residuals was checked using the P–P Plot. The plots in figure 4.1 show that the residuals were closely aligned with the diagonal line. The result shows that the residuals are normally distributed hence the normality assumption is satisfied.

Figure 4.1 test of normality



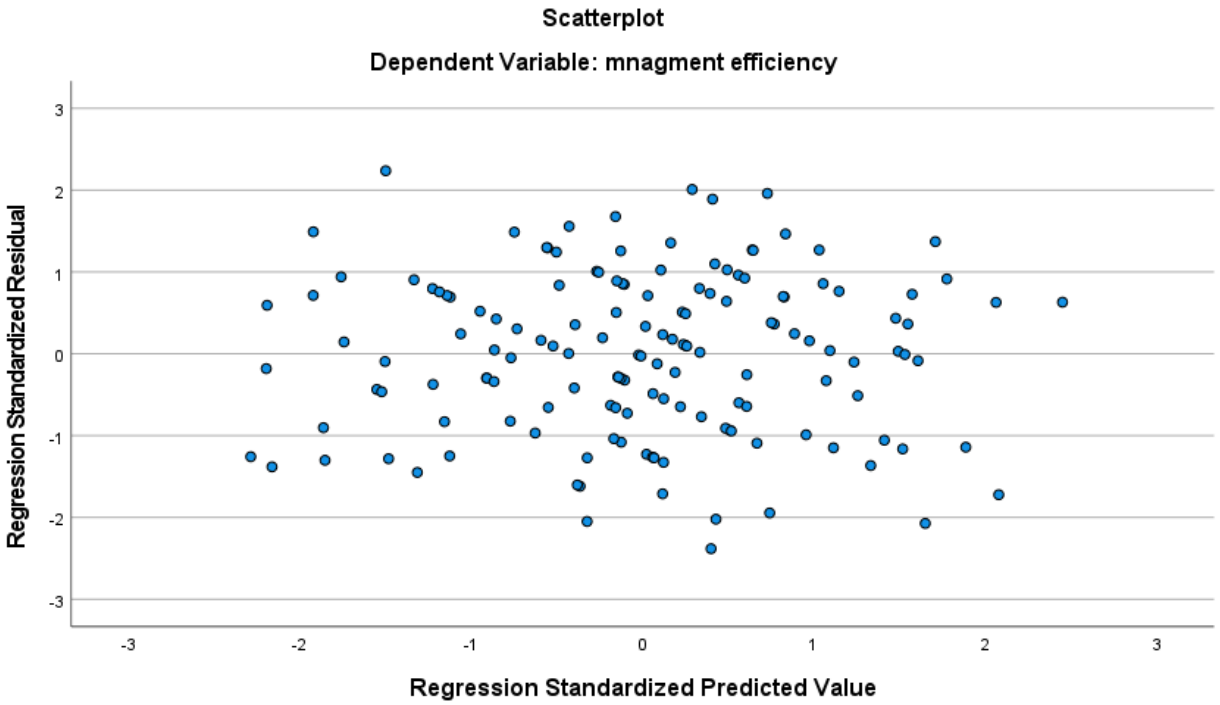
source: survey results (2026)

The Normal P–P Plot of Regression Standardized Residuals indicated that the data points closely followed the diagonal line with only slight deviations. This suggests that the residuals were approximately normally distributed and that the assumption of normality was satisfied

4.5.3 Homoscedasticity

Homoscedasticity means the residuals (errors) have constant variance across all levels of the predicted values. To test this, we plot the error or residual against the dependent variable. (Mooi & Sarstedt, 2011). The result in figure 4.2 shows that the plot showed a random dispersion of residuals around zero with no clear pattern or funnel shape, indicating that the variance of the errors is constant. Therefore, the homoscedasticity assumption for multiple regression analysis is satisfied.

Figure 4.2 test of homoscedasticity



source: survey results (2026)

4.5.4 Independence of Residuals (No Autocorrelation)

These assumptions mean the prediction errors (residuals) in the regression model should not influence each other.

Table 4.5 table of independence of residual

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.713[a]	.508	.490	.42825	1.955

a. Predictors: (Constant), automation of manger process, core banking system, data analytics, digital communication tool, digital payment platform

b. Dependent Variable: management efficiency

source: survey results (2026)

The Durbin-Watson statistic in table 4.5 was 1.955. Since this value is close to 2, it indicates that there is no significant autocorrelation among the residuals. Therefore, the assumption of independence of errors was satisfied, implying that the residuals were independently distributed and the regression model was statistically appropriate.

the model demonstrates a strong explanatory capability, indicating that digital transformation dimensions significantly contribute to explaining variations in management efficiency at the Commercial Bank of Ethiopia. Furthermore, the Durbin-Watson result confirms that the regression residuals were independent, satisfying one of the key assumptions of multiple regression analysis.

4.5.5 Linearity

Linearity means the relationship between the independent variables and the dependent variable follows a reasonably straight-line pattern.

Table 4.6 ANOVA test for linearity

DV with IV		Sum of square	df	Mean square	F	Sig.
Management efficiency * core banking system	linearity	15.146	1	15.146	60.974	<.001
	Deviation from linearity	4.723	13	.363	1.463	.140
Management efficiency* digital payment platform	linearity	13.274	1	13.274	50.364	<.001
	Deviation from linearity	4.579	13	.352	1.337	.200
Management efficiency * digital communication tools	linearity	15.533	1	15.533	62.389	<.001
	Deviation from linearity	3.016	8	.377	1.514	.158
Management efficiency * data analytics	linearity	8.110	1	8.110	26.136	<.001
	Deviation from linearity	2.289	9	.254	.820	.599
Management efficiency * automation of managerial process	linearity	17.631	1	17.631	70.733	<.001
	Deviation from linearity	2.125	13	.163	.656	.802

source: survey results (2026)

In table 4.6 this is the between Management Efficiency (DV) and each independent variable (IV). It checks two things: Linearity (is the relationship significantly linear?) and Deviation from linearity (is there any significant non-linear pattern?) so Linearity row (Sig. < 0.05) significant linear relationship

Deviation from linearity (Sig. > 0.05) no significant non-linearity This combination confirms a valid linear relationship If deviation were < 0.05, that would mean non-linear issues

4.6 Regression analysis

Table 4.7 Regressing model summary table

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713[a]	.508	.490	.42825

a. Predictors: (Constant), digital communication tool, digital payment platform, data analytics, core banking system, automation of manger process

source: survey results (2026)

The model summary in table 4.7 indicates a strong positive relationship between digital transformation variables and the dependent variable, with R = 0.713. The R^2 value of 0.508 shows that approximately 50.8% of the variation in the dependent variable is explained by the predictors, indicating a moderate to strong explanatory power. The adjusted R^2 of 0.490 confirms that the model remains stable after adjusting for the number of predictors. The standard error of 0.428 suggests a moderate level of prediction accuracy.

Table 4.8 Anova test of the relationships

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.865	5	5.373	29.297	.000[b]
	Residual	26.042	142	.183		
	Total	52.908	147			

a. Dependent Variable: management efficiency

b. Predictors: (Constant), digital communication tool, digital payment platform, data analytics, core banking system, automation of manger process

source: survey results (2026)

The results of the regression analysis in table 4.8 indicate that the overall model is statistically significant. The ANOVA test shows that the combined effect of digital communication tools, digital payment platforms, data analytics, core banking systems, and automation of managerial processes significantly

predicts the dependent variable ($F = 29.297$, $p < 0.001$). This implies that the regression model provides a meaningful improvement in explaining variations in the outcome variable compared to a model with no predictors.

However, the results also indicate that nearly half of the variation in the dependent variable remains unexplained, implying that other organizational, behavioural, or environmental factors not included in the model may also play an important role. Therefore, while the model is statistically valid and meaningful, its explanatory scope is not exhaustive.

Overall, the findings provide empirical support for the relevance of digital transformation variables in explaining the dependent variable, justifying further analysis of individual predictors to determine their specific contribution and relative influence

Table 4.9 Regression coefficients (direct relationship of variables)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			
		B	Std. Error	Beta	t	Sig.	
1	(Constant)	-.081	.321		-.252	.801	
	core banking system	.230	.074	.226	3.090	.002	SUPPORTED
	digital payment platform	.179	.075	.174	2.405	.017	SUPPORTED
	automation of manger process	.268	.079	.257	3.376	.001	SUPPORTED
	data analytics	.042	.068	.042	.610	.543	NOT SUPPORTED
	digital communication tool	.263	.075	.250	3.499	.001	SUPPORTED

a. Dependent Variable: management efficiency

source: survey results (2026)

The coefficients results indicated in table 4.9, that four of the five independent variables have a statistically significant positive effect on management efficiency. Specifically, Core banking system had a positive and statistically significant effect on management efficiency ($\beta = 0.226$, $p = 0.002$), Digital payment platform had a positive and statistically significant effect on management efficiency ($\beta = 0.174$, $p = 0.017$), Data analytics had a positive but **statistically insignificant** effect on management efficiency ($\beta = 0.042$, $p = 0.543$), Automation of managerial processes had a positive and statistically significant effect on management efficiency ($\beta = 0.257$, $p = 0.001$), and Digital communication tool had a positive and statistically significant effect on management efficiency ($\beta = 0.250$, $p = 0.001$).all

demonstrate significant positive relationships with management efficiency. Among these, automation of managerial processes and digital communication tools exhibit the strongest standardized effects, indicating their relatively higher contribution to improving management efficiency.

In contrast, data analytics ($\beta = 0.042$, $p = 0.543$) **does not show a statistically significant** effect when other variables are controlled, suggesting that its influence on management efficiency is not supported within the current model.

Furthermore, the Variance Inflation Factor (VIF) values range between 1.350 and 1.667, indicating no multicollinearity concerns among the independent variables. This confirms the reliability of the regression estimates.

4.7 Correlation analysis

Correlation analysis results measure how strong a relationship between variables is. It ranges from -1 to 1, where -1 shows perfectly negative relationship and +1 shows a perfectly positive relationship. In this research the researcher used the most common type of correlation, Pearson's correlation analysis method. (Sarstedt & Mooi, 2019).

Table 4.10 correlation analysis, the relationship of variables

Correlations

		core banking system	digital payment platform	digital communication tool	data analytics	automation of mangera process	mnagment efficiency	enviromental factor
core banking system	Pearson Correlation	1	.524**	.373**	.360**	.428**	.535**	.478**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	148	148	148	148	148	148	148
digital payment platform	Pearson Correlation	.524**	1	.333**	.347**	.432**	.501**	.428**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	148	148	148	148	148	148	148
digital communication tool	Pearson Correlation	.373**	.333**	1	.380**	.522**	.542**	.343**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	148	148	148	148	148	148	148
data analytics	Pearson Correlation	.360**	.347**	.380**	1	.441**	.392**	.334**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	148	148	148	148	148	148	148
automation of mangera process	Pearson Correlation	.428**	.432**	.522**	.441**	1	.577**	.335**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	148	148	148	148	148	148	148
mnagment efficiency	Pearson Correlation	.535**	.501**	.542**	.392**	.577**	1	.422**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	148	148	148	148	148	148	148
enviromental factor	Pearson Correlation	.478**	.428**	.343**	.334**	.335**	.422**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	148	148	148	148	148	148	148

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

source: survey results (2026)

based on table 4.10 Core Banking System (CBS) There is a positive relationship between core banking system and management efficiency, with a correlation coefficient of r = 0.535. This shows that there is a statistically significant association between the two variables. The result indicates that the core banking system has a significant impact on management efficiency. This implies that an effective core banking system is positively correlated with management efficiency at Commercial Bank of Ethiopia.

Digital Payment Platform (DPP) There is a positive relationship between digital payment platform and management efficiency, with a correlation coefficient of r = 0.501. This indicates that there is a statistically significant association between the variables. The finding shows that digital payment platforms significantly influence management efficiency. This implies that improved digital payment systems are positively correlated with management efficiency.

Digital Communication Tool (DCT) There is a positive relationship between digital communication tool and management efficiency, with a correlation coefficient of r = 0.542 This demonstrates that there is a statistically significant relationship between the variables. The result shows that digital communication tools have a significant impact on management efficiency. This implies that effective digital communication tools are positively correlated with management efficiency.

Data Analytics (DA) There is a positive relationship between data analytics and management efficiency, with a correlation coefficient of r = 0.392. This indicates that there is a statistically significant association between the two variables. The finding reveals that data analytics significantly affects management efficiency. This implies that the use of data analytics is positively correlated with management efficiency.

Automation of Managerial Process (AMP) There is a positive relationship between automation of managerial process and management efficiency, with a correlation coefficient of r = 0.577. This shows that there is a statistically significant association between the variables. The result indicates that automation of managerial processes has a significant impact on management efficiency. This implies that automation of managerial activities is positively correlated with management efficiency.

Environmental Factor (EF) There is a positive relationship between environmental factor and management efficiency, with a correlation coefficient of r = 0.422. This indicates that there is a statistically significant relationship between the variables. The finding shows that environmental factors significantly influence management efficiency. This implies that supportive environmental conditions are positively correlated with management efficiency.

4.8 Regression analysis of moderator variable by using the PROCESS Macro Version 4.2

A moderation analysis was conducted using the PROCESS Macro Version 4.2 developed by Andrew F. Hayes to examine whether environmental factors moderate the relationship between core banking systems and management efficiency at the Commercial Bank of Ethiopia. The analysis was performed using Model 1 of the PROCESS Macro with management efficiency as the dependent variable.

Table 4.11 regression analysis of moderator variable EF

Interaction term	coeff	t	P	LLCI	ULCI	Sig.
Core banking system *environmental factor	-.0480	-.5386	.5910	-.2241	.1281	Not significant
Digital payment platform * environmental factor	-.0369	-.4024	.6880	-.2181	.1443	Not significant
Digital communication tool *environmental factor	.0473	.5006	.6174	-.1396	.2342	Not significant
Data analytics * environmental factor	.0231	.2385	.8118	-.1687	.2149	Not significant
Automation of Managerial * environmental factor	-.0269	-.2708	.7869	-.2233	.1695	Not significant

source: survey results (2026)

The model summary in table 4.11 tells the core banking systems as the independent variable, and environmental factors as the moderator variable. In addition, digital payment platforms, digital communication tools, data analytics, and automation of managerial processes were included as covariates in the model.

The model summary results revealed that the overall regression model was statistically significant, with $R = 0.7162$, $R^2 = 0.5130$, $F(7,140) = 21.0648$, and $p < 0.001$. This indicates that approximately 51.3% of the variation in management efficiency was explained by the combined effect of the predictor variables included in the model. The findings suggest that the digital transformation variables collectively have substantial explanatory power regarding management efficiency.

However, the interaction effect between core banking systems and environmental factors was found to be statistically **insignificant** ($\beta = -0.0480$, $p = 0.5910$). The interaction term also produced a very small change in explained variance ($\Delta R^2|0.0010$), indicating

The interaction effect between digital payment platforms and environmental factors was found to be statistically insignificant ($\beta = -0.0369$, $p = 0.6880$). Furthermore, the interaction term contributed only a very small increase in the explained variance ($\Delta R^2|0.0006$). This result indicates that environmental factors **do not significantly** moderate the relationship between digital payment platforms and management efficiency.

The interaction effect between digital communication tools and environmental factors was found to be statistically insignificant ($\beta = 0.0473$, $p = 0.6174$). The interaction term contributed only a negligible increase in the explained variance ($\Delta R^2|0.0009$). This finding indicates that environmental factors **do not significantly** moderate the relationship between digital communication tools and management efficiency

The interaction effect between data analytics and environmental factors was found to be statistically insignificant ($\beta = 0.0231$, $p = 0.8118$). Furthermore, the interaction term accounted for only a negligible increase in explained variance ($\Delta R^2|0.0002$). This indicates that environmental factors **do not significantly** moderate the relationship between data analytics and management efficiency.

The interaction effect between automation of managerial processes and environmental factors was found to be statistically insignificant ($\beta = -0.0269$, $p = 0.7869$). In addition, the interaction term contributed only a negligible increase in explained variance ($\Delta R^2|0.0003$). This finding demonstrates that environmental factors **do not significantly** moderate the relationship between automation of managerial processes and management efficiency.

4.9 Qualitative Analysis of Interview Responses

The qualitative part of this study was carried out to support the quantitative results and to provide a better understanding of how digital transformation is affecting management efficiency at the Commercial Bank of Ethiopia.

The interview responses were analyzed using a thematic approach which means focusing on key areas that relate to the main variables of the study. This helps to explore not only what was happening, but also how and why these changes are being experienced by managers in practice.

Digital Transformation and Decision Making

Based on the result interview participants generally agreed that digital systems have improved the speed and quality of managerial decision making. Many managers strongly say that the availability of real time data through core banking systems allows them to make faster and more informed decisions. However, some respondents explained that digital access to operational data reduces delays that previously occurred when information had to be collected manually. In addition to this communication tools such as internal messaging platforms were mentioned as important in facilitating quick consultation between departments. These insights suggest that digital transformation supports decision making efficiency by improving access to timely information and enabling faster coordination among managers.

Automation and Managerial Productivity

Based on the result common theme across the interviews was the role of automation in improving managerial productivity. According to the results many managers reported that automated systems have reduced the amount of time spent on routine activities such as report preparation, approvals, and documentation processes. The result indicated that these improvements allow them to focus more on planning, supervision, and strategic tasks rather than administrative work. Some managers described automation as one of the most practical benefits of digital transformation in their daily responsibilities. This finding supports the view that automation plays a key role in enhancing management efficiency by reducing workload and improving the effective use of managerial time.

Digital Communication tool and Coordination

According to the result another important theme that emerged from the interviews was the impact of digital communication tools on coordination and information sharing. Respondents stated that commu-

nication system has made it easier to coordinate tasks across departments and branches. Managers emphasized that digital communication reduces delays in information flow and improves clarity in responsibilities. As a result, coordination between teams becomes more efficient, especially in a large organization like CBE where operations are spread across multiple locations. This suggests that communication tools contribute significantly to coordination efficiency among managers.

Data Analytics and Practical Limitations

Based on the finding in this result, although data analytics tools are available within the organization, many interview participants indicated that their practical use is still limited. Several managers mentioned that they rely more on basic system reports rather than advanced analytics when making decisions. Some respondents pointed out that there is a lack of training and familiarity with data analysis tools that makes it difficult to fully utilize these systems. Others say that analytics tools are not yet fully integrated into everyday managerial processes. These findings suggest that while data analytics has potential, its current contribution to management efficiency is limited due to challenges related to usage and capability.

Environmental Factors

Based on the result interview responses also touched on environmental factors such as system reliability, infrastructure, and organizational support. While some managers mentioned challenges related to technical limitations, most participants indicated that these issues do not significantly affect their overall use of digital tools.

Link to Quantitative Findings The qualitative findings provide useful explanations for the quantitative results presented earlier in this chapter in particular:

- The strong emphasis on **automation and communication tools** in the interviews is consistent with their significant positive effect on management efficiency in the regression analysis.
- The limited practical use of **data analytics** among managers supports its lack of significant impact in the quantitative model.
- The general consistency in experiences across respondents helps explain why **environmental factors did not show a moderating effect** in the statistical analysis.

Overall, the qualitative results reinforce the quantitative findings by providing detailed insights into how digital transformation affects managerial efficiency in practice

4.10 Hypothesis Testing

Hypothesis One: Core Banking System and Management Efficiency

H1: Core banking system implementation has a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

The regression results in table 4.9 show that the core banking system has a statistically significant positive effect on management efficiency with (B = 0.230, β = 0.226, t = 3.090, p = 0.002) value.

This finding indicates that a one-unit improvement in core banking system usage is associated with a 0.230 unit increase in management efficiency, holding all other variables constant.

This finding also aligns with (Bharadwaj et al. ,2013), who identified integrated information systems as a foundational digital resource that amplifies managerial capabilities across all management levels

Decision: The hypothesis is **supported**

Hypothesis Two: Digital Payment Platforms and Management Efficiency

H2: Digital payment platforms have a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

The regression result in table 4.9 shows that digital payment platform has a statistically significant positive effect on management efficiency with (B = 0.179, β = 0.174, t = 2.405, p = 0.017) value.

This finding indicates that a one-unit improvement in digital payment platform usage is associated with a 0.179 unit increase in management efficiency.

This finding also aligns with (Laudon and Laudon, 2005), whose argued that digital transaction systems improve organizational efficiency through automation and process simplification. freeing managerial bandwidth from routine approval and reconciliation tasks.

Decision: The hypothesis is **supported**

Hypothesis Three: Digital Communication Tools and Management Efficiency

H3: Digital communication tools have a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

The regression results in table 4.9 indicate that digital communication tools have a statistically significant positive effect on management efficiency with (B = 0.263, β = 0.250, t = 3.499, p = 0.001) value.

Digital communication tools recorded the highest mean score among all independent variables with (M = 3.87) value and the second-highest standardized coefficient with (β = 0.250) value, this indicating that digital communication tools are the most impactful digital transformation components for management efficiency at CBE. A one-unit improvement in digital communication tool usage corresponds to a 0.263 unit increase in management efficiency.

This finding is aligned with (Hinds and Kiesler, 2002), whose provided empirical evidence that organizations using digital communication tools for coordination achieve faster problem resolution, better knowledge sharing across units, and higher managerial productivity compared to organizations relying predominantly on face-to-face and telephone communication

Decision: the hypothesis is **supported.**

Hypothesis Four: Data Analytics & Business Intelligence and Management Efficiency

H4: Data analytics and business intelligence have a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

The regression analysis result in table 4.9 shows that data analytics and business intelligence do not have a statistically significant effect on management efficiency when controlling for the other independent variables with (B = 0.042, β = 0.042, t = 0.610, p = 0.543) value.

This is the most unexpected finding of the study. Although the correlation analysis result in the above shows a positive bivariate association between data analytics and management efficiency with ($r = 0.392$, $p < 0.01$) value, however this relationship loses statistical significance once the other digital transformation variables are controlled for in the multiple regression model. This suggests that data analytics does not independently drive management efficiency at CBE.

Several contextual explanations may account for this finding. According to the result First, the relatively higher standard deviation for data analytics with (SD = 0.60) value, comparing to other constructs this value implies more variation in managers' experience with and adoption of analytics tools, this suggesting uneven exposure across management levels and branches. Second, data analytics is a more advanced capability that typically requires a higher level of digital maturity and dedicated

training; that mean CBE might be in earlier stages of embedding analytics into routine managerial decision-making. Third, and as Melesse et al. (2025) found, digital innovation readiness among Ethiopian financial institutions remains unsatisfactory overall, which may limit the practical application of analytics capabilities even when the tools are available.

Decision: the hypothesis is **not supported.**

Hypothesis Five: Automation of Managerial Processes and Management Efficiency

H_5 Automation of managerial processes has a significant positive effect on management efficiency at the Commercial Bank of Ethiopia.

The regression analysis results in table 4.9 shows that automation of managerial processes has a statistically significant positive effect on management efficiency with ($B = 0.268$, $\beta = 0.257$, $t = 3.376$, $p = 0.001$) value.

Automation of managerial processes recorded the largest unstandardized coefficient with ($B = 0.268$) value and the highest standardized coefficient with ($\beta = 0.257$) value among all five of the dimensions this result making it the strongest individual driver of management efficiency in the model. A one-unit increase in automation is associated with a 0.268-unit improvement in management efficiency.

This finding is aligned with (Hammer and Champy, 1993), whom said that in the foundational work on business process reengineering they argued that the most significant efficiency gains from information technology come from automating existing.

Decision: the hypothesis is **supported**

Hypothesis Six: Moderating Effect of Environmental Factors on the Relationship Between Digital Transformation and Management Efficiency

H6: Environmental factors (regulatory environment, competitive pressure, Training & Support and tele com infrastructure) have significant moderating effect on the relationship between digital transfor mation and management efficiency at the Commercial Bank of Ethiopia.

Based on the moderation analysis by using the PROCESS Macro developed by Andrew F. Hayes, the study tested whether environmental factors moderate the relationship between the dimensions of digital transformation and management efficiency at the Commercial Bank of Ethiopia. The moderation analysis results in table 4.11 shows that all interaction terms between environmental factors and the dimensions of digital transformation were statistically insignificant. since all p-values were greater than 0.05, This indicates that environmental factors do not significantly moderate the relationship between digital transformation dimensions and management efficiency at the Commercial Bank of Ethiopia

This finding is aligned with (Zhu and Kraemer 2005), whom said that the moderating influence of environmental factors tends to be most pronounced during the adoption and early implementation phases of technology; once technology is embedded in organizational practice, its efficiency effects become institutionalized and relatively insensitive to environmental fluctuations. This tells us while CBE has been operating the Temenos T24 system since 2012, the technology is no longer in an early adoption phase. And also from the result of correlation analysis confirmed that environmental factor itself is significantly associated with management efficiency with ($r = 0.422$, $p < 0.01$) value, this result suggesting that environmental conditions operate as a direct predictor rather than a moderator of management efficiency in the CBE.

Decision: Environmental Factors **do not significantly** moderate the relationship between digital transformation and management efficiency at the Commercial Bank of Ethiopia. Therefore, H_6 is rejected.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The primary purpose of this study was to examine the impact of digital transformation on management efficiency at the Commercial Bank of Ethiopia (CBE). Using a mixed research approach with a structured questionnaire administered to 148 managers across headquarters and selected branches in Addis Ababa, the study investigated five dimensions of digital transformation core banking systems, digital payment platforms, digital communication tools, data analytics and business intelligence, and automation of managerial processes alongside the moderating role of environmental factors.

5.2 Summery

Out of 180 questionnaires distributed, 148 were valid responses, representing an 86.1% response rate. Statistical analysis was conducted using SPSS version 27, applying descriptive statistics, correlation analysis, regression modelling, and moderation analysis using the PROCESS Macro version 4.2 to test the hypotheses and examine the relationships among variables. Most respondents were male, and most fell within the 40-49 age group. Most participants held a master's degree. In terms of digital tool usage, core banking systems and digital communication tools were the most frequently used platforms among CBE managers. Many respondents had been working with digital banking systems for more than five years. Reliability tests confirmed acceptable internal consistency across all variables, with Cronbach's alpha values exceeding the 0.7 threshold.

Core Banking System (CBS) Significant positive predictor of management efficiency Managers who effectively utilize the core banking system make faster and more informed decisions, confirming that infrastructure level digital investment yields measurable managerial returns.

Digital Payment Platforms (DPP) Significant positive predictor of management efficiency though it recorded the lowest mean score among all variables (Table 4.2) indicating that its potential remains partially unrealized due to underutilization at the managerial level.

Digital Communication Tools (DCT) Significant positive predictor and the most widely adopted digital capability among CBE managers, on interview Managers says who use digital communication tools

effectively demonstrate stronger coordination and faster information exchange across branches and departments.

Data Analytics and Business Intelligence (DA) Data Analytics and Business Intelligence show a statistically significant positive relationship with management efficiency at the bivariate level (table 4.10). However, this effect becomes statistically insignificant in the multiple regression model, the explanatory power of data analytics overlaps with other digital transformation variables included in the model, indicating that its unique contribution to management efficiency is limited when the combined effects of other predictors are considered. And the qualitative findings provide a clear explanation for this result. Many managers reported limited use of analytics tools in their daily work, often relying instead on basic system reports. This suggests that while data analytics tools are available, they are not yet fully integrated into managerial practices, limiting their impact on efficiency

Automation of Managerial Processes (AMP) The strongest predictor of management efficiency across all five dimensions. Automation of routine managerial tasks such as reporting, approvals, and compliance monitoring frees managers to focus on higher-value strategic activities, generating the largest efficiency returns of any digital transformation component examined, this allows them to focus more on strategic responsibilities, which directly improves productivity.

Environmental Factors (Moderation) Environmental factors did not significantly moderate the relationship between any of the five digital transformation dimensions and management efficiency. When we see the interaction term (table 4.11) efficiency benefits of digital transformation at CBE are robust and materialize regardless of external environmental conditions. And the quantitative analysis found no significant moderating effect on the relationship between digital transformation and management efficiency. This is supported by interview responses, where most managers indicated that although some challenges such as system reliability exist, these do not significantly hinder their overall use of digital tools. This suggests that the benefits of digital transformation are relatively stable across different working environments within the organization.

The regression model explained more than half of the variance in management efficiency, demonstrating that the five digital transformation dimensions collectively have strong and substantial explanatory power over managerial efficiency outcomes at CBE.

Overall, the integration of quantitative and qualitative findings provides a more comprehensive understanding of how digital transformation influences management efficiency. While statistical analysis

identifies the key drivers of efficiency, qualitative insights explain how these improvements occur in practice, strengthening the overall validity of the study.

5.3 Conclusions

This study was undertaken to address a significant empirical gap in the literature on digital transformation and organizational efficiency in Ethiopian banking: specifically, to understand how digital transformation affects management efficiency the speed, quality, and productivity with which managers perform their functions at the Commercial Bank of Ethiopia. The study's overarching conclusion is that digital transformation significantly and substantially enhances management efficiency at CBE. Four of the five digital transformation dimensions examined independently predict management efficiency, and together the five dimensions account for more than half of the variance in managerial efficiency outcomes. This finding establishes digital transformation as a primary organizational determinant of managerial performance at Ethiopia's largest commercial bank.

With respect to Research Question One how digital transformation affects management efficiency at CBE, the study concludes the following. The core banking system enhances management efficiency by providing an integrated, real-time data infrastructure that supports faster and better-informed managerial decisions, reduces reconciliation workloads, and enables systematic performance monitoring across branches and departments. Digital payment platforms improve management efficiency by automating transaction processing and reducing the time managers spend on manual oversight of routine financial operations, though their managerial level potential remains partially unrealized. Digital communication tools are the most widely adopted digital capability among CBE managers and represent the most structurally important dimension of digital transformation for coordination and communication efficiency, enabling faster information flows across a geographically dispersed organization. Data analytics and business intelligence, while positively associated with management efficiency at the bivariate level, have not yet matured into an independent driver of efficiency at CBE because their use remains closely intertwined with CBS-generated reporting rather than constituting an independent analytical capability. Automation of managerial processes is the strongest individual driver of management efficiency because it directly liberates managerial time and cognitive capacity from routine tasks, enabling reallocation to higher-value strategic and leadership activities.

With respect to Research Question Two how environmental factors influence the relationship between digital transformation and management efficiency The study indicates that environmental factors do

not significantly moderate the relationship between digital transformation and management efficiency within the CBE institutional context. Moreover, the significant efficiency benefits of digital transformation at CBE appear robust and relatively insensitive to variations in environmental conditions across branches and management levels. Furthermore, the key findings may suggest that this result reflects the maturation of CBE's digital systems beyond the early adoption phase. Considering the organizational standardization achieved through centralized infrastructure implementation since 2012, the evidence could indicate that these institutional conditions help explain the absence of significant environmental moderation. Research confirms factors support this interpretation.

Conducting this research proved that the process illuminated the complexities of investigating organizational transformation in a large, hierarchically structured financial institution. However, the significant challenges encountered, the unexpected discoveries made, and the lessons learned throughout the research process may suggest that a richer understanding of digital transformation and management efficiency in the Ethiopian banking sector could emerge from honest reflection. Additionally, the findings could indicate that this section presents key insights into the research journey. Given that the evidence demonstrates these elements contributed to the study's depth, the results might indicate that reflection on the process adds important scholarly value. Study shows process yielded insight

The first major challenge the study encountered was that gaining access to managerial respondents at CBE required sustained effort. Nevertheless, the significant cooperation barriers may suggest that translating institutional permission into actual participation at the branch level could demonstrate the importance of informal trust-building. Moreover, the findings could indicate that several branch managers were initially cautious about participating in research touching on internal organizational processes and digital systems. In light of the evidence showing a broader pattern of institutional conservatism, the results might suggest that this caution appears understandable in a bank managing significant public deposits. Access challenges show trust-building critical.

Overcoming this challenge required that the study rely on repeated explanations of the academic and non-commercial purpose of the research. Thus, the significant experience may suggest that assurances of participant anonymity and the use of trusted organizational contacts could demonstrate the value of

informal intermediaries. Furthermore, the key findings could indicate that formal gatekeeping and informal trust-building are equally important dimensions of the research access process. Notwithstanding the formal permissions obtained, the evidence might suggest that researchers who fail to invest in relationship-building appear likely to encounter cooperation barriers that official permissions alone cannot resolve. Findings show informal access matters equally.

The second challenge was that navigating the complexity of measuring multi-dimensional management efficiency as a construct proved more demanding than anticipated. However, the study operationalized management efficiency across four dimensions decision-making efficiency, resource utilization efficiency, coordination and communication efficiency, and managerial productivity drawing on established literature. Moreover, the significant effort required to ensure that survey items adequately captured these distinct dimensions may suggest that extensive pilot testing and instrument refinement could demonstrate the complexity of multi-dimensional measurement. In light of the evidence from the reliability analysis, the results might indicate that acceptable internal consistency (Cronbach's alpha > 0.7 for all constructs) appears achievable through iterative revision. Measurement quality shows multiple refinement rounds required.

The process of achieving this measurement quality involved that multiple rounds of item revision, repiloting, and expert consultation were more demanding than the study's outset anticipated. Furthermore, the significant findings from the reliability analysis could indicate that the key results support the instrument's validity across diverse educational and professional backgrounds. Additionally, the evidence may suggest that the important process of instrument refinement could demonstrate the value of sustained methodological attention. Given that the data confirms acceptable internal consistency across all constructs, the results might indicate that this level of measurement quality appears critical for studies of this complexity. Pilot testing shows instrument refinement essential

One of the most significant unexpected findings in this study was that data analysis was not significant in the multivariate model. Based on the extensive theoretical and empirical evidence in the international literature on digital transformation linking analysis to excellent decision-making, the researchers began the study with a strong preconception that data analysis would be one of the most powerful predictors of managerial effectiveness. The finding that the effect of analytics was moderated by other predictor variables was initially perplexing and required careful analysis and reflection. In the process of delving deeper into this finding, we ultimately interpreted it as evidence that analytical capabilities were not

yet mature and that there was an overreliance on reports generated by business intelligence systems (BIS), rather than on independent analytical skills. This was arguably one of the most intellectually enlightening moments of the research process. This transformed the contribution of this study from a simple validation of known relationships into a more nuanced and practically significant finding: the distinction between possessing analytical tools and possessing analytical capability is crucial, and the current state of CBE lies somewhere between these two states.

A second unexpected discovery was that environmental moderation showed non-significance within the CBE context. However, the TOE framework and the broader digital transformation literature may suggest that environmental factors could moderate the technology-efficiency relationship, particularly in a developing economy context where infrastructure variability appears significant. Moreover, the significant finding that moderation was absent could indicate that institutional standardization and digital system maturity might suppress environmental moderation effects. In light of the evidence from the analysis, the results might suggest that this discovery added theoretical depth to the study beyond its original design parameters. Moderation absence shows institutional standardization key.

A third discovery was that middle-level managers at CBE serve as the critical implementation layer of digital transformation. Nevertheless, the significant qualitative interviews could indicate that top-level managers articulated strategic visions while lower-level managers described operational improvements in their daily workflows. Furthermore, the findings may suggest that middle-level managers department heads and division managers might indicate that the translation of digital tools into efficiency practices appears most fragile at this organizational layer. In light of the evidence from their narratives, the results could indicate that tensions between the pace of technological change and the absorptive capacity of teams below appear particularly significant. Evidence shows middle management layer critical.

From the methodological perspective, the mixed-methods design demonstrated that its value to the study was particularly significant. However, the quantitative findings could indicate that four of five digital transformation dimensions significantly predicted management efficiency, with automation appearing as the strongest predictor. Moreover, the significant qualitative interviews may suggest that the evidence reveals concrete behavioral changes, workflow redesigns, and time savings that managers associated with each digital tool. Considering the findings on data analytics quantitatively non-signifi-

cant but qualitatively acknowledged as strategically important, the results might indicate that this divergence could demonstrate the added credibility mixed methods designs provide. Mixed methods show convergence and divergence are both valuable.

This experience confirmed that the value of mixed-methods research designs for investigating complex organizational phenomena appears well-supported, consistent with the methodological position taken by Creswell and Creswell (2018). Furthermore, significant evidence could indicate that the convergence of quantitative and qualitative evidence on automation and digital communication tools may suggest that these findings appear robust. Additionally, the key results might indicate that the study's conclusions could demonstrate the importance of methodological flexibility in organizational research. Given that the findings show that the mixed-methods design supported both depth and credibility, the evidence may suggest that this approach appears critical for studies of this nature. Design choice shows enhanced credibility.

The study also demonstrated that the single-institution case design provided both significant depth and important constraints. Moreover, the key findings could indicate that the depth of institutional knowledge enabled by focusing on CBE alone including access to organizational documents, technology implementation records, and efficiency variations across branches may suggest that this depth appears unachievable in a multi-bank comparative design. However, the significant limitation of the single-case design might indicate that the findings cannot be straightforwardly generalized to other Ethiopian commercial banks, particularly private banks such as Awash Bank and Dashen Bank. In light of the evidence that these institutions differ from CBE in ownership structure, organizational culture, and the pace of digital transformation, the results could indicate that this trade-off between depth and breadth appears inherent in case study research. Case design shows depth-breadth trade-off acknowledged.

In summary, the research journey may suggest that methodological rigor, analytical challenges, and substantive discoveries collectively enriched the study beyond its original scope. Furthermore, the significant challenges encountered access difficulties, data availability constraints, and the complexity of multi-dimensional measurement could indicate that adaptive research management and methodological flexibility appear critical to addressing these obstacles. Moreover, the key discoveries made the data analytics maturity finding, the non-significant environmental moderation, and the pivotal role of middle management might indicate that these findings could demonstrate the value of honest engagement with

unexpected results. In light of the evidence that these elements were not anticipated at the study's outset but emerged organically from rigorous analysis, the findings may suggest that the study appears positioned as a substantive contribution to the empirical literature on digital transformation and management efficiency in developing economy banking contexts. Study shows organic discoveries strengthen empirical contribution.

This study makes several theoretical contributions to the literature on digital transformation, management efficiency, and organizational capabilities in developing economy banking contexts. First, it provides an empirical validation of the Dynamic Capabilities framework (Teece et al., 1997) in the Ethiopian banking context, demonstrating that CBE's sustained investment in sensing, seizing, and transforming digital capabilities over more than a decade has generated measurable managerial efficiency gains. The finding that digital transformation accounts for more than half of the variance in management efficiency confirms that dynamic capabilities operationalized through specific technology systems and management practices are significant predictors of organizational performance at the managerial level.

Second, the study extends management efficiency theory (Drucker, 2012; Bloom and Van Reenen, 2007) by providing the first multidimensional empirical measurement of management efficiency in an Ethiopian banking context, and by establishing the relative importance of different digital transformation dimensions for each efficiency dimension. The finding that automation is the strongest driver is particularly consistent with Drucker's principle that managerial efficiency requires the systematic elimination of low-judgment routine tasks and provides an empirical grounding for this theoretical proposition that has been largely assumed rather than tested in the literature.

Third, the finding regarding data analytics contributes to the information systems literature on the conditions under which analytics capabilities generate organizational value. The distinction between analytics availability and analytics capability demonstrated empirically through the bivariate vs. multivariate contrast is a theoretically important contribution that extends DeLone and McLean's (1992, 2003) success model by showing that information system use must be independently embedded in managerial workflow for information quality to translate into management efficiency, rather than being subsumed within the broader digital infrastructure.

Fourth, the non-significant moderation finding contributes to the TOE framework literature by demonstrating that the moderating role of environmental factors is context-dependent: in organizations with

mature, institutionalized digital systems, environmental moderation effects are suppressed by organizational standardization. This finding qualifies the TOE framework's predictions and suggests that longitudinal studies examining moderation effects across the technology lifecycle would add significant theoretical value to this literature.

5.4 Recommendations

5.4.1 Recommendations for CBE Management

Based on the findings of this study, the following recommendations are directed at CBE's senior leadership,

First CBE should Speed up automation means they should stop doing things manually in order to work better and smarter. The biggest thing helping CBE managers work more efficiently is automation. So, CBE should move faster to automate tasks that are still being done by hand things like tracking budgets, scheduling staff, checking compliance, and preparing reports. They should roll this out across all levels of the bank, step by step, with clear goals every three months, and senior leaders should keep a close eye on progress.

Second, CBE should make better and more intentional use of its data rather than relying solely on system-generated reports. Currently, managers largely depend on reports that the banking system automatically produces, which is not sufficient for effective decision-making. Data should be used as a real thinking tool one that helps managers identify problems, plan strategically, and make informed decisions. To achieve this, three things need to happen. CBE must first clean up its data by ensuring that information is accurate, consistent, and easily accessible without requiring managers to go through IT every time they need something. Second, managers at all levels should be trained to read data meaningfully, ask the right questions, and translate numbers into practical decisions. Third, and most importantly, data must be embedded into daily work routines used in regular meetings, performance reviews, and branch reporting so that data-driven thinking becomes a normal organizational habit rather than an occasional exercise.

Third CBE should Get more out of digital payment tools CBE already uses digital payment platforms, but managers aren't using them to their full potential. CBE should find out which payment tasks are still being done manually and build better tools to handle them automatically like dashboards that flag

problems or reconcile accounts on their own. Managers should also be regularly trained on the full features of these platforms.

CBE should fix communication across all branches that means digital communication tools are already working well and saving time. CBE should build on this by making sure every branch uses the same communication systems with the same access. Branches that don't yet have video calling should get it this alone and can cut down on unnecessary travel and make coordination much faster and cheaper.

CBE should Create a system to track how well managers are working that means CBE should build a simple but clear system to measure management performance. This should track things like: How fast are decisions being made? Are resources being used wisely? How well are teams coordinating? This makes think of it like a health monitor leaders can check in at any time to see where things are running smoothly and where something needs to be fixed, without waiting for someone to send them a report.

5.4.2 Policy Recommendations

Based on the result the following recommendations are made to the National Bank of Ethiopia and relevant government agencies: Currently, most regulatory assessments focus primarily on customer-facing indicators, such as transactions, transaction volume and financial inclusion rates. Incorporating internal management efficiency metrics will provide a more comprehensive picture of the benefits of digital transformation and guide targeted interventions. Support the development of industry-wide analytical capabilities.

Given that research indicates analytical maturity is a key constraint to achieving efficiency gains, many banks are not yet good at collecting and using data to make smart decisions. The National Bank of Ethiopia should set basic standards that all banks must follow when it comes to managing data. They should also work with universities and colleges to train bank staff on how to use modern data tools. This will help banks get more value from the technology they are investing in banks are increasingly using technology to handle tasks automatically like checking for rule violations or flagging unusual activity. But there are no clear rules about what is allowed and what is not. The government needs to create simple, clear guidelines that means banks are going to know exactly what they can automate. This will give banks the confidence to move forward without fear of breaking any laws.

A forward-looking regulatory framework will eliminate the legal ambiguities surrounding digital processes identified by Khalifa (2025) and enable banks to pursue automation initiatives with greater confidence.

5.4.3 Recommendations for Future Research

This study raises several questions that future researchers could explore for example future studies should not only focus on the Commercial Bank of Ethiopia (CBE). Researchers should also look at other Ethiopian banks like Awash Bank, Dashen Bank, and the new Tsedey Bank to see how using modern technology affects, how well these banks are managed and run. this helps to make a comparison among commercial banks in Ethiopia to reveal whether the findings are institution-specific or generalizable across the Ethiopian banking sector and would enable investigation of how ownership structure (state versus private) moderates digital transformation outcomes.

Qualitative investigation of data analytics adoption barriers. The non-significant finding for data analytics warrants deeper qualitative investigation. Future studies should employ in-depth interviews with analytics users and non-users among CBE managers to understand the specific behavioural, cultural, and infrastructural barriers that prevent analytics from translating into management efficiency gains. Such insights would inform more targeted capacity-building interventions.

Investigation of employee-level efficiency outcomes. This study focused exclusively on management efficiency. Future research should examine how digital transformation affects the efficiency of frontline banking employees and explores potential spillover effects between managerial and employee-level efficiency. Understanding these dynamics would provide a more complete picture of digital transformation's organizational impact.

Exploration of additional moderating variables. Given the non-significant moderating role of environmental factors at the institutional level, future research should investigate alternative moderators such as organizational culture, leadership digital orientation, and individual manager technology self-efficacy that may condition the strength of digital transformation's effect on management efficiency.

5.5 Limitations and Future Research Directions

Although this study is methodologically rigorous, several limitations must be acknowledged.

First, the single-case study design limits the generalizability of the findings to other Ethiopian commercial banks or banking institutions in other developing countries. Although the size and systemic

importance of the Central Bank of Ethiopia (CBE) make it a suitable subject of study, caution is warranted when extrapolating the findings to other institutional contexts.

Second, this study relies on self-reported survey data from management, which may be subject to social desirability bias. Management may have overestimated the positive impact of digital tools on their efficiency, particularly in a context where senior leadership emphasizes digital transformation as a strategic priority. Future research should attempt to supplement perceived survey measurements with objective efficiency metrics, such as decision-making cycle times, report generation times, and (where available) approval turnaround times.

Third, a cross-sectional study design does not allow for causal inference. While regression results can establish statistical associations, they cannot definitively prove that digital transformation is the cause of improved managerial efficiency. Under the current research design, the possibility of "reverse causality "that is, managers with higher management efficiency are often better able to adopt and utilize digital tools cannot be ruled out. To establish the direction of causality, longitudinal or quasi-experimental designs are required.

Fourth, although the sample was concentrated in Addis Ababa due to the centralization of CBE management functions, this implies that the experiences of managers in rural and regional branches are not fully reflected. Given potential disparities in digital infrastructure availability between urban and rural areas, this limitation may affect the comprehensiveness of the research findings, particularly regarding the environmental moderation hypothesis.

Fifth, this study did not directly measure organizational digital maturity as a construct, which limits the ability to fully validate the "capability development" interpretation proposed for the data analysis results. If future research can integrate validated digital maturity scales, it will help strengthen the theoretical interpretation of the relationship between the usability of analytical tools and analytical capabilities. However, based on these limitations, the mixed-methods design, high response rate, rigorous reliability testing, and careful consideration of regression assumptions employed in this study collectively ensure that the findings have a solid methodological foundation and provide a meaningful contribution to the empirical literature on digital transformation and managerial efficiency in the Ethiopian banking sector.

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Appendix A

Addis Ababa University, College of Business and Economics
MBA Program in Management

QUESTIONNAIRE ON: Digital Transformation and Its Impact on Management Efficiency in Ethiopian Commercial Banks: A Case Study of the Commercial Bank of Ethiopia, Addis Ababa

Dear Respondents, the purpose of this questionnaire is to collect data for an academic research study that examines the impact of digital transformation on management efficiency at the Commercial Bank of Ethiopia. Specifically, the study focuses on key digital transformation initiatives, including core banking systems, digital payment platforms, digital communication tools, data analytics, and automation of managerial processes, and how this influence management efficiency in terms of decision-making, resource utilization, coordination, and managerial productivity.

Your responses are essential in providing insights into how digital technologies affect managerial performance within the bank. The accuracy and honesty of your responses will significantly contribute to the quality and reliability of the research findings.

All information provided will be treated with strict confidentiality and will be used solely for academic purposes. The data will be analysed and presented in aggregate form, and no individual respondent will be identified.

I sincerely appreciate your time, cooperation, and valuable contribution to this study.

Instructions:

Please answer all questions honestly based on your experience and perception. For most statements, indicate the extent to which you agree or disagree using the following scale:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

SECTION A: DEMOGRAPHIC AND PROFESSIONAL INFORMATION

Please tick (✓) or fill in the appropriate response.

1. Gender:

[ ] Male

[ ] Female

2. Age:

[ ] Under 30 years

[ ] 30-39 years

[ ] 40-49 years

[ ] 50 years and above

3. Highest Educational Qualification:

[ ] Diploma

[ ] Bachelor's Degree

[ ] Master's Degree

[ ] PhD

[ ] Other (please specify): _____

4. Management Level:

[ ] Top-level management (Executive Director)

[ ] Middle-level management (Department Head, Division Manager)

[ ] Lower-level management (Branch Manager

6. Years of Experience at CBE:

[ ] Less than 5 years

[ ] 5-10 years

[ ] 11-15 years

[ ] More than 15 years

7. Years in Current Management Position:

[ ] Less than 2 years

[ ] 2-5 years

[ ] 6-10 years

[ ] More than 10 years

Please indicate your level of agreement with the following statements about digital transformation at CBE.

	CORE BANKING SYSTEM	1	2	3	4	5
CBS1	The core banking system improves the speed of banking operations.					
CBS2	The core banking system improves transaction accuracy.					
CBS3	The core banking system provides real-time information for managerial decision-making.					
CBS4	The core banking system reduces delays in operational activities.					
CBS5	The core banking system improves coordination among departments.					
	DIGITAL PAYMENT PLATFORMS	1	2	3	4	5
DPP1	Digital payment systems reduce transaction processing time					
DPP2	Digital payment systems reduce manual transaction handling.					
DPP3	Digital payment platforms improve operational efficiency.					
DPP4	Digital payment systems reduce workload for managers.					
DPP5	Digital payment systems support faster managerial operations.					
	DIGITAL COMMUNICATION TOOLS	1	2	3	4	5
DCT1	Digital communication tools improve the speed of information sharing					
DCT2	Digital tools reduce delays in decision-making					

DCT3	Digital communication systems improve teamwork efficiency.					
DCT4	Digital communication tools support faster decision-making.					
	DATA ANALYTICS	1	2	3	4	5
DA1	Data analytics tools provide useful insights for decision-making					
DA2	Improve data-driven decision-making					
DA3	Analytics tools improve decision accuracy					
DA4	Reduce time searching for information					
	AUTOMATION OF MANAGERIAL PROCESSES	1	2	3	4	5
AMP1	Automation reduces time spent on routine tasks					
AMP2	Automated systems improve workflow efficiency.					
AMP3	Automation improves managerial productivity.					
AMP4	Automated workflows improve approval processes					
AMP5	Automation allows focus on strategic activities					
	MANAGEMENT EFFICIENCY	1	2	3	4	5
ME1	Managers complete tasks more efficiently using digital systems					
ME2	Digitalization improves coordination among management staff.					
ME3	Digital technologies improve utilization of organizational resources.					
ME4	Digitalization improves managerial productivity.					
ME5	Digital tools help me access the information I need for decisions quickly					
ME6	Overall, my decision-making efficiency has improved with digital transformation					
	ENEVIROMENTAL FACTORS	1	2	3	4	5
EF1	Technological infrastructure limitations hinder efficiency improvements					
EF2	Lack of digital skills among managers limits efficiency gains					
EF3	Insufficient training on digital systems reduces their efficiency impact					

EF4	Digital tools sometimes create additional work rather than saving time					
EF5	System integration problems reduce efficiency					
EF6	Resistance to change among managers limits efficiency improvements					
EF7	Regulatory constraints limit what we can do efficiently					
EF8	Overall, significant barriers to achieving efficiency gains from digital transformation exist					

SECTION I: OPEN-ENDED QUESTIONS

I1. In your opinion, what are the most significant efficiency improvements you have experienced as a manager due to digital transformation at CBE?

_____

_____

_____

I2. What suggestions do you have for further improving management efficiency through digital transformation at CBE?

_____

_____

_____

THANK YOU FOR YOUR PARTICIPATION!

Your time and insights are greatly appreciated. Please return the completed questionnaire to the researcher or designated collection point.

If you have any questions about this research, please contact:

BETELHEM HUNEGNAW

Mobile +251918031308

Email berryhunex@gmail.com

Appendix B

Interview Guide

Interviewee: _____

Position: _____

Department: _____

Date: _____

Time: _____

Duration: _____

INTRODUCTION

Thank you for agreeing to participate in this interview. My name is Betelhem Hunegnaw, and I am an MBA student at Addis Ababa University College of Business and Economics. I am conducting research on how digital transformation affects management efficiency at the Commercial Bank of Ethiopia. Your insights as a senior manager are extremely valuable to this study. The interview will take approximately 15-20 minutes. With your permission, I would like to audio-record this interview to ensure accurate capture of your perspectives. All information will be kept confidential, and your name will not appear in any reports or publications. You may decline to answer any question or withdraw from the interview at any time. Do you have any questions before we begin? May I have your permission to record this interview?

SECTION 1: DIGITAL TRANSFORMATION JOURNEY

1. Could you please describe your role and involvement in digital transformation initiatives at CBE?

2. How would you characterize CBE's digital transformation journey over the past decade? What have been the key milestones?

3. How would you assess the current state of digital transformation at CBE? What has been achieved regarding management processes?

SECTION 2: IMPACT ON DECISION-MAKING EFFICIENCY

1. How has digital transformation affected the speed of decision-making at various management levels?

2. Has the quality of decisions improved with digital tools and data availability? Can you provide examples?

3. What changes have you observed in how managers access and use information for decisions?

4. Are there areas where decision-making has become less efficient despite digital tools?

SECTION 3: IMPACT ON RESOURCE UTILIZATION EFFICIENCY

1. How has digital transformation affected how managers utilize their time? Are they spending less time on routine tasks?

2. Have you observed improvements in how human resources are allocated and utilized across the organization?

3. How has digital transformation affected the efficiency of budget and financial resource management?

SECTION 4: IMPACT ON COORDINATION AND COMMUNICATION EFFICIENCY

1. How has digital transformation affected communication efficiency within and across departments?

2. Has coordination between headquarters and branches improved? In what ways?

3. Have there been any unintended negative effects on communication or coordination from digital tools?

SECTION 5: IMPACT ON MANAGERIAL PRODUCTIVITY

1. How would you characterize changes in managerial productivity since digital transformation began?

2. Are managers able to handle more complexity and responsibility now than before?

3. Which management levels have experienced the greatest productivity improvements? Why?

SECTION 6: FACTORS ENABLING OR CONSTRAINING EFFICIENCY GAINS

1. What factors have been most important in enabling management efficiency improvement through digital transformation?

2. What have been the biggest challenges or barriers to achieving efficiency gains?

3. How important have training and skill development been for realizing efficiency improvements?

4. How does CBE's organizational culture support or hinder efficiency gains from digital transformation?

CLOSING Thank you very much for your time and valuable insights. I will be transcribing and analyzing the interview data over the coming weeks. If you would like, I can share a summary of the research findings once the study is completed. Is there anything you would like to ask me?

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