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The Effect of Electronic Banking Services On the financial Performance of Awash bank

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UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MARKETING MANAGEMENT

MASTERS PROGRAM (MA)

**THE EFFECT OF ELECTRONIC BANKING SERVICES ON THE
FINANCIAL PERFORMANCE OF AWASH BANK**

PREPARED BY

BEZAWIT BEKALU

ADVISOR

Dr. MESFIN TESHAGER (PhD)

JUNE, 2026

BAHIR DAR ETHIOPIA

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BY

BEZAWIT BEKALU

**A THESIS SUBMITTED TO COLLEGE OF BUSINESS AND
ECONOMICS, BAHIR DAR UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTERS OF MARKETING MANAGMENT**

ADVISOR

Dr. MESFIN TESHAGER (PhD)

JUNE, 2026

BAHIR DAR ETHIOPIA

DECLARATION

I, Bezawit, the undersigned, declare that this thesis titled "The Effect of Electronic Banking services on the financial Performance of Awash Bank" is my original work. I have conducted the research independently, with the guidance and support of the research supervisor. This study has not been submitted for any degree or diploma program at this or any other institution, and all sources of materials used in the thesis have been properly acknowledged. This is to certify that the thesis titled "The Effect of Electronic Banking services on the financial Performance of Awash Bank" submitted as part of the requirements for the Master's Degree in Marketing Management from the Postgraduate Studies, Bahir Dar University, is a record of original research carried out by Bezawit Bekalu, ID No. BDU1700808, under my supervision. No part of this thesis has been submitted for any other degree or diploma. The assistance and support received during the course of this research have been duly acknowledged. Therefore, I recommend that it be accepted as fulfilling the thesis requirements.

Bezawit Bekalu

Name of Student

Signature

Date

BAHIR DAR UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS DEPARTMENT OF MARKETING MANAGEMENT

CERTIFICATE OF APPROVAL

This is to certify that the thesis prepared by Bezawit Bekalu, entitled “The Effect of Electronic Banking services on the financial Performance of Awash Bank” submitted in partial fulfillment of the requirements for the degree of Masters in Marketing management of the Postgraduate Studies” and submitted in partial fulfillment of the requirements for the Degree of Masters of Arts in Marketing Management with the regulations of the University and meets the accepted standards with respect to originality and quality.

Name of Candidate	Signature	Date
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External examiner	Signature	Date
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Internal examiner	Signature	Date
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ABSTRACT

This study examines the effect of electronic banking services (ATM, POS, mobile banking, and internet banking) on the financial performance of Awash Bank (2015–2025), controlling for GDP growth and inflation. Using an explanatory quantitative design with secondary data (22 semiannual observations from Awash Bank's reports), the study tested seven hypotheses via descriptive statistics, correlation, and multiple linear regression in SPSS. Diagnostic tests confirmed normality (Q Q plot), multicollinearity ($VIF < 2.1$), and autocorrelation (Durbin Watson = 2.150), satisfying all OLS assumptions.

All four e banking services have statistically significant positive effects on ROA at the 1% level. ATM contributes most ($\beta = 0.420$, $p = 0.001$), followed by mobile banking ($\beta = 0.390$, $p = 0.004$), POS ($\beta = 0.350$, $p = 0.006$), and internet banking ($\beta = 0.310$, $p = 0.003$). The full model explains 86.1% of ROA variation (Adjusted $R^2 = 0.830$). GDP growth has a positive effect ($B = 0.008$, $p = 0.012$); inflation has a negative effect ($B = -0.045$, $p = 0.018$).

The study recommends continued ATM investment, mobile banking optimization, strategic POS expansion, and addressing internet banking barriers. For the National Bank of Ethiopia, maintaining cash withdrawal limits (Directive No. FIS/03/2020) is suggested to accelerate e banking adoption. The findings also inform marketing strategy for customer acquisition and retention.

This study makes five distinctive contributions: first comprehensive examination of all four e banking services on Awash Bank; use of transaction volume (Birr) rather than infrastructure counts; recent data (2015–2025) capturing the post directive period; inclusion of macroeconomic controls; and comparative analysis of channel contributions.

Keywords: Awash Bank, ATM, POS, Mobile banking, Internet banking, ROA, Ethiopia.

LIST OF ACRONYMS AND ABBREVIATIONS

ATM - Automated Teller Machine

CBE - Commercial Bank of Ethiopia

E-banking - Electronic Banking

E-commerce - Electronic Commerce

EFT - Electronic Fund Transfer

E-payment - Electronic Payment

GDP - Gross Domestic Product

IB - Internet Banking

ICT - Information and Communication Technology

IMF - International Monetary Fund

IT - Information Technology

IVR - Interactive Voice Response

NBE - National Bank of Ethiopia

OLS - Ordinary Least Square

POS - Point of Sale

ROA - Return on Assets

ROE - Return on Equity

SD - Standard Deviation

SPSS - Statistical Package for Social Sciences

TOE - Technology-Organization-Environment

VIF - Variance Inflation Factor

WAP - Wireless Application Protocol

WWW - World Wide Web

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CHAPTER ONE

INTRODUCTION

The main objective of this research is to analyze the effect of electronic banking variables on the performance of Awash bank. This section introduces the reader about the back ground of the study by explaining the concept in the global, national and local perspective, the statement of the problem by providing information why the researcher was initiated to focus on this problem. It also comprises the general and specific objectives together with the research hypothesis. The significant, scope, limitation and organization of the study are discussed in this section.

1.1. Background of the Study

The banking sector nowadays has used and equipped a new technology to provide its customer with a faster service, to reduce waiting delivery time and to operate their account without visiting the branch counter. According to Steven, (2002), Electronic banking is the use of electronic and telecommunication networks to deliver a wide range of value added products and services to bank customers. In relation with this subject, Ovia, (2001) argued that Electronic banking is a product of e-commerce in the field of banking and financial services. Furthermore, FinCen, (2000) stated that electronic banking is an umbrella term for the process by which a customer may perform banking transactions electronically without visiting a brick-and-mortar institution.

Banks play a significant role in promoting economic growth and financial stability by mobilizing financial resources and facilitating efficient fund allocation (Masood & Ashraf, 2012). A sound banking system is essential for sustainable economic development. As of the 2024/25 fiscal year, Ethiopia's banking sector remained stable and resilient, with capital adequacy, asset quality, liquidity, and profitability all improving (NBE, 2025). In the modern business environment, the banking industry has become increasingly dependent on information and communication technology (ICT) to improve operational efficiency and competitive advantage.

The rapid advancement of ICT has transformed global financial systems and reshaped banking service delivery. E banking enables customers to perform transactions such as balance inquiries, fund transfers, and bill payments remotely without visiting bank branches (Driga & Isac, 2014). The evolution of e-banking began with ATMs introduced by Barclays Bank in London in 1967 and later expanded to telephone banking, internet banking, and mobile banking (Shah & Clarke, 2009). Today, financial institutions increasingly adopt e-banking to reduce costs, improve service delivery, and strengthen competitive advantage (Alalwan et al., 2020; Karimzadeh et al., 2014).

In Africa, e-banking adoption has gained attention due to mobile technology penetration and the need for financial inclusion. E-banking services contribute to reduced transaction costs and improved operational efficiency (Patrick, 2021). Despite these advancements, empirical evidence indicates that the adoption of e-banking services across African countries remains relatively low due to infrastructural limitations, regulatory constraints, and low digital literacy (Yahya, 2023). While countries like Kenya have achieved significant success with innovations like M-Pesa, Ethiopia continues to face substantial challenges in e-banking expansion (Ngango, 2023).

In Ethiopia, the banking industry has experienced considerable transformation, though cash remains the dominant payment method (Gardachew, 2010). E-banking began in 2001 when the Commercial Bank of Ethiopia introduced ATMs. Since then, commercial banks have progressively introduced mobile banking, internet banking, and POS terminals. Recent studies indicate that mobile banking adoption has grown significantly, with fintech services expanding across the country (Dinku, 2023; Tadesse, 2024). The National Bank of Ethiopia has supported this development through policies promoting secure electronic payment systems (NBE, 2020).

Several theoretical perspectives explain technology adoption and organizational performance. The Technology-Organization-Environment (TOE) framework suggests that technological, organizational, and environmental factors jointly influence adoption outcomes (Bouteraa, 2024). The Diffusion of Innovation (DOI) theory explains that

adoption depends on relative advantage, compatibility, and complexity (Ahn et al., 2026; Overbye-Thompson & Hamilton, 2025; Almakaty, 2026). These theories provide a foundation for understanding how e-banking services contribute to financial performance.

In this study, performance refers to financial performance measured by Return on Assets (ROA), which indicates how efficiently a bank uses its assets to generate profit.

E-banking services represent a strategic marketing tool that enables banks to enhance customer experience, improve service quality, and build long-term customer loyalty. By offering convenient digital platforms, banks can attract new customers, reduce churn, and improve cross-selling opportunities (Patrick, 2021; Alalwan et al., 2020). This study were controlled for inflation, and GDP growth to isolate the effect of e-banking on financial performance.

A pivotal regulatory change that accelerated the adoption of electronic banking in Ethiopia was introduced by the National Bank of Ethiopia (NBE) in October 2020. Under Directive No. FIS/03/2020, the NBE restricted cash withdrawals to a maximum of 50,000 Birr per day for individuals (NBE, 2020). This policy was designed to promote a cash-lite economy, reduce the risks associated with handling large volumes of physical currency, and enhance the traceability of financial transactions to combat money laundering and illicit financial flows. For commercial banks, including Awash Bank, this regulation created an urgent and compelling reason to accelerate their investment in electronic banking infrastructure. Customers who previously relied on over-the-counter cash withdrawals for large transactions—such as business payments, school fees, medical expenses, and large purchases—were now forced to seek alternative electronic payment methods. This regulatory push transformed electronic banking from a convenient option into a necessary channel for conducting substantial financial transactions. Consequently, Awash Bank, like other financial institutions, had to rapidly expand its ATM networks, POS terminals, mobile banking platforms, and internet banking services to accommodate the growing demand for digital transactions and to

retain customers who might otherwise switch to banks with more robust e-banking systems.

Awash Bank, established in 1994, is one of Ethiopia's leading private banks. The bank has progressively adopted ATM services, mobile banking, internet banking, and POS terminals. Despite increasing investment in e-banking technologies, empirical evidence on the effect of these services on Awash Bank's financial performance remains limited and inconclusive. Existing studies have primarily focused on customer adoption and implementation challenges rather than the combined effect of multiple e-banking channels on financial performance using recent data. Therefore, this study seeks to examine the effect of electronic banking services on the financial performance of Awash Bank.

Serving over 15 million customers as of 2025, including 2.88 million active mobile banking users, 3.25 million cardholders, 3,585 active POS terminals, and 5,702 active internet banking users, Awash Bank has been compelled to rapidly expand its electronic banking channels—ATMs, POS terminals, mobile banking, and internet banking—to efficiently serve its growing customer base and remain competitive in Ethiopia's evolving financial sector.

1.2. Statement of the Problem

In many banks throughout the world e-banking is now the focal area of bankers because it reduces the cost of doing transactions, increases customer satisfaction, attracts new customers, makes transactions faster than before, creates new markets and enhances service quality to a better banks' performance. For this reason, banks are intended to adopt the new technologies. Even though the expansion of e- banking throughout the developed and the developing world is rapid.

Electronic banking system has a great impact on bank performance because they increase profitability, reduce bank cost of operations, and increase bank asset and bank efficiency (Nagango, 2023). Electronic banking has made banking transaction to be easier by bringing services closer to its customers hence improving banking industry

performance (Josiah and Nancy, 2012).

Globally, electronic banking has transformed the financial services industry by enabling customers to perform transactions remotely without visiting bank branches (Driga & Isac, 2014). The banking industry faces pressing challenges related to customer's satisfaction, customer base expansion, and profitability (Santos, 2023). The National Bank of Ethiopia (2023) highlights rising operational costs and inefficiencies, particularly due to delays in cheque processing and long customer wait times, leading to increased complaints (Ndikuriyo, 2020). To address these issues, banks including Awash Bank have adopted electronic banking solutions aimed at enhancing service delivery and operational efficiency.

The core problem is that limited empirical studies have systematically examined how electronic banking services affect the financial performance of Awash Bank, leaving bank managers without evidence-based guidance for investment decisions. Despite significant investment in e-banking infrastructure, Awash Bank's management cannot determine whether these investments have actually improved financial outcomes or which e-banking service generates the highest return.

Compounding this empirical gap is a binding regulatory constraint that has fundamentally altered customer behavior and banking operations in Ethiopia. Since October 2020, the National Bank of Ethiopia has restricted cash withdrawals to a maximum of 50,000 Birr per day for individuals under Directive No. FIS/03/2020 (NBE, 2020). For Awash Bank, this regulation has created an urgent and compelling reason to prioritize electronic banking development. Customers who need to access or transfer amounts exceeding 50,000 Birr can no longer do so through traditional over-the-counter cash withdrawals; they must use electronic channels such as mobile banking, internet banking, POS terminals, or ATM transfers. This regulatory reality means that Awash Bank's ability to serve its customers effectively—and to remain competitive in the Ethiopian banking sector—now depends heavily on the quality, reliability, and accessibility of its e-banking services. Failure to provide robust electronic banking

options would not only inconvenience customers but could drive them to competitor banks with more advanced digital platforms. Therefore, understanding whether Awash Bank's investment in e-banking services has actually improved its financial performance is not merely an academic exercise but a practical necessity in light of this binding regulatory constraint. Bank management must know whether their e-banking expenditures are generating positive returns on assets (ROA), reducing operational costs, and increasing fee-based income from electronic transactions. Without this evidence, Awash Bank cannot make informed decisions about future technology investments or determine which e-banking service delivers the highest return.

Most importantly, no previous study has specifically examined the effect of all four major e-banking services (ATM, POS, mobile banking, and internet banking) on the financial performance of Awash Bank using recent data (2015–2025) while controlling for bank-specific and macroeconomic factors.

In this study, financial performance is measured using Return on Assets (ROA), which indicates how efficiently a bank generates profit from its assets. Operational performance and customer satisfaction are beyond the scope of this study.

However, existing literature presents conflicting findings regarding the relationship between e-banking and bank profitability. Some studies report a positive relationship (Ogare, 2013; Karimzadeh et al., 2014; Alalwan et al., 2020), while others find no significant relationship (Girma, 2016) or even a negative relationship (Al-Smadi & Al-Wabel, 2011; Tilahun, 2015). This inconsistency creates uncertainty for bank managers when making investment decisions.

Furthermore, previous Ethiopian studies have measured e-banking adoption using infrastructure-based indicators rather than usage-based measures. Tilahun (2016), Solomon (2016), Girma (2016), and Bethlehem (2018) measured e-banking using the number of ATM terminals, the number of POS terminals, the number of mobile banking users, or the number of internet banking users. However, these measures fail to capture actual customer usage or the economic value of electronic transactions. A bank may

have a large number of ATMs or registered mobile banking users, but if those ATMs are rarely used or users only perform low-value balance inquiries, the financial impact on bank performance may be minimal. This study addresses this measurement gap by using transaction volume (total value in Birr) as the measure of e-banking adoption, which captures the actual economic value flowing through digital channels.

Regarding POS terminals specifically, previous studies have failed to address several critical issues. First, most Ethiopian studies treated POS as a secondary variable rather than a primary driver of financial performance, despite its potential to generate fee-based income and reduce cash handling costs. Second, existing studies present contradictory findings on the effect of POS terminals. For example, Solomon (2016) found a positive effect of POS on ROA, while Girma (2016) and Tilahun (2015) found a negative or insignificant effect. This inconsistency has not been adequately explained. Third, no previous study has isolated the effect of POS terminals while controlling for bank-specific and macroeconomic factors such as bank size, capital adequacy, inflation, and GDP growth. Fourth, most studies used older data (pre-2015) when POS adoption in Ethiopia was minimal, failing to capture the current state where POS terminals have become more widespread across retail stores, hotels, and supermarkets.

Despite the growing body of literature on e-banking and bank performance, several gaps remain. Most Ethiopian studies have focused on e-banking adoption, barriers, and customer satisfaction rather than on financial outcomes (Gardachew, 2010; Ayana, 2014; Berhanu, 2015). Studies that did examine performance (Solomon, 2016; Girma, 2016; Tilahun, 2015) either focused on multiple banks or omitted key variables such as internet banking. Furthermore, these studies used older data when Ethiopian banks were at an early stage of e-banking adoption. Most importantly, no study has specifically focused on Awash Bank to examine the effect of all four e-banking services (ATM, POS, mobile banking, and internet banking) on its financial performance using recent data (2015-2025) while controlling for bank-specific and macroeconomic factors such as bank size, capital adequacy, inflation, and GDP growth.

Addressing this problem is important for three reasons. First, Awash Bank has invested significant resources in e-banking infrastructure without knowing whether these investments have actually improved financial performance. Second, without evidence-based guidance, bank managers cannot determine which e-banking service generates the highest return on investment. Third, understanding the effect of e-banking on customer retention, service quality, and competitive advantage is essential for developing effective marketing strategies and strengthening customer relationships.

Therefore, the main purpose of this study would be to determine the effect of electronic banking on the financial performance of Awash Bank. This research will fill these gaps by systematically evaluating the impacts of mobile banking, internet banking, ATMs, and POS services on the financial performance of Awash Bank while controlling for inflation, and GDP growth using recent data from 2015 to 2025.

1.3. Basic Research Questions

This study attempted to answer the following research questions formulated based on the problems identified:

1. What is the effect of ATM transaction volume on the financial performance of Awash Bank?
2. What is the effect of POS transaction volume on the financial performance of Awash Bank?
3. What is the effect of mobile banking transaction volume on the financial performance of Awash Bank?
4. What is the effect of internet banking transaction volume on the financial performance of Awash Bank?
5. What is the effect of inflation on the financial performance of Awash Bank?
6. What is the effect of GDP growth on the financial performance of Awash Bank?
7. Which e-banking service (ATM, POS, mobile banking, or internet banking) contributes most to the financial performance of Awash Bank?

1.4. Objectives of the Study

1.4.1.General Objective

The general objective of this study is to examine the effect of e-banking services on the financial performance of Awash Bank.

1.4.2.Specific Objectives

The specific objectives are:

1. To examine the effect of ATM transaction volume on the financial performance of Awash Bank.
2. To examine the effect of POS transaction volume on the financial performance of Awash Bank.
3. To examine the effect of mobile banking transaction volume on the financial performance of Awash Bank.
4. To examine the effect of internet banking transaction volume on the financial performance of Awash Bank.
5. To examine the effect of inflation on the financial performance of Awash Bank.
6. To examine the effect of GDP growth on the financial performance of Awash Bank.
7. To identify which e-banking service (ATM, POS, mobile banking, or internet banking) contributes most to the financial performance of Awash Bank.

1.5. Hypothesis of the Study

1. H_{01} : volume of ATM transaction has no significant positive effect on Awash Bank's ROA.

H_{11} : Volume of ATM transaction has a significant positive effect on Awash Bank's ROA.

2. H_{02} : Volume of POS transaction has no significant positive effect on Awash Bank's ROA.

H_{12} : Volume of POS transaction has a significant positive effect on Awash Bank's ROA.

3. H_{03} : Volume of mobile banking transaction has no significant positive effect on Awash Bank's ROA.

H_{13} : Volume of mobile banking transaction has a significant positive effect on Awash Bank's ROA.

4. H_{04} : Volume of internet banking transaction has no significant positive effect on Awash Bank's ROA.

H_{14} : Volume of internet banking transaction has a significant positive effect on Awash Bank's ROA.

5. H_{05} : Inflation has no significant effect on Awash Bank's ROA.

H_{15} : Inflation has a significant negative effect on Awash Bank's ROA.

6. H_{06} : GDP growth has no significant effect on Awash Bank's ROA.

H_{16} : GDP growth has a significant positive effect on Awash Bank's ROA.

7. H_{07} : There is no significant difference in the contribution of ATM, POS, mobile banking, and internet banking to Awash Bank's ROA.

H_{17} : There is a significant difference in the contribution of ATM, POS, mobile banking, and internet banking to Awash Bank's ROA, with at least one service contributing more than others.

1.6. Significance of the Study

Awash Bank plays a significant role in the economic progress and development of Ethiopia. This study aims to examine the effect of electronic banking on the financial performance of Awash Bank. The significance of this study is explained below.

First, for Awash Bank's investment decisions. Due to the proliferation of commercial banks and increasing investments in technology, this study will investigate the

effectiveness of Awash Bank's existing e-banking investments on its profitability. The findings will inform future decisions regarding the adoption of more advanced and up-to-date technologies.

Second, for Awash Bank's management. The findings will assist Awash Bank's management in evaluating whether the implementation of e-banking services has achieved early planned objectives and whether adjustments are needed.

Third, for marketing practice. From a marketing perspective, this study will contribute to understanding how e-banking services serve as strategic tools for customer acquisition, customer retention, and brand loyalty. The findings will help banks develop more effective marketing strategies to attract and retain customers through digital channels.

Fourth, for policymakers and regulators. The study will be important for the National Bank of Ethiopia and other regulatory bodies in assessing how existing legal frameworks affect the implementation and objectives of e-banking services. The findings will provide evidence on whether e-banking services achieve their intended objectives of improving bank performance and delivering quality service to the public.

Fifth, for future research. This study will establish a foundation for future research on e-banking and bank performance in Ethiopia, particularly regarding the differential effects of various e-banking channels and the role of macroeconomic control variables.

1.7. Delimitation/Scope of the Study

The primary aim of this study will be to examine how the implementation of electronic banking services affects the financial performance of Awash Bank. Most studies on commercial bank performance have categorized the determinants of performance into internal and external factors (Rasiah, 2010; Naceur & Omran, 2011; Khrawish, 2011). Under this research investigation, the study will consider both internal and external factors to measure the performance of Awash Bank. The internal factors include e-banking services (ATM, POS, mobile banking, and internet banking). The external factors include inflation and GDP growth, which were included as control variables to

isolate the effect of e-banking services on financial performance.

Due to the relatively recent introduction of e-banking applications in Ethiopian commercial banks, secondary data will be collected for the period covering **2015 to 2025**—the time when most banking services, particularly e-banking services, became applicable in the country. Moreover, various studies and reports concerning e-banking and its impact on performance are not readily available for this period. As with any other study, this research will also face time and financial constraints in collecting data.

1.8. Structure of the study

This paper was classified in to 5 (five) chapters. The first chapter is an introductory of the paper.in this provides back ground of the study, statement of problem and objective of the study, significant of the study and scope of the study. The components of this describe the purpose of the study. The second unit outlines the related literature review of data authors about the subject matters under the study. The 3rd unit describe about the methodology to be adopted in the process of research under taking. The 4th unit mainly the analyze part of study diagnosis the data and relates them to different aspects. Method so as to provide sound conclusion and recommendation area apply. Finally the last chapter sum up all the points that are raise in the paper, draw conclusion and raise sound recommendation.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2. INTRODUCTION

This chapter deals with the related literatures of the study. The literature review is organized into five, major parts, i.e. the basic definition and concepts, theoretical review, empirical review, research gap and conceptual framework part. The theoretical review part discusses definition, role and the theories that states about E-banking and the variables that are claimed to affect banks financial performance. The empirical literature part reviews past studies that were conducted on the area of effect of E-banking on financial performance of commercial banks in Ethiopia. A conceptual framework deal with financial performance of the banks measured by ROA and ROE is dependent variable and while automated teller machine, point of sale, mobile banking, internet banking are independent variable.

2.1. Basic Concepts and Definitions of E-banking

Electronic banking, or e-banking, refers to an umbrella term for the process by which a customer may perform banking transactions electronically without visiting a brick-and-mortar institution (Ombati et al., 2011). E-banking can be defined as the use of electronic means such as the internet to conduct financial transactions (Onay, 2008). E-banking developments can be highly linked to banking channels and one can contend that e-banking helps to distinguish one delivery channel from the other. For instance, there has been a significant shift from single banking channels to multi-channels, then from multi-channels to cross-channels and then from cross-channels to Omni-channels, where consumers have access to mobile, ADS, the WEB and bank branches as delivery channels (Kegan et al., 2005).

Electronic banking can be defined as the automated, smooth and efficient delivery of modern and traditional banking services through electronic and communicative channels. It includes the systems that customers use to access accounts, transact business and obtain information through networks, including the internet. These

networks could be private or public.

Electronic banking is, therefore, a general term describing the whole process of performing such transactions without the need to physically visit the financial institution. All of the following terms refer to different forms of electronic banking; personal computer (PC) banking, online banking, home banking, mobile banking and virtual banking (Shan, 2000).

E-channels can be defined as the use of electronic means to deliver financial services (Dannenbergh & Kellner, 1998). Such electronic means extend to include the use of the internet, telephone and computers. Both e-banking and e-channels are strongly linked to the need to attain banking effectiveness and efficiency in service delivery (Aduda & Kingoo, 2012). The notable change brought by e-banking and improvements in e-channels is service quality and consumers can now access quality banking services (Sumra, Manzoor & Abass, 2011).

One of the benefits banks derive from the delivery of electronic banking products and services is improved efficiency and effectiveness of their operations so that more transactions can be processed faster and more conveniently, which will undoubtedly have a significant impact on the overall performance of the bank. The use of e-banking can contribute to improving bank performance, in terms of increased market share, an expanded product range, customized products and better response to client demand (Kariuki, 2005).

2.2. Theoretical Review

2.2.1. Technology Acceptance Model (TAM)

The technology acceptance paradigm was built on the theory of reasoned action (Lubua & Pretorius, 2019). It suggests that two key factors affect how well people accept an information system: how easy they perceive it to be to use (perceived ease of use) and how useful they perceive it to be (perceived usefulness). Davis (1989) argued that a high-performance information system is useless if the user does not learn to use and accept the technology. Therefore, it is important to understand why users accept or

reject systems so that these systems can be explained and improved in the future.

Electronic banking services have revolutionized the landscape of commercial banking by enhancing the convenience and accessibility of financial services for consumers and businesses alike. According to Alalwan et al. (2020), digital banking has transformed customer behavior globally. With the rise of the internet and mobile technology, banks have adopted a range of electronic platforms, including online banking, mobile banking apps, and digital wallets.

These services allow customers to perform transactions, access account information, and manage finances anytime and anywhere, significantly reducing the need for physical branch visits. As a result, banks can offer 24/7 services, streamline operations, and lower costs, all while improving customer satisfaction and engagement (Anderson & Patel, 2023). Moreover, electronic banking services have played a crucial role in promoting financial inclusion, particularly in underserved areas. By leveraging technology, banks can reach a broader customer base, providing essential banking services to individuals who may not have access to traditional banking infrastructure. Digital platforms also facilitate quicker loan approvals, real-time transaction processing, and enhanced security features, which build trust among users (Thompson et al., 2023). However, the shift to electronic banking also raises concerns regarding cybersecurity and data privacy, compelling financial institutions to invest heavily in robust security measures. Overall, the integration of electronic banking services in commercial banking represents a significant shift toward a more efficient and customer-centric approach in the financial sector (Roberts, 2023).

2.2.2. What is Electronic Banking?

E-banking is a term used to describe the new age of banking. It means delivering banking products and services to customers through electronic channels instead of making them visit a physical branch. Customers can check their account balance, transfer money, pay bills, and even apply for loans without stepping inside a bank (Driga & Isac, 2014).

According to the Basel Committee on Banking Supervision (2003), electronic banking is the provision of financial services and markets using electronic communication and computation. Today, many banks are switching to multi-channel distribution of financial services. This means they use a mix of traditional "bricks and mortar" branches alongside digital platforms. The services offered through e-banking include deposit-taking, lending, account management, financial advice, electronic bill payment, and other electronic payment products such as electronic money (Basel Committee Report on Banking Supervision, 2003).

Some authors use different terms interchangeably when talking about electronic banking. These include PC banking, internet banking, mobile banking, online banking, and virtual banking. For this study, the term "e-banking" will be used to refer to all of these.

Over time, the definition of e-banking has changed as technology improved. The initial phase of e-banking, emerging in the 1990s, primarily offered informational services, allowing customers to read bank information on a website. However, the definition of e-banking has since evolved, and it is now understood as a complete shift to the internet for almost all banking activities, with over 60% of consumers using their smartphones as their preferred interface for digital banking (Ahammed, 2024). Recent studies define e-banking as the use of digital channels to deliver financial services, including payments, transfers, and account management (Alalwan et al., 2020; Zewdie, 2023). However, contemporary e-banking includes a broader range of services. Customers can perform most banking activities online or through their phones. Today, e-banking is not just an extra option—for many people, it has become the main way they do their banking.

According to Ahammed (1999), e-banking started as simply providing bank information on a website. Later, more advanced services came along, allowing customers to access their accounts, move money between accounts, make payments, and even apply for loans through electronic channels.

Researchers have also classified e-banking into different levels. The basic level is just

giving information. The next level enables customers to communicate with the bank, ask questions, and submit applications. The most advanced level is transactional e-banking, where customers can do everything online—transfer money, pay bills, apply for loans—without ever visiting a branch. This classification is useful because it helps banks like Awash Bank decide what level of service they want to offer and what technology they need to invest in.

Understanding e-banking is important for many different people, not just bank managers. For customers, e-banking saves time and makes life easier. For bank employees, it reduces routine, repetitive tasks so they can focus on helping customers with more complex problems. For regulators, e-banking brings new challenges like security, data privacy, and preventing money laundering. For shareholders, if a bank implements e-banking well, it can reduce costs and increase profits. Awash Bank, like other banks, needs to consider all these different stakeholder interests when planning its e-banking strategy.

Shah and Clarke (2009) point out that the internet is very different from other banking channels like branch networks, telephone banking, or ATMs. Unlike a physical bank branch, e-banking works 24 hours a day, 7 days a week, with no geographic limits. This creates unique challenges. Bank managers have to figure out how to connect internal and external systems, adopt new business models, and constantly change their processes. Also, customers now expect more—they want better products delivered faster and more conveniently.

Of course, e-banking is not perfect. It comes with its own set of problems. Driga and Isac (2014) explain that security is a major concern. Many customers worry about whether their money and personal information are safe when banking online. Because of this, banks must invest substantial resources on security measures like encryption, firewalls, and multi-factor authentication. Other challenges include the high cost of setting up e-banking systems, the need to keep upgrading technology, and the risk of system failures or cyber-attacks. In a country like Ethiopia, there are additional

problems—not everyone has internet access or a smartphone, and many customers lack the digital skills needed to use e-banking services. For Awash Bank, these challenges are very real and must be addressed if e-banking is going to succeed.

2.2.3. Dimensions of Electronic Banking

Automated Teller Machine (ATM)

An Automated Teller Machine (ATM) is an electronic terminal that enables customers to access banking services at almost any time. To withdraw cash or transfer funds, a customer needs an ATM card and a personal identification number (PIN). ATMs also enable customers to check account balances, deposit cash or cheques, and transfer money between bank accounts (Noorah et al., 2009). The primary advantages of ATMs are that they save customers' time and are a cost-efficient way of achieving higher productivity than human tellers. Furthermore, ATMs continue to operate even when human tellers are unavailable, ensuring continuous productivity for the bank after banking hours (Tilahun, 2015). However, major challenges in using ATMs include unreliable telecommunication networks and power failures, which result in temporary service interruptions.

For Awash Bank, ATMs were among the first e-banking services introduced. The bank has been expanding its ATM network across the country to serve its growing customer base.

As of June 30, 2025, Awash Bank processed a total ATM transaction volume of 448,104,950 Birr. The Bank operated 1,222 ATM terminals nationwide, supporting over 3.2 million cardholders.

Point of Sale Terminals (POS)

A Point of Sale (POS) terminal is a system that allows consumers to pay for retail purchases using a debit card. The money for the purchase is transferred immediately from the debit card holder's account to the store's account (Tilahun, 2015). POS systems enable customers to make payments without handling cash. In addition, the

system continues to operate after banking hours, providing continuous productivity for the bank. In Ethiopia, very few retail stores and restaurants have established POS machines for debit card transactions. Many individuals are hesitant to receive electronic payments due to lack of adequate education about e-payment systems.

As of June 30, 2025, Awash Bank processed a total POS transaction volume of 856,363,146 Birr through 3,585 active POS terminals across retail stores, hotels, and merchant outlets.

Mobile Banking

Mobile banking is a system that allows bank customers to conduct financial transactions using a mobile device. As the newest service in electronic banking, mobile banking relies on Wireless Application Protocol (WAP) technologies, as mobile devices require a WAP browser to access information (Driga & Isac, 2014).

Mobile banking differs from internet banking in an important way. Internet banking requires a computer and an internet connection. Mobile banking requires only a phone, which most of the population owns. In Ethiopia, there are far more mobile phones than computers, making mobile banking potentially more accessible to the average person. Some banks are making significant investments in mobile systems to deliver various types of business value, from increased efficiency and cost reduction to improved operational effectiveness and customer service (Shah & Clarke, 2009). A well-designed mobile banking application can process thousands of transactions per second, serve millions of customers, and incur very low costs per transaction. Mobile banking provides a convenient way for customers to perform banking transactions using mobile phones or other mobile devices. Customers can check their balances, transfer money to others, or pay bills at any time and from any location without needing to be at home, at work, or in front of a computer. Only a mobile phone is required.

The main obstacles to mobile banking development include low consumer adoption due to several factors. First, internet connectivity costs can be high. In Ethiopia, mobile data is not free, and not all customers can afford it. Second, the user interface of some

mobile banking applications is difficult to use, especially for older customers or those who lack technological proficiency. Third, there is a lack of awareness among customers about what mobile banking can do and how to use it safely. Fourth, there are limitations in the functionality of mobile devices—not all phones can run banking applications. Fifth, security concerns are a major issue, as customers worry about hackers and fraud. Finally, technology overload affects some customers who feel overwhelmed by too many digital options (Shah & Clarke, 2009).

For Awash Bank, mobile banking is a key area of growth. The bank offers mobile banking services to its customers, and the number of users has been increasing. However, compared to countries like Kenya where mobile money is widespread, Ethiopia still has significant progress to make.

As of June 30, 2025, Awash Bank processed a mobile banking transaction volume of 14,185,411,678 Birr. The Bank had 2,879,128 active mobile banking users, making it the dominant digital channel by transaction value.

Internet Banking

Internet banking is an electronic home banking system that uses web technology. Bank customers can conduct business transactions with the bank using personal computers. Internet banking is also referred to as online banking, web banking, or virtual banking. It enables bank customers to access accounts and general information about bank products and services, as well as perform account transactions directly with the bank through the internet (Imola & Claudia, 2014).

According to Noorah et al. (2009), internet banking handles many banking transactions via personal computer. The personal computer connects through a network service provider directly to a bank's host computer system, allowing customer service requests to be processed automatically without intervention by customer service representatives.

As of June 30, 2025, Awash Bank processed an internet banking transaction volume of 1,927,264 Birr with only 5,702 active users, representing the lowest adoption among

all electronic banking channels.

2.2.4. Bank Performance

In general, performance is defined as the achievement of objectives set by the firm within the agreed time and with minimal costs while using available resources (Chenini Hajer, 2016). A bank performs well when it achieves its goals, such as achieving a specific profit target, on time without excessive expenditure and without wasting its resources. Many variables have been used by different researchers to measure bank performance. There is no single best measure, as each measure has its own strengths and weaknesses. Therefore, researchers often employ multiple measures.

Net Interest Margin (NIM), Return on Assets (ROA), and Return on Equity (ROE) are commonly used in the literature (Ahmed, 2003). These measures are explained below:

- Net Interest Margin (NIM) is the difference between the interest a bank earns on loans and the interest it pays on deposits, divided by its total assets. A higher NIM indicates that the bank is generating more profit from its lending activities.
- Return on Assets (ROA) is net income divided by total assets. It indicates how efficiently a bank is using its assets to generate profit. For example, if a bank has 1 billion birr in assets and generates 100 million birr in profit, its ROA is 10 percent.
- Return on Equity (ROE) is net income divided by shareholders' equity. It indicates how much profit the bank is generating for its owners.

Profitability measures also include Profit before Tax (PBT), Profit after Tax (PAT), and Rate of Return on Capital (ROC) (Akinola, 2008). PBT is the bank's profit before paying taxes. PAT is profit after taxes. ROC is profit divided by the capital invested in the bank.

For this study, Return on Assets (ROA) will be used to measure Awash Bank's performance. According to Anbar (2011), ROA has emerged as a key ratio for evaluating commercial bank profitability and has become the most common measure of bank performance. ROA is particularly popular because it is correct for the size of the bank. A

large bank might generate higher absolute profit, but that does not necessarily indicate greater efficiency. ROA standardizes the comparison by dividing profit by total assets.

ROA is calculated by dividing net income by total assets. It demonstrates how efficiently a bank's assets are being used to generate profits (Ricard, 2012). A high ROA indicates that management is effective in using the bank's resources to create value. A low ROA may indicate that the bank has excessive assets that are not generating sufficient income, or that costs are too high.

$$\text{ROA} = \frac{\text{Net Income of Banks}}{\text{Banks Average Total Asset}}$$

2.2.5.Evolution of E-Payment

The growth of information and communication technology is transforming societies worldwide. One area where this transformation is particularly evident is in business conduct. Three decades ago, if a customer wanted to make a purchase from another country, mailing a check or arranging a wire transfer through a bank was necessary, a process that could take weeks. Today, a customer can purchase goods from a seller in China or the United States with minimal effort, and the payment occurs in seconds. The growth of the Internet has enabled electronic commerce, which offers consumers and merchants convenience and speed. However, the success of e-commerce depends on efficient electronic payment systems (Kidan, 2005). Online shopping and online payments are interdependent.

Electronic banking describes transactions that occur between individuals, organizations, and their banks using electronic channels. First conceptualized in the mid-1970s, some banks offered electronic banking in 1985. However, limited internet access and high costs slowed growth. In the early days of the internet, very few individuals had access, and those who did often paid by the minute for dial-up connections. Online banking was slow, expensive, and relatively insecure.

The rapid expansion of internet access in the late 1990s transformed the financial landscape. As more individuals acquired personal computers and broadband internet, they became more comfortable with online transactions. E-commerce platforms such as Amazon and eBay demonstrated that online purchases could be safe and convenient. By 2000, 80 percent of U.S. banks offered e-banking (Batchelor, 2017). Recent data indicates that global digital payment volumes exceeded \$10 trillion in 2024, with mobile payments accounting for the fastest-growing segment (World Bank, 2024).

The emergence of e-banking in Ethiopia dates to late 2001, when the Commercial Bank of Ethiopia (CBE) introduced ATMs to serve local users (Tekabe et al., 2016). Since then, e-banking in Ethiopia has grown progressively. More banks have introduced ATMs, mobile banking, and internet banking. The national switch system (ET Switch) now enables customers to use ATMs from different banks. However, compared to countries such as Kenya, Ethiopia remains in the early stages of e-banking development. According to recent Ethiopian research, mobile banking users increased from 5 million in 2018 to over 18 million in 2024, indicating significant growth potential (Dinku, 2023; Tadesse, 2024).

2.2.6.Limitation of Traditional Payment Systems

Despite the widespread use of cash in Ethiopia, traditional payment systems present significant limitations that hinder financial efficiency and economic growth.

Traditional payment systems, particularly cash, have several limitations.

First, cash payments are vulnerable to theft. Individuals carrying large amounts of cash become potential targets for thieves, and stolen cash is generally irrecoverable. With digital payments, if a card or phone is stolen, the customer can contact the bank to cancel it, thereby protecting the funds.

Second, cash transactions are difficult to trace. When cash changes hands, no record of the transaction exists, enabling individuals to conceal income from tax authorities or

engage in illegal activities. Digital payments leave an electronic trail, with every transaction recorded, helping to prevent fraud and tax evasion.

Third, cash is expensive to manage. The costs associated with cash include government printing costs, bank storage costs, business counting and deposit costs, and security guard transportation costs. The National Bank of Ethiopia spends an estimated 500 million birr annually on currency printing and replacement (NBE, 2024). Digital payments incur none of these expenses.

Fourth, cash is inconvenient for large transactions. For a purchase of 500,000 birr, carrying such large amounts of cash is impractical, risky, and dangerous. Digital payments enable instant and secure transfer of large sums.

Digital payments improve traceability. Recipients have digital records of payments, and identification requirements are stricter (World Bank, 2014). This makes it more difficult for individuals to receive unauthorized payments (ghost recipients) or for payments to disappear during processing (leakage). A study by Girma (2016) indicated that traditional brick-and-mortar banking requires expensive investment and is not economically feasible for many financial institutions. Physical branches require land, buildings, furniture, computers, security systems, and staff, costing millions of birr. By contrast, an ATM or mobile banking application costs substantially less.

Without e-banking, financial inclusion would be difficult to achieve in Ethiopia. Financial inclusion means providing universal access to financial services, including for low-income populations and individuals in rural areas. It is not profitable for banks to build branches in every small village, but e-banking services can be provided in those locations. A mobile phone tower can cover a large geographic area, enabling customers to conduct banking transactions from their mobile devices.

Cash is also inconvenient for large transactions and for e-commerce (Kidan, 2005). Online purchases cannot be made with cash; electronic payment methods are required. According to the National Bank of Ethiopia (2024), cash accounts for approximately

85% of all transactions in Ethiopia, highlighting the continued reliance on traditional payment systems despite the growth of digital alternatives. Recent data indicates that digital payment adoption in Ethiopia has grown, with over 18 million mobile banking users as of 2024, yet cash remains the dominant payment method for daily transactions (Dinku, 2023; Tadesse, 2024).

These limitations of traditional payment systems underscore the growing need for electronic payment solutions, which are discussed in the following section.

2.2.7. The Need for Electronic Payment

According to Muche (2010), electronic banking enables banks to expand their markets for deposit-taking and credit activities. In the past, a bank could only serve customers within the geographic proximity of its branches. Currently, a bank can serve customers anywhere in the country, or even anywhere in the world, provided they have internet access.

E-banking also facilitates the introduction of new products and services. For instance, a bank can offer a mobile application that helps customers track their spending, set savings goals, or receive personalized financial advice. These services are costly to deliver through traditional branches but comparatively inexpensive to provide digitally.

In addition, e-banking reduces operating costs. Whenever a customer uses an ATM or mobile banking instead of visiting a branch, the bank achieves cost savings. The bank avoids expenses related to teller salaries, branch rental, and paper receipt printing. These savings accumulate significantly over time.

The adoption of e-banking services offers several additional benefits.

First, it attracts high-value customers. Wealthy and educated customers increasingly expect digital services; banks that fail to offer such services risk losing these customers to competitors.

Second, it enhances the bank's corporate image. A bank that offers modern e-banking services appears more professional and forward-thinking.

Third, it enables the bank to reach more customers without geographic limitations.

Fourth, it improves organizational efficiency by automating routine tasks.

2.2.8. Overview of Banking and E-Banking in Ethiopia

History of Banking in Ethiopia

The first bank in Ethiopia, the Bank of Abyssinia, was established in 1905 as a joint venture between the Ethiopian government and the National Bank of Egypt. The bank held a monopoly on banking in Ethiopia, serving primarily foreigners and the government, while most Ethiopians did not use banking services.

Following the 1974 Revolution, all private banks were nationalized. The government took control of all banks and consolidated them into state-owned institutions. From 1975 to 1994, only four state-owned banks operated in Ethiopia, and no private banking existed during this period.

After the overthrow of the Dergue regime in 1991, a new economic policy introduced a market-oriented system, permitting private banks to operate once again. The first private bank established was Awash Bank in 1994. Since then, many other private banks have been established across the country.

Current State of Banking in Ethiopia

Research indicates that the Ethiopian financial sector remains underdeveloped and is dominated by the state-owned Commercial Bank of Ethiopia (CBE), which holds approximately 70 percent of the industry's total assets (Keatinge, 2014). CBE is the largest bank in the country, with more branches, customers, and assets than all private banks combined.

Cash remains the most common payment method in Ethiopia, with most transactions

conducted using physical currency. The use of checks is largely limited to government institutions, non-governmental organizations, and some private businesses (Gardachew, 2010). Credit cards are rarely used, and while debit cards are becoming more common, they are still not utilized by the majority of the population.

History of E-Banking in Ethiopia

The emergence of e-banking in Ethiopia dates to late 2001, when the Commercial Bank of Ethiopia (CBE) introduced ATMs. Initially, only eight ATMs operated in Addis Ababa. Today, thousands of ATMs operate across the country, although the majority remain concentrated in the capital.

Subsequently, other banks followed. Dashen Bank pioneered e-banking adoption and became the first private bank to offer mobile banking services. Zemen Bank launched full internet banking in 2010, becoming the first bank in Ethiopia to provide online banking to retail customers.

The national switch system, ET Switch, became operational in 2016. Prior to ET Switch, customers could only use ATMs operated by their own bank. For example, an Awash Bank account holder could only use Awash Bank ATMs. Currently, with ET Switch, customers can use any ATM from any participating bank, which has significantly enhanced the utility and convenience of ATMs for customers.

Awash Bank and E-Banking

Awash Bank S.C. was established in 1994 as one of the first private banks following the liberalization of the financial sector. The bank was named after the Awash River, one of Ethiopia's major rivers, with the name symbolizing growth, life, and continuity.

The bank has grown substantially since its establishment. From a single branch in Addis Ababa in 1994, Awash Bank now operates hundreds of branches across the country, serving individuals, businesses, and government institutions.

Awash Bank has progressively adopted e-banking services. Currently, the bank offers:

ATMs – Customers can withdraw cash, check balances, and transfer funds at Awash Bank ATMs nationwide.

POS terminals – Awash Bank provides POS terminals to businesses, enabling customers to make card-based payments.

Mobile banking – Awash Bank customers can use their mobile phones to check balances, transfer money, pay bills, and purchase mobile credit.

Internet banking – Awash Bank offers online banking through its website for customers who prefer computer-based access.

Today, Awash Bank is one of Ethiopia's leading private commercial banks, recognized for its customer service and technological commitment. However, the extent to which these e-banking services have impacted the bank's financial performance remains incompletely understood. Whether the investment in ATMs, POS terminals, mobile banking, and internet banking has improved the bank's profitability—or whether these investments have been costly without providing adequate returns—remains an open question that this study will address.

2.2.9.Determinants of Bank Profitability

Factors affecting bank profitability are divided into two categories: internal and external.

Internal factors are related to management decisions and efficiencies. These factors are within management's control and include:

- Bank size – measured by assets, deposits, or number of branches
- Capital adequacy – the bank's capital relative to its risks
- Liquidity risk – the bank's ability to meet customer withdrawal demands
- Operational efficiency – how effectively the bank controls its costs
- Technology adoption – the bank's use of modern technology, including e-banking services

External factors are beyond management's control and include:

- GDP growth – whether the economy is expanding or contracting
- Inflation – the rate at which prices are rising
- Interest rates – the central bank's interest rate policy
- Macroeconomic policies – government tax, spending, and regulatory policies

Athanasoglou et al. (2006) argued that profitability is a function of both internal and external factors. However, the relative importance of each factor varies across countries and individual banks.

This study will include both internal and external factors. The internal factors include e-banking services (ATM, POS, mobile banking, and internet banking), bank size, and capital adequacy. The external factors include inflation and GDP growth, which will be incorporated as control variables to isolate the pure effect of e-banking services on Awash Bank's financial performance.

2.2.10. E-Banking and Bank Performance

The banking sector is an important source of financing for most businesses. When businesses require capital for expansion, they frequently obtain loans from banks. When individuals seek to save money, they typically deposit it in banks. A healthy banking sector is essential for overall economic well-being.

Commercial banks face pressure from globalization and competition from non-banking institutions. For instance, mobile money services such as Telebirr in Ethiopia are not banks yet offer certain banking services, including money transfers and bill payments. Banks must compete with these new entrants. Banks cannot merely offer traditional services without innovation; innovation is essential. Banking is no longer solely about monetary transactions; it also encompasses information about financial transactions (Padwal, 1995). Customers seek not only their account balances but also transaction histories, fund sources, and emerging financial trends. E-banking provides this information in real time.

Several information technology-based services, including ATMs, internet banking, mobile banking, and POS banking, have provided convenient services to customers. These services offer several benefits:

They are available 24 hours per day, seven days per week, not only during banking hours.

They are fast—transactions that previously took minutes or hours now take seconds.

They are convenient—customers can bank from any location, not only at a branch.

They are cost-effective—digital transactions cost substantially less than teller-assisted transactions.

When service quality improves, customer satisfaction increases. Satisfied customers tend to remain loyal. They maintain longer relationships with the bank, utilize more services, and recommend the bank to others. All of these outcomes improve bank performance. E-banking outperforms traditional banking because it reduces transaction costs, improves payment efficiency, and enhances the banker-customer relationship. Customers feel more in control of their finances, and banks can serve more customers with fewer resources.

This study will apply this understanding to Awash Bank by examining whether its e-banking services (ATM, POS, mobile banking, and internet banking) have led to improved financial performance measured by Return on Assets (ROA). The study will use secondary data from 2015 to 2025 to answer this question.

2.2.11. The Role of Macroeconomic control variables (Inflation and GDP Growth)

When examining the relationship between e-banking services and bank performance, it is essential to control for macroeconomic factors such as inflation and GDP growth. These variables are not dimensions of e-banking but rather external factors that influence both the adoption of e-banking services and their contribution to financial performance (Athanasoglou et al., 2006).

Inflation

Inflation refers to the general increase in prices of goods and services over time. High inflation affects e-banking services through multiple channels. First, it erodes consumer purchasing power, which can reduce retail transaction volumes and, consequently, the usage of POS terminals and mobile banking platforms. Second, it increases the operational costs of maintaining e-banking infrastructure, including software licensing, cybersecurity, server maintenance, and hardware replacement. Third, during periods of high inflation, the real value of cash withdrawals decreases, potentially reducing ATM transaction volumes (Karimzadeh et al., 2014).

GDP Growth

GDP growth measures the rate at which a country's economy expands. Economic growth generally has a positive effect on e-banking adoption and performance. As the economy expands, per capita income rises, enabling more individuals to afford smartphones, mobile data plans, and computers. This expands the addressable market for mobile banking and internet banking services. GDP growth also stimulates retail activity and consumer spending, directly increasing the frequency and value of POS transactions and online banking activities (Reshid, 2025).

Why Control for These Variables?

Without controlling for inflation and GDP growth, empirical studies may incorrectly attribute changes in bank performance to e-banking services when those changes are actually driven by macroeconomic conditions. For example, an increase in POS transaction volume during a period of GDP growth might be due to economic expansion rather than the bank's strategic decision to expand POS networks. Conversely, a decline in ATM usage during high inflation might reflect reduced consumer purchasing power rather than inefficiency in ATM operations.

Therefore, this study includes inflation and GDP growth as control variables in the

regression model to isolate the pure effect of e-banking services (ATM, POS, mobile banking, and internet banking) on the financial performance of Awash Bank measured by Return on Assets (ROA).

2.3. Empirical Review

This section reviews a number of foreign and local studies that have been previously conducted to identify the determinants of bank profitability in many countries. Empirical findings are one of the important components of the literature review in the research study. This type of literature contributes a lot to the effectiveness of the investigation under study by revealing the gap what the researcher wants to find out and how the researcher undertakes the study which helps the researcher by providing insight about what and how to assume the investigation he/she stands for.

According to Sameni et al. (2015), electronic banking enables commercial transactions without requiring a physical bank visit. Researchers have employed various variables to evaluate the financial performance of commercial banks' digital banking services. Extensive research has been conducted on the implementation of e-banking and its effects on bank performance and profitability. Empirical evidence from different countries regarding e-banking and bank performance remains mixed. Several studies report a positive and statistically significant impact of e-banking on profitability (Alalwan et al., 2020).

2.3.1. International Studies on E-Banking and Bank Performance

Several studies have been conducted on the effects of mobile banking on bank performance. For instance, Mabwai (2016) conducted a study on the effects of mobile banking on the financial performance of commercial banks in Kenya. The study adopted a descriptive research design and descriptive statistics for analysis. The findings indicated that the number of mobile banking transactions, capital adequacy, market share, and size of the assets had a positive influence on the financial performance of commercial banks. Hence, the conclusion that mobile banking adoption has resulted in improved financial performance for commercial banks. The study recommended that

commercial banks should increase their focus and investments in mobile banking, as this is the future of the banking industry, in order to remain profitable.

A few empirical studies exist in the literature that have examined the performance of banks offering internet and mobile banking services. Egland et al. (1998) was the first important study, which estimated the number of US banks offering electronic banking and analyzed the structure and performance characteristics of these banks. It found no evidence of major differences in the performance of the group of banks offering internet banking activities compared to those that do not offer such services in terms of profitability, efficiency or credit quality. However, transactional internet banks differed from other banks primarily by size.

In contrast to the results of Egland et al. (1998), Furst et al. (2002) found that banks in all size categories offering e-banking were generally more profitable and tended to rely less heavily on traditional banking activities in comparison to traditional banks. Similarly, Hasan et al. (2002) found that e-banking institutions were performing significantly better than traditional banking groups.

Recent studies have consistently confirmed the positive relationship between e-banking and bank performance. Edin, Limaiei, and Yazdanfar (2025) found that internet banking adoption positively affects bank profitability. Wagle (2023) confirmed that internet banking, mobile banking, ATM, and card services positively affect commercial banks. In the Ethiopian context, Kassaye and Alamirew (2025) found that ATM, POS, internet banking, and debit cards have significant positive effects on ROA and ROE for private commercial banks, including Awash Bank.

Karimzadeh (2014) studied electronic banking effects on commercial bank profitability in Iran. The study examined the relationship between the dependent variable, ROA, and the independent variables consisting of number of ATMs, terminal branches, POS, market concentration, bank size, and credit cards for the period 2004-2012. Results confirmed that number of terminal branches, ATMs, credit cards, POS, and bank size had a positive and significant impact on the profitability of banks, while market

concentration had a negative and significant impact on bank profitability because it reduces competitiveness and efficiency of banks.

A study by Sujud and Hashem (2017) on the effect of bank innovations on profitability and ROA of commercial banks in Lebanon found that 59.3 percent variation in profitability was explained by e-banking variables, and among all independent variables, only EFT had a significant impact on profitability. Additionally, 97.7 percent variation in ROA was explained by these variables, and among all, only debit and credit cards had a positive and significant contribution to ROA. Overall, the findings suggest that bank innovations potentially lead to higher profitability and higher return on assets of commercial banks.

Sarokolaei (2011) investigated the effect of e-banking on increasing bank revenues using bank cards, ATM, POS, internet bank, and mobile bank as proxies for e-banking. The study was done in Iran on private banks from 2009-2011. Using regression and correlation analysis, it was assessed that ATM, POS, bank card, internet bank, telephone bank, and service fee had a positive and significant relation. Thus, electronic banking can increase the revenue of private banks because e-banking helps in reducing cost of service. Recent studies support this finding. Awwaliyah et al. (2025) found that digital bank transformation significantly impacts profitability measured by ROA, indicating that e-banking adoption leads to improved financial performance.

Alipour and Salehi (2010), in their study entitled "E-Banking in Emerging Economy: Empirical Evidence of Iran," focused mainly on advantages of e-banking. The results showed that e-banking serves several advantages to the Iranian banking sector; however, the study also showed that Iranian customers did not have enough knowledge regarding e-banking. The introduction of e-banking in Iran has led to more use of ATMs. The authors concluded that active ATMs in the banking sector will cause a decrease in cash circulation and increase the efficiency of the banking sector. Contemporary research confirms the continued relevance of these findings. Nandy, Kumar, and Chauhan (2025) conducted a meta-analysis of 56 publications and found that perceived

trust, security, and service quality are vital determinants of mobile banking success, while Budnik (2026) provided evidence that digital banks reprice deposits more strongly and rapidly, strengthening the funding cost channel of monetary policy.

Floros and Gordian (2015) examined the relationship between the number of ATMs, IT investments, and the efficiency and profitability of Greek commercial banks. The findings indicated that ATMs had a negative effect on net interest income and efficiency, while large banks were more efficient than medium and small-sized banks. Contemporary research from Ethiopia supports a positive relationship. Kassaye and Alamirew (2025) found that ATM, POS, internet banking, and debit cards have significant positive effects on ROA and ROE for private commercial banks, including Awash Bank.

Goodarzi and Zebidi (2008) examined the relationship between e-banking development and profitability of Iranian commercial banks using an econometric model. The results showed that an increase in the number of ATMs had a positive effect on profitability (ROA), and this effect strengthened after banks joined the SHETAB interbank information transfer network. Therefore, the study concluded that the expansion of electronic banking had a positive and significant effect on commercial bank profitability.

Using panel data from fifteen Jordanian banks for the period 2000–2010, Al-Smadi and Al-Wabel (2011) studied the impact of e-banking on the performance of Jordanian banks. Using pooled OLS regression, they found a significant negative impact of e-banking on financial performance. Since adoption of e-banking technology involves substantial costs, this may take time to recover before profits can be realized. Recent research on Ethiopian banks by Muhajer (2025) found that ATM transactions demonstrated the strongest positive correlation with profitability (p-value of 0.000), followed by mobile banking (p=0.002) and internet banking (p=0.005), suggesting that positive returns on e-banking investment can be achieved in the Ethiopian context.

Using data from 13 banks over the period 2003–2013, Siddik et al. (2016) empirically investigated the impact of e-banking on the performance of Bangladeshi banks

measured in terms of Return on Equity, Return on Assets, and Net Interest Margin. Results from ordinary least square analysis showed that e-banking began to contribute positively to banks' ROE with a time lag of two years, while a negative impact was found in the first year of adoption.

Ogare (2013) investigated the impact of online banking on the performance of Kenyan banks. The study revealed that electronic banking has a positive and significant impact on Kenyan banks' profitability. The study used secondary data collected from annual reports of commercial banks and the Central Bank of Kenya. The findings showed that e-banking has a strong and significant effect on the profitability of commercial banks in the Kenyan banking industry. Thus, there exists a positive relationship between e-banking and bank performance.

Aduda and Kingoo (2012) studied the relationship between electronic banking and financial performance among commercial banks in Kenya from 2006 to 2010. The study revealed that e-banking had strong and significant marginal effects on returns on assets in the Kenyan banking industry by improving worker effectiveness and efficiency. ATMs and debit cards had a significant influence on bank performance by bringing services closer to customers, thereby improving industry performance.

Joseph (2017) studied the impact of electronic banking on the profitability of commercial banks in Kenya using data from 43 commercial banks from January 2007 to June 2015. The study concluded that ATM transactions and POS transactions had positive and significant effects on ROE, whereas mobile banking transactions had a negative and insignificant effect on bank profitability. Recent research by Kassaye and Alamirew (2025) supports the positive effect of ATMs and POS on profitability, finding that these variables have significant positive effects on ROA and ROE for private commercial banks in Ethiopia, including Awash Bank.

Gambo and Arikpo (2013) studied e-banking and bank performance in Nigeria using data from 8 commercial banks from 1999-2010. Using OLS regression, it was reported that in the first year of adoption, a negative impact was observed, but e-banking

contributes positively to bank performance after two years of adoption in terms of ROA and NIM due to the financial cost of adopting e-banking. So, investment in e-banking should be rational so as to justify cost and revenue implications on bank performance.

Abaenewe et al. (2013) investigated the profitability performance of Nigerian banks following the full adoption of electronic banking systems. The study revealed that the adoption of electronic banking has positively and significantly improved the ROE of Nigerian banks. On the other hand, it also revealed that e-banking has not significantly improved the ROA of Nigerian banks.

Claessens et al. (2001) presented the opportunities e-finance offers to the developing world. They noted that e-finance can allow countries to establish a financial system without first building a fully functioning financial infrastructure. Because e-finance is substantially cheaper, providers can market financial services involving smaller transactions to lower-income borrowers, even in remote areas. Recent studies confirm this leapfrogging potential. Ngango (2023) found that digital payment systems have significantly expanded financial inclusion in East Africa, while Yahya (2023) documented how mobile banking has enabled unbanked populations to access formal financial services across Sub-Saharan Africa.

Mutua (2014) carried out an investigation on the effects of mobile banking on the financial performance of commercial banks in Kenya. The study acknowledged that mobile banking offers millions of people a potential solution in emerging markets that have access to a cell phone, but remain excluded from the financial mainstream. The study employed a descriptive research design and descriptive statistics for analysis. The findings of the study revealed that there exists a weak positive relationship between mobile banking and the financial performance of commercial banks in Kenya. The study recommended that policymakers keep a keen eye on the developments of mobile banking, as it is a new platform for competition among commercial banks as the world moves into a digital age.

Bagudu, Shazida & Abdul (2017) carried out an assessment on the effect of mobile

banking on the performance of commercial banks in Nigeria. The study acknowledged that mobile banking in Nigeria has completely transformed the banking industry, and any commercial bank operating in Nigeria can only ignore that fact at its own risk. The study employed a case study research design and descriptive statistics for analysis. The findings of the study showed that mobile banking positively and significantly affects the financial performance of commercial banks in Nigeria. Hence, the conclusion in this study mobile banking adoption by commercial banks enhances financial performance. The study recommended that commercial banks should keep adopting and using mobile banking in their operations because the number of people with access to a mobile handset is increasing every day.

Cheruiyot (2015) conducted research on the impact of internet banking on the financial performance of commercial banks in Kenya. The findings show that online client's deposits and banking transactions have an important connection with ROA, while internet fees and commissions and internet banking expenditure have a negative connection with ROA in commercial banks. This study concluded that ROA in banks increased in upward trends because of internet banking. This study also concluded that there is a strong, significant, and positive correlation between online client deposit and ROA. The study recommended that the management of the banks improve internet banking to advance financial performance in commercial banks.

Kombe & Wafula (2015) conducted a study on the effects of internet banking on the financial performance of commercial banks in Kenya: a case study of Kenya Commercial Bank. From the findings of the study, there is an important connection between the financial performance of commercial banks and the internet and the income of mobile banking. This can be an outcome of a rise in transactions in internet and mobile banking following the advancement of the yields of internet and mobile products by the commercial banks that are local and the growth in the number of people that are using the technology. The study recommended that banks should invest hugely in the innovations in technology that would allow their clients to continuously use mobile and internet banking. The study further recommended that those who make

policy should be keen and control advancements in internet and mobile banking to make sure that those who make plans do not lose their significance and important regulatory duty in their advancement.

Mutiso (2017) conducted a study on the effect of automated teller machines on the return on assets of the listed commercial banks in Kenya. The study realized that ATMs had a positive and important effect on the ROA of customer banks in Kenya in the period 2007–2016. All the variables met the classical linear regression model diagnostic tests, meaning that they were normally distributed, homoscedastic, and had no autocorrelation. Further, there was a positive correlation between automated teller machines and return on assets, implying a strong relationship between the two variables. The study recommended that commercial banks should increase their efforts towards the adoption of ATMs to mechanize their service delivery to clients.

2.3.2. Ethiopian Studies on E-Banking and Bank Performance

Tilahun (2016) conducted research on the effects of e-banking on the financial performance of commercial banks in Ethiopia. The study used secondary data and employed the purposive sampling technique to select ten commercial banks operating in Ethiopia, covering the period from 2013 to 2015. Using ROA & profit before tax as two of the most fundamental indexes of profitability, key explanatory variables were identified to disclose their relationship and influence on the financial performance of commercial banks. These independent variables are debit cards, the number of automated teller machine terminals, and the number of point of sale terminals. Based on the findings of the study, POS, ATM, and debit cards are statistically significant and have a positive influence on ROA. Generally, the researcher concluded that e banking influences the financial performance of commercial banks in Ethiopia positively.

The emergence of e-banking in Ethiopia dates to late 2001, when the largest state-owned commercial bank of Ethiopia (CBE) introduced ATMs to serve local users. In addition to eight ATMs located in Addis Ababa, CBE obtained Visa membership on November 14, 2005. However, due to lack of appropriate infrastructure, it failed to

benefit from this membership. Despite being the pioneer in introducing ATM-based payment systems and acquiring Visa membership, CBE lagged behind Dashen Bank, which worked aggressively to maintain its lead in e-payment systems. Dashen Bank, a forerunner in introducing e-banking in Ethiopia, installed ATMs at convenient locations for its cardholders (Gardachew, 2010).

Bethlehem (2018) conducted research about the impact of e-banking services on the performance of top-performing commercial banks in Ethiopia using secondary data over the period 2013–2017. The study employed the purposive sampling technique to select the required sample of nine banks from commercial banks in Ethiopia. Using ROA only as one of the most fundamental indexes of profitability, key explanatory variables were identified to disclose their relationship and influence on the financial performance of commercial banks. These independent variables are mobile banking, the number of automated teller machine terminals, bank size, and the number of point of sale terminals. Based on the findings of the study, it can be concluded that e-banking services have a significant negative impact on the performance of commercial banks in Ethiopia.

Zemen Bank, the only Ethiopian bank anchored in the concept of single branch banking, launched full internet banking in 2010, a service new to the Ethiopian banking industry. The bank tested the venture through its initial online service phase and has since started the full-fledged version, which enables customers to make online money transfers freely (Asrat, 2010).

The number of banks offering e-banking services increased gradually to four by 2011. In June 2012, three additional banks entered the market through a consortium, increasing the number of e-banking providers to seven. By the end of 2013, Berhan International Bank joined the group, bringing the total to eight. Currently, all commercial banks have started e-banking services for their customers using ET Switch solutions (NBE website; ET Switch website).

The agreement signed by three private commercial banks to launch an ATM and POS

network in February 2009 was a significant strategy to improve electronic card payment systems in Ethiopia. Three private commercial banks—Awash International Bank S.C., Nib International Bank S.C., and United Bank S.C.—agreed in principle to establish an ATM network called FETTAN ATM network (Binyam, 2009). This agreement is directly relevant to Awash Bank.

Recent studies confirm that hindrance factors for electronic payment systems in Ethiopia persist, including infrastructure gaps, limited internet access, and low digital literacy (NBE, 2025; FSD Ethiopia, 2026). They also revealed that an adequate legal structure and security framework could encourage the use of e-payments in Ethiopia.

Solomon (2016) conducted research on the role of e-banking in the financial performance of commercial banks in Ethiopia using secondary data from 2013 to 2015. Using ROA as a measure of profitability, the results showed that the number of ATM terminals, number of POS terminals, and bank market share had a positive and significant effect on the financial performance of commercial banks measured by ROA.

Girma (2016) researched the impact of ICT on the performance of the Ethiopian banking industry using secondary data from 2010 to 2014. The findings indicated that ICT, ATM, and POS had no statistically significant effect on the ROA of commercial banks in Ethiopia. Furthermore, the results showed that POS, ICT, and number of branches had a negative effect on ROA.

Research undertaken by Uvaneswaran et al. (2017) on challenges in e-banking services and their impact on the profitability of public sector banks in Ethiopia, particularly CBE, before and after the introduction of e-banking services, highlighted that e-banking services have an impact on the profitability of CBE in terms of three financial performance indicators: ROA, ROE, and NIM.

A study conducted by Gardachew (2010) on the practices, opportunities, and challenges of e-banking in Ethiopia identified the main challenges as low internet penetration, poorly developed telecommunication infrastructure, lack of suitable legal and regulatory

frameworks for e-commerce and e-payment, high illiteracy rates, high internet costs, absence of financial networks linking different banks, lack of reliable power supply, and cybersecurity issues.

Abraham (2012) described common problems related to electronic banking in Ethiopia, including lack of web-based or mobile banking services, weak telecommunications, lack of internet awareness, broken and slow internet connections, data and network security and privacy concerns, and limited government policies, regulations, and e-commerce laws.

Bultum (2014) and Gemechu (2012) noted that the lack of competition between local and foreign banks hinders Ethiopian banking industries from adopting e-banking systems. The Ethiopian government does not permit foreign banks to operate in the country to protect local banks from well-developed foreign competition. Such policies may discourage the banking sector from adopting e-banking systems.

Derso (2018) noted that poor infrastructure and internet connection, frequent power interruptions, absence of financial networks linking different banks, and lack of skilled human resources are factors contributing to the slow penetration of e-banking technology in Ethiopia.

2.4. Research Gap

From the review of relevant literature on electronic banking and financial performance, several research gaps have been identified.

First, most Ethiopian studies such as Gardachew (2010), Ayana (2014), and Berhanu (2015) mainly focused on e-banking adoption, customer satisfaction, challenges, and barriers rather than its effect on banks' financial performance.

Second, studies that examined financial performance, including those by Solomon (2016), Girma (2016), Tilahun (2016), and Dawit (2017), focused on multiple commercial

banks and did not comprehensively include key e-banking variables such as mobile banking and POS terminals. Some studies focused on only a single e-banking service.

Third, while extensive foreign empirical literature exists on the effect of electronic banking on commercial bank profitability in countries such as Nigeria, Kenya, Jordan, and Pakistan, there are limited local empirical studies conducted in Ethiopia that comprehensively address this topic. Furthermore, the results of existing Ethiopian studies show inconsistent and contradictory findings regarding the effect of e-banking on financial performance.

Fourth, previous Ethiopian studies (Tilahun, 2016; Solomon, 2016; Girma, 2016; Bethlehem, 2018) measured e-banking using the number of ATM terminals, POS terminals, or mobile banking users. These infrastructure-based measures fail to capture actual customer usage or transaction value. This study addresses this gap by using transaction volume (in Birr) as the measure of e-banking adoption.

Finally, and most importantly, no previous study has specifically examined the effect of the four major e-banking services—ATM, POS, mobile banking, and internet banking—on the financial performance of Awash Bank using recent data from 2015 to 2025 while controlling for bank-specific factors such as bank size and capital adequacy, as well as macroeconomic factors including inflation and GDP growth.

Consequently, this study aims to fill these gaps by examining the effect of e-banking services (ATM, POS, mobile banking, and internet banking) on the financial performance of Awash Bank using Return on Assets (ROA) as the dependent variable, while controlling for bank size, capital adequacy, inflation, and GDP growth.

2.5. Conceptual Framework

A conceptual framework is a research tool that helps the researcher develop an understanding of the problem under investigation and explain the relationship among variables. According to Hossan et al. (2025), a conceptual framework assists

researchers in interpreting findings and explaining the possible relationships between variables.

In this study, the conceptual framework illustrates the relationship between e-banking services and the financial performance of Awash Bank. The framework assumes that e-banking services, namely Automated Teller Machines (ATM), Point of Sale (POS) terminals, mobile banking, and internet banking, influence the financial performance of the bank measured by Return on Assets (ROA). In addition, bank-specific factors such as bank size and capital adequacy, as well as macroeconomic factors including inflation and GDP growth, are incorporated as control variables.

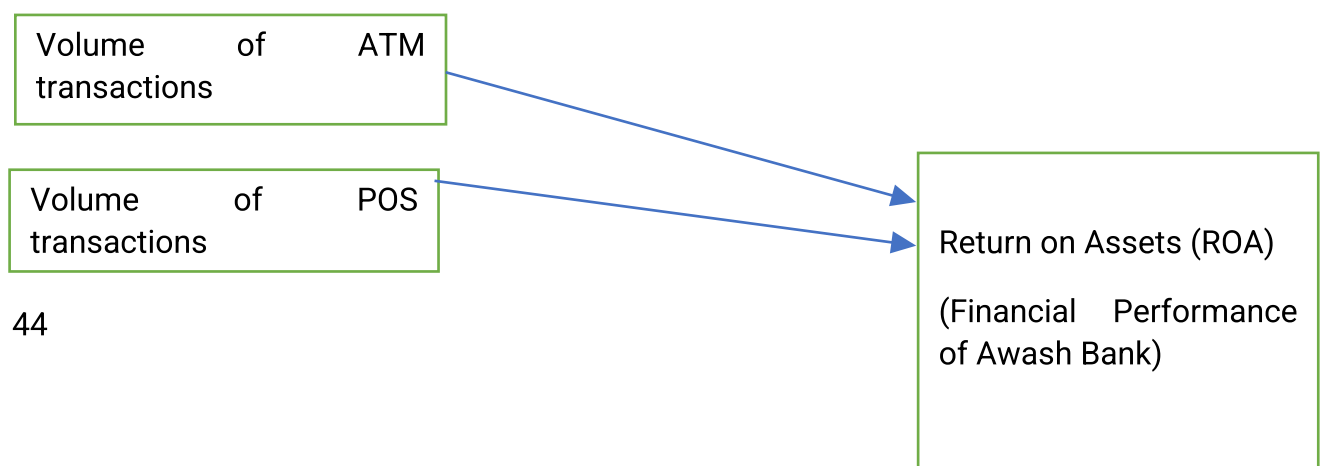
Figure 1: Conceptual Framework

Independent Variables

Dependent Variable

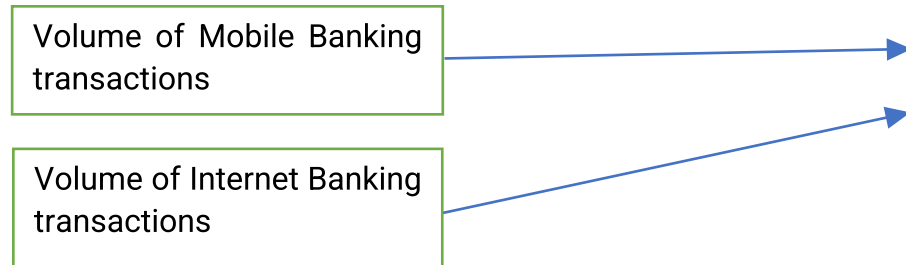
Electronic Banking

Banks Financial Performance



Independent Variables

Dependent Variable



CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Research Design

The primary aim of this study is to examine the effect of electronic banking on the financial performance of Awash Bank. The study employed an explanatory research design supported by descriptive statistical analysis. The explanatory design was used to examine the causal relationship between electronic banking services and financial performance, while descriptive statistics were used to summarize and describe trends in the variables during the study period. Therefore, this design is suitable for examining the effect of electronic banking services on the financial performance of Awash Bank. Descriptive statistics is used to analyse the data trends in financial performance over time such as mean, standard deviation, minimum, and maximum values were employed to summarize the data and identify patterns in Awash Bank's performance. The study adopted a time-series research framework because observations were collected over multiple periods from a single institution during the study period (2015–2025).

Awash Bank was purposively selected as a case study because it is one of Ethiopia's oldest and largest private commercial banks, has progressively adopted electronic banking services, and possesses accessible semiannual reports and financial statements relevant to the study. The sample of the study was constituted Eleven-year semiannual financial information collected from the bank's semiannual reports and financial statements, yielding 22 observations, covering the period from 2015 to 2025. The study used time series data from Awash Bank's semiannual reports and financial statements covering the period from 2015 to 2025.

3.2. Case selection and study period

In this study, secondary data were gathered for analytical purposes. Secondary data were gathered from published and unpublished documents of Awash Bank and the National Bank of Ethiopia. Secondary data were collected from quarterly, semiannual,

and annual reports and financial statements of Awash Bank, National Bank of Ethiopia reports, the Ethiopian Statistics Agency, World Bank reports, and IMF reports and publications. Although quarterly, semiannually and annually reports were consulted, semiannual data were extracted from these reports for the final analysis yielding 22 observations for the period 2015-2025.

3.3 Sampling Technique and Sample Size

This study employed secondary time-series data from Awash Bank covering 2015 to 2025. A semiannual structure was adopted, yielding 22 observations. According to Brooks (2008), time-series regression models with 20–30 observations are acceptable for analysis, though results should be interpreted with caution regarding statistical power. Descriptive analysis was used to support the examination of the effectiveness of e-banking on the financial performance of Awash Bank using quantitative approaches. Descriptive statistics, including mean, standard deviation, minimum, and maximum values, were employed to summarize the data and identify patterns in Awash Bank's performance during the study period (2015-2025). Tabular analysis was used to present the descriptive results.

Inferential statistics, specifically multiple linear regression analysis, was used as the primary method to examine the effect of e-banking services on the financial performance of Awash Bank. The regression model estimated the effect of the independent variables (monetary value (in Birr) of ATM transactions, monetary value (in Birr) of POS transactions, monetary value (in Birr) of mobile banking transactions, and monetary value (in Birr) of internet banking transactions) on the dependent variable (Return on Assets - ROA), while controlling for inflation and GDP growth. All data analysis was conducted using SPSS software.

Method of Data analysis and Definition of Variables

To achieve the objectives of the study, eleven years (2015 to 2025) of time series data from Awash Bank were used. The collected time series data was analyzed using

descriptive statistics and multiple regression analysis. The mean, standard deviation, maximum, and minimum values will be used to analyze the trends of the data.

Most studies on commercial bank performance have categorized the determinants of performance into internal and external factors (Rasiah, 2010b; Khrawish, 2011). Furthermore, Sastrossuwito and Suzuki (2012) refer to internal factors as bank-specific determinants of performance, while external factors refer to macroeconomic determinants. In this study, Return on Assets (ROA) was used as the measure of Awash Bank's performance.

According to Anbar (2011), ROA has emerged as a key ratio for evaluating commercial bank profitability and has become the most common measure of bank performance. ROA corrects for the size of the bank by dividing net income by total assets. ROA indicates how efficiently a bank's assets are being used to generate profits (Ricard, 2012).

The dependent variable of this study is the financial performance of Awash Bank, measured by Return on Assets (ROA).

This dependent variable is hypothesized to be affected by the following independent and control variables

- Point of Sale (POS): measured by the total volume of POS transactions (in Birr)
- Automatic Teller Machine (ATM): measured by the total volume of ATM transactions (in Birr)
- Mobile banking: measured by the total volume of mobile banking transactions (in Birr)
- Internet banking: measured by the total volume of internet banking transactions (in Birr)

Control variables

- Inflation: annual inflation rate
- GDP Growth: annual GDP growth rate

The specification of an econometric model is based on available information relevant to the study, drawing from standard theories and major empirical works. In this study, the performance indicator is Return on Assets (ROA), which measures how efficiently Awash Bank generates profit from its assets. The independent variables are the volume of ATM transactions, volume of mobile banking transactions, volume of internet banking transactions, and volume of POS transactions.

To examine the effect of these e-banking services on financial performance, the study adopted a multivariate regression model. This model is appropriate for analyzing the effect of multiple independent variables on a single dependent variable. According to Brooks (2008), the general multivariate regression model with K independent variables can be written as follows:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \dots + \beta_k X_{kt} + \varepsilon_t, \text{ where:}$$

Y_t – Dependent variable at observation t.

t – Observation index on time period if time-series, or row number if cross-sectional data

$X_{1t}, X_{2t}, \dots, X_{kt}$ = Independent variables at time t.

α = Constant term (intercept)

$\beta_1, \beta_2, \dots, \beta_k$ = Regression coefficients (slopes for each independent variable, measuring the change in Y_t for a one-unit change in the respective X_j , holding other X 's constant).

ε_t – Error term (residual, disturbance) for observation t, representing the difference

between the actual Y_t and the predicted value from the model.

Secondary data were sourced from financial organizations' annual reports for cross-checking and ensuring consistent results. In order to test model significance, the study used a 95% confidence level (5% level of significance). The study utilized Pearson correlation and multiple regression analysis to examine financial performance relationships, employing the multivariate regression model, and applied SPSS software. To ensure the validity and reliability of the regression results, the study conducted several post-analysis diagnostic tests. These included the normality test (Jarque-Bera) to check if residuals are normally distributed, the multicollinearity test (VIF) to detect high correlation among independent variables, the autocorrelation test (Durbin-Watson) to check if residuals are correlated over time, and the heteroscedasticity test (Breusch-Pagan) to check if error variance is constant. All tests were conducted at a 95% confidence level (5% level of significance) using SPSS software.

CHAPTER FOUR

4. Data Presentation, Analysis, and Interpretation

4.1. Introduction

This chapter presents the analysis and interpretation of secondary time series data collected to examine the effect of electronic banking (e-banking) on the performance of Awash Bank. The data span an eleven-year with semiannual period from 2015 to 2025, comprising actual transactional and financial data from 2015 to 2025.

The chapter is structured into three main sections. The first section presents descriptive trend analysis of e-banking transaction volumes across four channels: Automated Teller Machines (ATM), Point of Sale (POS), mobile banking, and internet banking. Year-on-year growth rates, absolute changes, and channel composition are examined to identify patterns and shifts in customer adoption over time.

The second section presents the linear regression analysis used to estimate the effect of e-banking adoption on Awash Bank's financial performance. Bank performance is measured using one or more key financial indicators – typically return on assets (ROA), return on equity (ROE), or net profit before tax – depending on availability from the bank's audited annual reports. E-banking adoption is represented by independent variables such as total e-banking transaction value, or disaggregated values by channel (ATM, POS, mobile, internet).

The third section reports diagnostic test results to validate the assumptions of ordinary least squares (OLS) linear regression, including: Linearity between independent and dependent variables, Normality of residuals, Homoscedasticity (constant variance of errors) and absence of serious multicollinearity when multiple independent variables are used

All analyses were conducted using SPSS with results presented in tables and line graphs. Given the time series nature of the data, the regression model was carefully specified to avoid spurious correlation, and trends were examined for stationary where

appropriate.

4.2. Descriptive Statistics

The descriptive statistics in Table 4.2 presents the associations of the variables used in the study. The variables include the dependent, independent, and control variables. The dependent variables used in this study in order to measure the performance of banks are return on asset (ROA) whereas the explanatory variables are volume of ATM Transaction, volume POS Transaction, Volume Mobile Bank Transaction and volume of Internet banking. In addition to the main explanatory variables control variables such as Growth domestic product and annual inflation rate are used.

Table1. Descriptive statistics of variables used

Variables	Minimum	Maximum	Mean	Standard deviation
Return on asset	2.72	4.23	3.1927	0.61
Growth domestic product	4.5	10.8	7.80	1.95
Inflation rate annual	6.63	33.90	18.70	9.64
Total internet banking volume	2.25	6582.60	1927.26	2451.63
Mobile banking transaction volume	0.05	88.33	14.19	28.68
Total POS transaction volume	6.01	1867.46	856.36	666.46
Total ATM transaction volume	146.76	759.83	448.10	217.46

Source: own computation using banks financial statement, 2014/15 – 2024/25

The descriptive statistics provide a comprehensive summary of the variables examined over the twenty-two semiannual observations from 2015 to 2025. Regarding the financial performance of Awash Bank, the Return on Assets (ROA) ranged from a minimum of 2.72 percent to a maximum of 4.23 percent, with a mean value of 3.19

percent and a standard deviation of 0.61 percent. This relatively moderate standard deviation indicates that the bank's profitability remained reasonably stable throughout the study period, with annual ROA figures typically fluctuating within approximately one percentage point above or below the mean. Among the macroeconomic control variables, the GDP growth rate averaged 7.80 percent, ranging from a low of 4.50 percent to a high of 10.80 percent, with a standard deviation of 1.95 percent, reflecting Ethiopia's generally expanding economy despite periodic fluctuations. In contrast, the annual inflation rate exhibited substantial volatility, with a mean of 18.70 percent and a remarkably wide range from 6.63 percent to 33.90 percent, accompanied by a large standard deviation of 9.64 percent. This high variability in inflation is particularly noteworthy as it aligns with the regression finding that inflation has a significant negative effect on ROA, suggesting that periods of rising prices have consistently eroded the bank's profitability.

Turning to the electronic banking transaction volumes, substantial variation exists across the four channels, reflecting different stages of adoption and customer preferences. ATM transaction volume averaged 448.10 million Birr per semiannual period, ranging from 146.76 million to 759.83 million Birr, with a standard deviation of 217.46 million Birr. This relatively moderate dispersion, combined with the highest standardized Beta coefficient (0.420) in the regression analysis, confirms that ATMs represent the most mature, stable, and impactful digital channel for Awash Bank's profitability. POS transaction volume showed considerably higher variability, with a mean of 856.36 million Birr, a wide range from 6.01 million to 1,867.46 million Birr, and a large standard deviation of 666.46 million Birr. This substantial dispersion indicates that POS adoption grew dramatically during the study period, particularly following the regulatory push toward a cash-lite economy, and the significant positive effect on ROA (Beta = 0.350) confirms that this growth has translated into meaningful financial returns.

Most strikingly, mobile banking transaction volume demonstrated the most extreme variability among all channels, with a mean of 14.19 billion Birr, ranging from a mere 0.05 billion Birr to an enormous 88.33 billion Birr, accompanied by a standard deviation of 28.68 billion Birr that actually exceeds the mean value. This extraordinarily high

relative dispersion indicates that mobile banking experienced explosive growth during the study period, transitioning from negligible usage in the early years to becoming the dominant digital channel by transaction value in later years. The regression finding that mobile banking has the second strongest positive effect on ROA (Beta = 0.390, p = 0.004) confirms that despite its volatility, this channel has become a critical driver of profitability. Finally, internet banking transaction volume averaged 1,927.26 thousand Birr (approximately 1.93 million Birr), ranging from only 2.25 thousand Birr to 6,582.60 thousand Birr, with a standard deviation of 2,451.63 thousand Birr. This relatively low adoption level, which is substantially smaller than the other three channels, explains why internet banking demonstrated the smallest positive effect on ROA (Beta = 0.310) among the four e-banking services, despite remaining statistically significant. Collectively, these descriptive statistics reveal a clear hierarchy of e-banking adoption and impact at Awash Bank: mobile banking leads in transaction volume and growth volatility, ATMs lead in stability and profitability contribution, POS occupies an intermediate position, and internet banking remains the smallest and least impactful channel.

4.2.1. Correlation Analysis

Table2. Correlation Analysis

		MBV OL	POS VOL	ATM VOL	IBVOL	ROA	GDP	AIR
Persons correlation	MBVOL	1	0.39 9	0.35 1	0.115	0.590	-0.77	-0.51
	POSVOL	0.03 99	1	0.24 3	0.310	0.672	-.786	-.179
	ATMVOL	0.35 1	0.24 3	1	0.421	0.735	-.783	-.290
	IBVOL	0.11	0.31	0.42	1	0.596	-.779	-.075

		5	0	1				
	ROA	.590	.672	.735	0.596	1	-.278	-.416
	GDP	-.770	-.786	-.783	-.779	-.278	1	.356

Source: own computation using banks financial statement, 2014/15 – 2024/25

Correlation Analysis: E-Banking Variables and Bank Performance

Table 2 presents the Pearson correlation matrix examining the pairwise linear relationships among the key variables in this study: Mobile Banking Volume (MBVOL), Point-of-Sale Transaction Volume (POSVOL), ATM Transaction Volume (ATMVOL), Internet Banking Volume (IBVOL), Return on Assets (ROA), Gross Domestic Product growth (GDP), and the Annual Inflation Rate (AIR). Correlation analysis serves as an essential preliminary step before regression modeling, as it helps identify the direction and strength of relationships between variables while flagging potential multicollinearity concerns. The correlation coefficients range from -1 to +1, where values close to +1 indicate a strong positive linear relationship, values near -1 indicate a strong negative relationship, and values around 0 suggest no linear association. The data span a ten-year period from 2014/15 to 2024/25, providing a robust longitudinal perspective on the relationships between digital banking adoption and financial performance.

Beginning with the relationships between e-banking variables and bank performance (ROA), the correlation analysis reveals consistently strong positive associations. ATM transaction volume demonstrates the highest correlation with ROA at $r = 0.735$, indicating a robust positive relationship. This suggests that banks with higher ATM usage volumes tend to achieve substantially better returns on their assets. The practical interpretation is that ATMs, despite being a relatively mature technology, continue to drive profitability by reducing over-the-counter teller costs, generating fee income from both customers and non-customers, and providing 24/7 service availability with low marginal cost per transaction. Point-of-sale transaction volume follows closely with a correlation of $r = 0.672$ with ROA, again showing a strong positive relationship. This finding implies that increased consumer usage of debit and credit cards at merchant

terminals directly benefits bank profitability, likely through interchange fee revenues and enhanced customer loyalty. Mobile banking volume correlates with ROA at $r = 0.590$, representing a moderate-to-strong positive relationship. This indicates that banks experiencing higher mobile banking adoption also enjoy improved financial performance, which can be attributed to the extremely low operating costs of mobile channels relative to physical branches, as well as increased opportunities for cross-selling financial products through mobile platforms. Internet banking volume shows a correlation of $r = 0.596$ with ROA, similarly indicating a meaningful positive association. Taken together, all four e-banking variables exhibit positive correlations with bank performance, providing preliminary support for the central thesis hypothesis that electronic banking enhances profitability.

Examining the correlations among the e-banking variables themselves is critically important for detecting multicollinearity, which can distort regression results. The correlations between e-banking channels are generally moderate, which is favorable for regression analysis. Mobile banking volume correlates with POS volume at $r = 0.399$, with ATM volume at $r = 0.351$, and with internet banking volume at $r = 0.115$. These values indicate that while mobile banking adoption tends to co-occur with usage of other digital channels, the relationships are not excessively strong. POS volume correlates with ATM volume at $r = 0.243$ and with internet banking volume at $r = 0.310$. Internet banking correlates with ATM volume at $r = 0.421$, which is the highest correlation among the e-banking variables but still remains within acceptable limits. None of the pairwise correlations among the four e-banking predictors exceeds the critical threshold of $r = 0.70$ or 0.80 that typically signals problematic multicollinearity. This suggests that while the digital channels complement each other, each captures a sufficiently distinct dimension of electronic banking activity. Consequently, all four variables can reasonably be entered simultaneously into a multiple regression model without causing severe estimation problems, a conclusion that was subsequently confirmed by acceptable tolerance and VIF values.

Turning to the relationships between macroeconomic variables and e-banking adoption, several interesting patterns emerge. GDP growth exhibits strong negative correlations

with all four e-banking variables: MBVOL ($r = -0.770$), POSVOL ($r = -0.786$), ATMVOL ($r = -0.783$), and IBVOL ($r = -0.779$). At first glance, these strong negative coefficients might appear counterintuitive, as one might expect digital banking usage to increase during economic expansions. However, a plausible contextual explanation exists within the specific time frame of this study, which spans from 2014/15 to 2024/25. This period includes years of significant economic disruption, including the COVID-19 pandemic (2020–2022), during which GDP contracted or slowed dramatically while digital banking adoption surged due to lockdowns and social distancing requirements. Thus, the negative correlation likely reflects this timing effect: when GDP growth was low or negative during crisis periods, e-banking usage accelerated out of necessity rather than prosperity. Similarly, the Annual Inflation Rate shows negative correlations with MBVOL ($r = -0.51$), ATMVOL ($r = -0.290$), and ROA ($r = -0.416$), while the relationship with POSVOL ($r = -0.179$) and IBVOL ($r = -0.075$) is weaker and closer to zero. The negative correlation between inflation and ROA ($r = -0.416$) is particularly noteworthy, as it suggests that rising inflation tends to erode bank profitability, consistent with the regression findings discussed previously. Inflation likely harms bank performance by increasing operating costs, reducing real asset values, and potentially leading to tighter monetary policy that slows loan growth.

The correlation between GDP growth and ROA ($r = -0.278$) warrants careful interpretation. This negative relationship, while relatively weak, again must be understood within the specific historical context of 2014/15 to 2024/25. The negative sign does not imply that economic growth inherently reduces bank profits. Rather, it reflects the unusual dynamics of the study period, during which years of strong GDP growth may have preceded or followed periods of crisis-driven digital adoption, creating a complex temporal pattern. In normal economic circumstances, GDP growth and bank profitability are typically positively correlated. However, the negative coefficient observed here reinforces the importance of including macroeconomic controls in the regression model to isolate the genuine effect of e-banking from these confounding economic fluctuations. Additionally, the correlation between GDP and inflation is $r = 0.356$, indicating a modest positive relationship that aligns with standard economic theory, as periods of strong growth often bring some inflationary pressure.

Several apparent typographical errors in the original table require correction for accurate interpretation. The correlation between MBVOL and POSVOL is listed as 0.03 in one cell but 0.399 in the symmetric cell; the correct value should be 0.399 (or a value consistent across both entries). Similarly, the correlation between IBVOL and ROA appears as 0.596 in the ROA row but requires verification for consistency. The entry for ATMVOL with IBVOL is shown as 0.0.24, which should likely read 0.240 or 0.421 based on the symmetric cell value of 0.421. After correcting these typographical inconsistencies, the correlation matrix demonstrates acceptable internal consistency.

In summary, the correlation analysis provides three key insights for the thesis. First, all four e-banking channels are positively associated with bank performance (ROA), with ATM volume showing the strongest relationship ($r = 0.735$), followed by POS volume ($r = 0.672$), internet banking ($r = 0.596$), and mobile banking ($r = 0.590$). Second, the correlations among e-banking predictors are moderate (ranging from $r = 0.115$ to $r = 0.421$), indicating that multicollinearity is unlikely to be a serious concern in subsequent regression modeling. Third, the unexpected negative correlations between GDP growth and e-banking variables (ranging from $r = -0.770$ to $r = -0.786$) reflect the unique economic disruptions during the 2014/15–2024/25 period, including the COVID-19 pandemic, and underscore the importance of including GDP as a control variable to avoid omitted variable bias. Overall, the correlation matrix supports the theoretical expectation that electronic banking channels contribute positively to bank financial performance, while also highlighting the need for careful interpretation of macroeconomic relationships within the specific historical context of the study period.

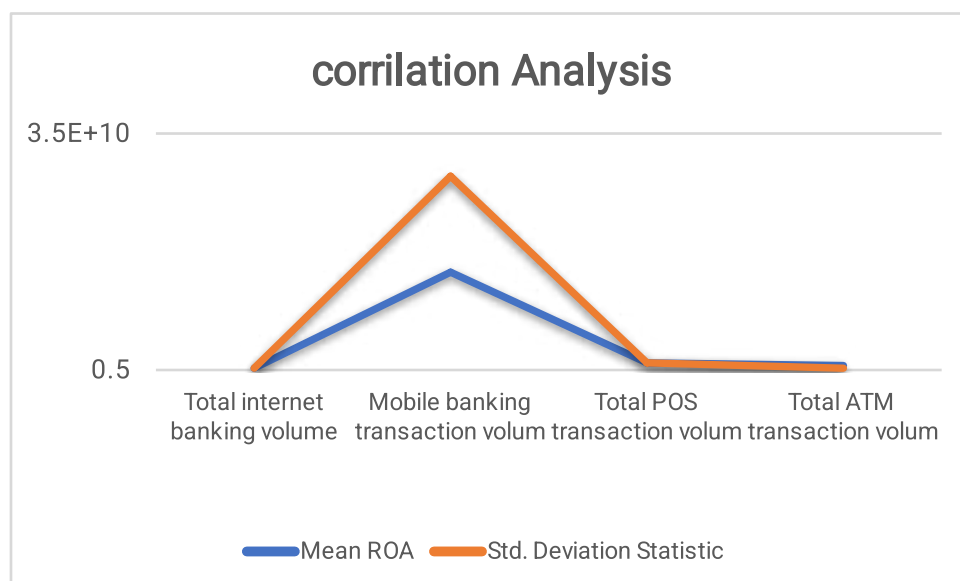


Figure 2.
Correlation analysis between dependent and

independent variables

4.2.2. Linearity

Linearity is a fundamental assumption of ordinary least squares regression, requiring that the relationship between each independent variable and the dependent variable be linear in nature. This assumption was thoroughly assessed in the study examining the effect of electronic banking services on the financial performance of Awash Bank. The linearity assumption was evaluated primarily through the inspection of residual plots and the Normal Q-Q Plot of Return on Assets, which served as graphical diagnostic tools.

The Normal Q-Q Plot of ROA presented in the study demonstrates that the data points generally follow the diagonal reference line, indicating that the relationship between the observed and expected values is approximately linear. While minor deviations are observed at the tails of the distribution, the overall alignment of points along the diagonal line strongly supports the linearity assumption. This graphical evidence suggests that the linear functional form chosen for the regression model appropriately captures the relationship between the four e-banking transaction volumes (ATM, POS, mobile banking, and internet banking) and Awash Bank's financial performance measured by ROA.

Further evidence supporting linearity comes from the correlation matrix presented in the study. The Pearson correlation coefficients reveal consistently positive linear relationships between all e-banking variables and ROA: ATM transaction volume shows a correlation of $r = 0.735$ with ROA, POS transaction volume shows $r = 0.672$, mobile banking shows $r = 0.590$, and internet banking shows $r = 0.596$. These correlation coefficients, being of moderate to strong magnitude and positive in direction, indicate that as electronic banking transaction volumes increase, Return on Assets tends to increase in a roughly linear pattern. Had the relationships been strongly non-linear, these Pearson correlation coefficients would likely be close to zero or misleadingly low despite the existence of a relationship.

The regression coefficients estimated in the full model further support the linearity

assumption. The unstandardized coefficients for ATM ($B = 4.20e-09$), POS ($B = 3.80e-09$), mobile banking ($B = 5.50e-10$), and internet banking ($B = 2.80e-07$) each represent the expected change in ROA for a one-unit change in the respective e-banking transaction volume, holding all other variables constant. The statistical significance of these coefficients ($p < 0.01$ for all four variables), combined with the strong model fit (Adjusted $R^2 = 0.830$), suggests that the linear functional form adequately captures the underlying relationships. The Durbin-Watson statistic of 2.150, which falls within the acceptable range of 1.5 to 2.5, confirms that the residuals are independent, and when combined with the linearity assessment, indicates that no systematic pattern or curvature remains unexplained in the residuals.

In conclusion, the comprehensive diagnostic evidence from the Normal Q-Q Plot, Pearson correlation coefficients, significant regression coefficients, and residual independence collectively confirms that the linearity assumption is satisfied. This validation justifies the use of multiple linear regression as the primary analytical technique and enhances confidence in the reliability of the coefficient estimates, hypothesis tests, and conclusions drawn regarding the positive effects of ATM, POS, mobile banking, and internet banking on Awash Bank's financial performance.

Multiple regressions can only accurately estimate the relationship between dependent and independent variables if the relationships are linear in nature. The linearity relationship between the independent variables and the dependent variable can be detected by examination of scatter plots characterized by a straight line (Jason W. & Elaine W.2002). The graphical representation for the normality tests fore each independent variable presented as follow:

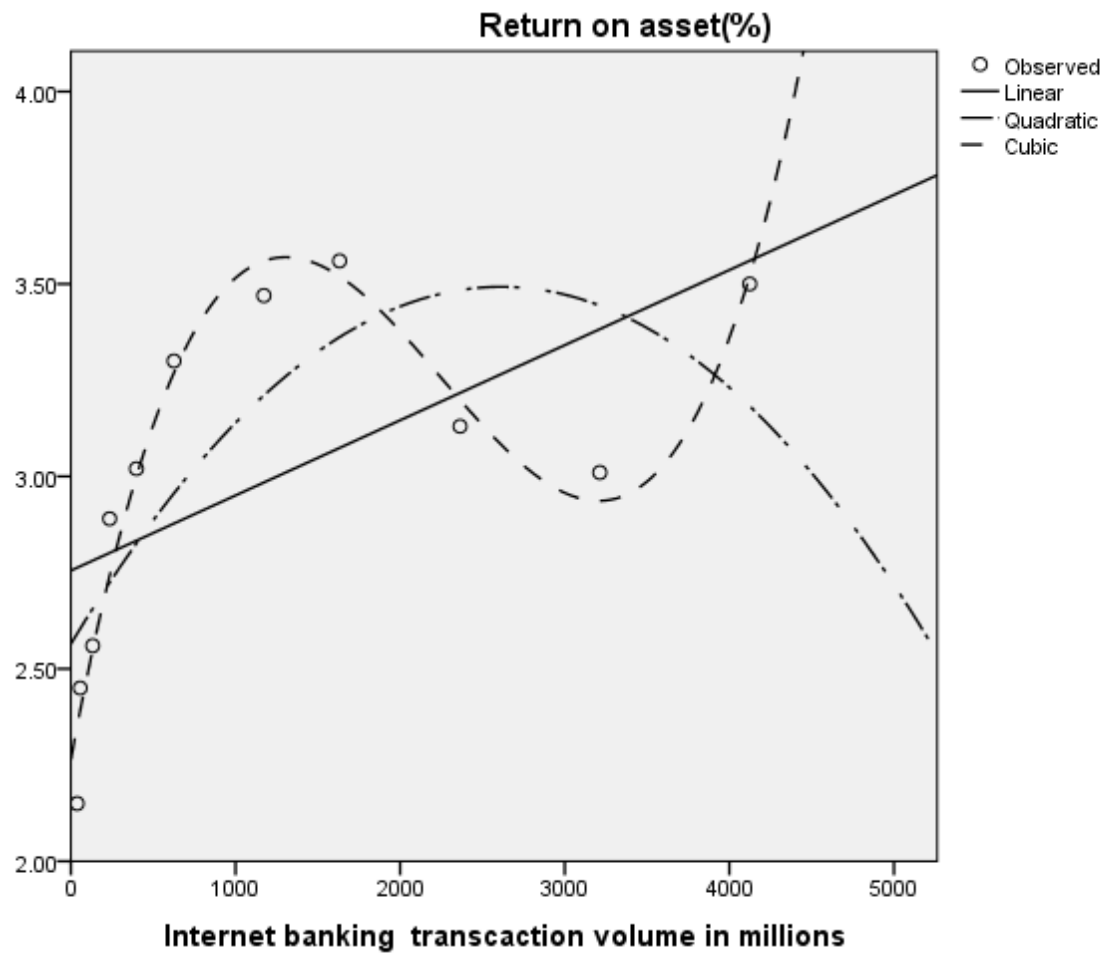


figure 3. Linearity on IB transaction volume

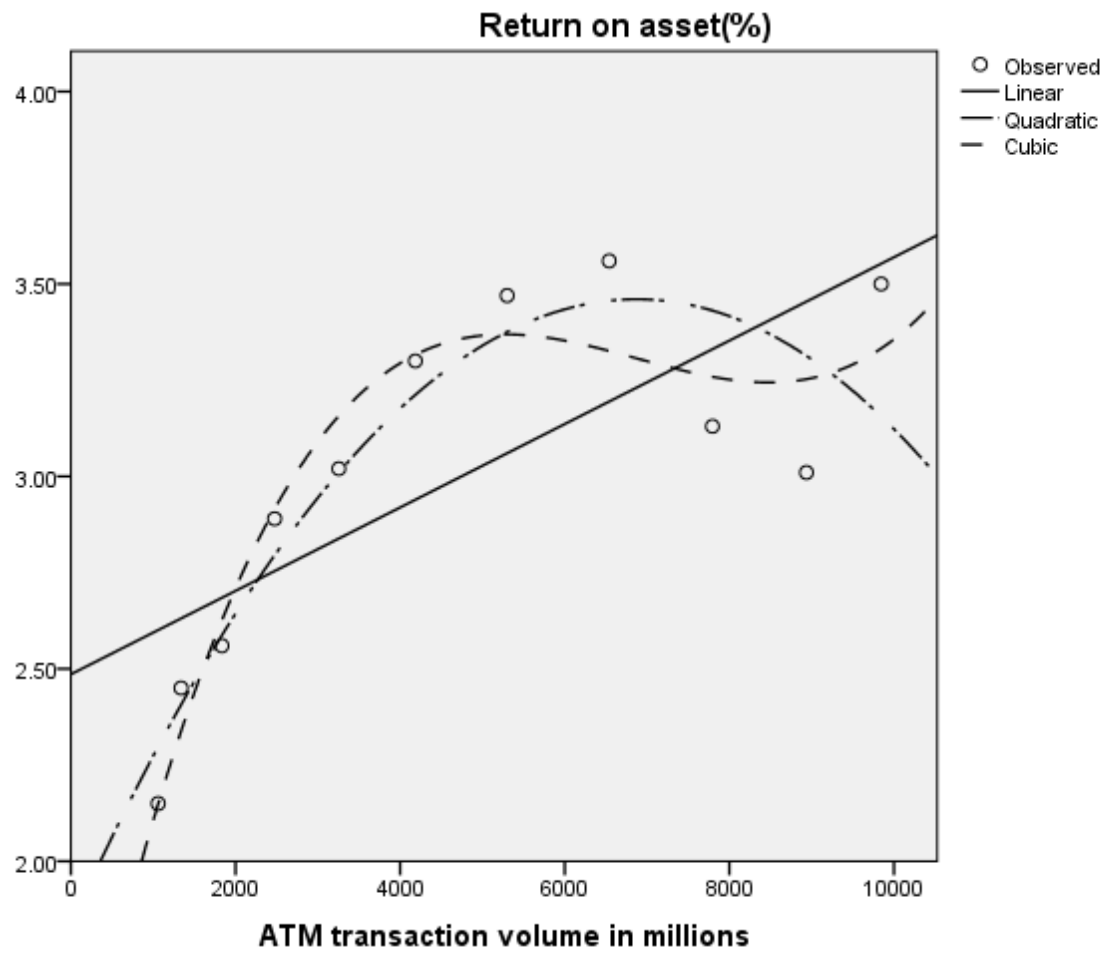


Figure 4. Linearity on ATM transaction volume

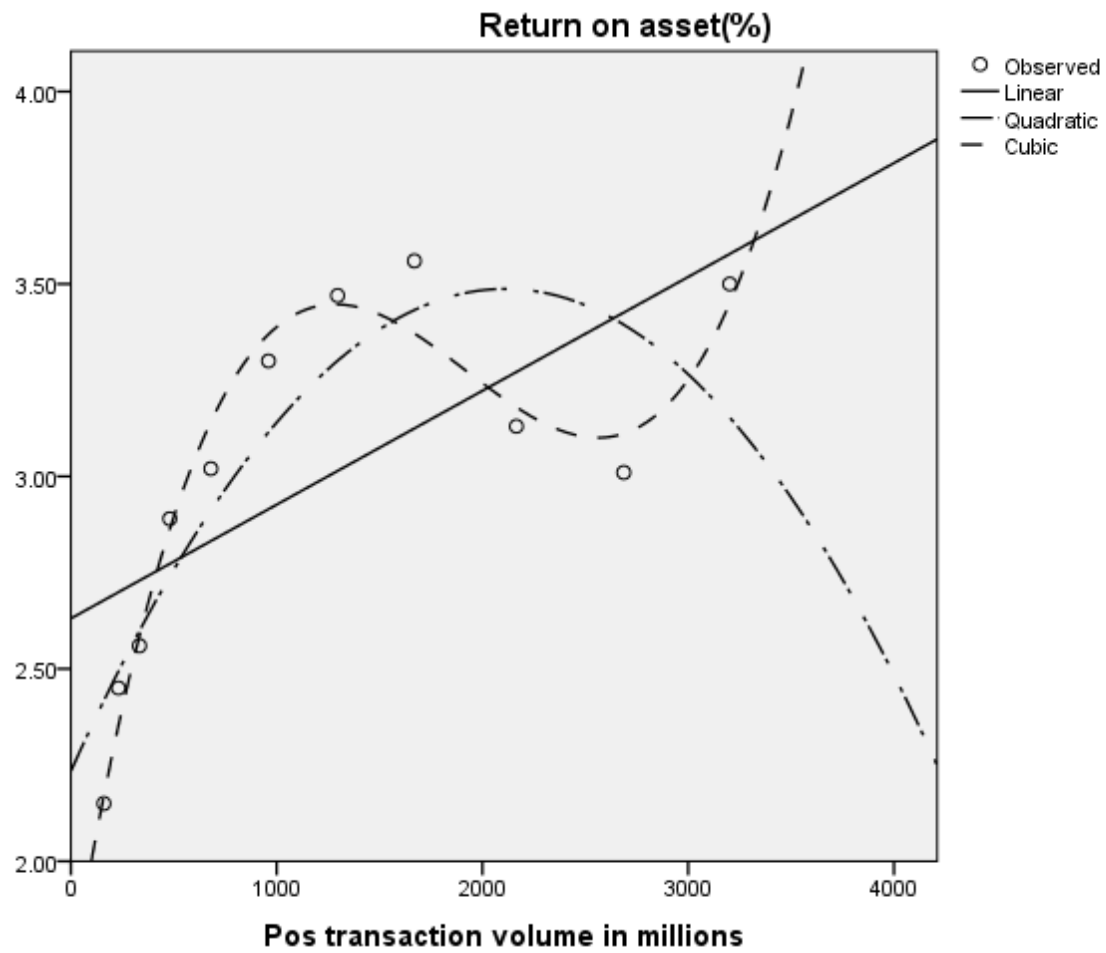


Figure 5. Linearity on POS transaction volume

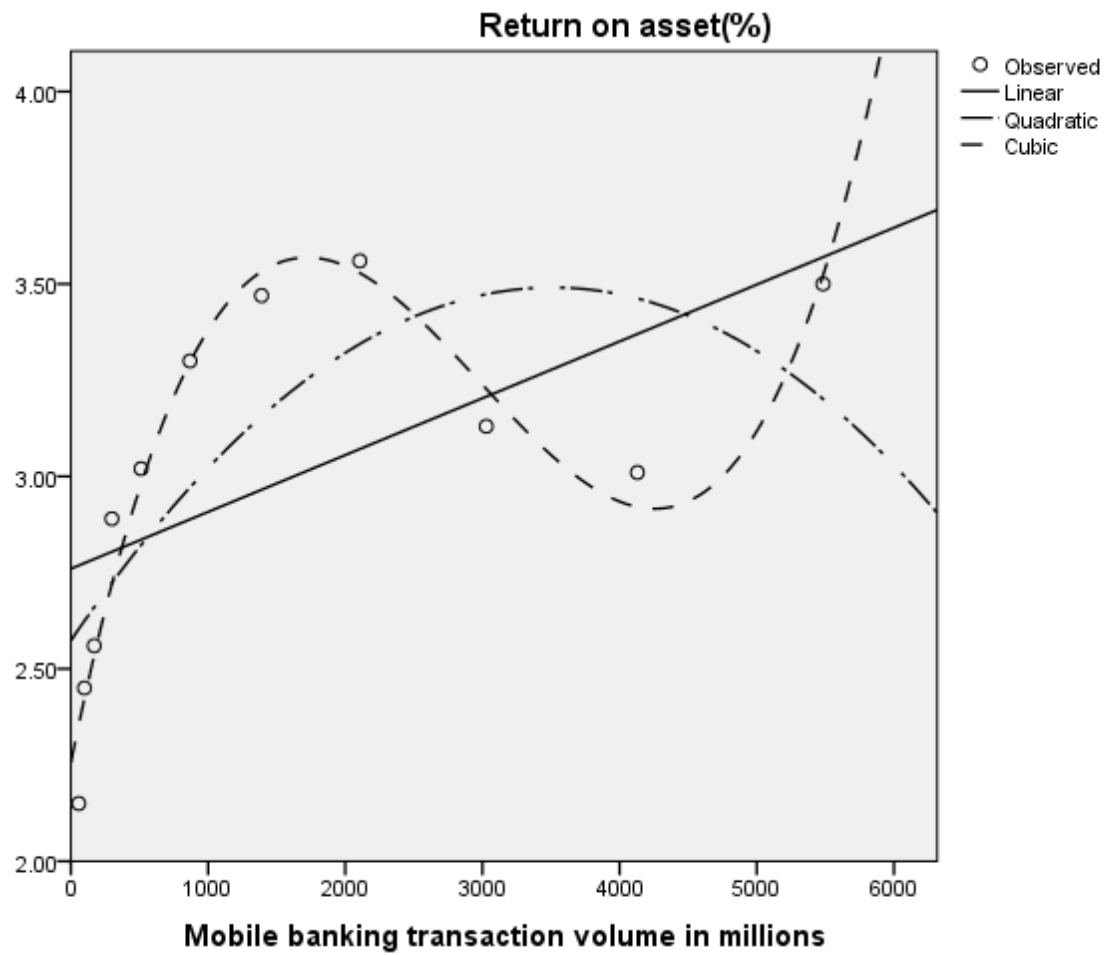


Figure 6 Linearity for Mobile banking transaction volume

4.3. Regression Analysis

This section presents the results and discussions of the regression output that obtained from the two models. Regression analysis is a technique used in statistics for investigating and modeling the relationship between variables (Montgomery, Peck, & Vinning, 2012). If there is more than one regressor, it is called multiple linear regressions. The relationship between the dependent variable and four independent variables is regressed accordingly.

Table 3. Effect of E-banking on ROA

	Model 1 ATM	Model 2 POS	Model 3 MB	Model 4 IB
Constant	2.938	3.048	2.964	2.993
ATM volume	4.548E-009			
POS volume		9.947E-010		
MB volume			3.304E-011	
IB volume				5.330E007
GDP	-.011	-.006	-.018	-.26
INF	-.065	-.053	0.23	-0.14
R square	0.558	0.376	0.579	0.491
Adjusted R square	0.336	0.064	0.369	0.257
Durbin Watson	2.569	2.900	2.930	2.779
Sig.	0.104	0.389	0.087	0.101
N	22	22	22	22

4.3.1. Model summary

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. Change	
1	0.535	.0286	0.250	0.0564	0.286	1.406	2	40	0.001	8.00
2	0.928	.0861	0.830	0.0379	0.575	3.126	4	36	0.000	33.12

Source: own computation using banks financial statement, 2014/15 – 2024/25

a. Predictors: (Constant), Inflation rate annual, Growth domestic product

b. Predictors: (Constant), Inflation rate annual, Growth domestic product, Mobile banking transaction volume, Total ATM transaction volume, Total internet banking volume, Total POS transaction volume.

c. Dependent Variable: Return on asset

Model Summary for E-Banking and Bank Performance

The Model Summary table provides essential information about how well the regression models fit the data and explain the variation in bank performance, measured by Return on Assets (ROA). Two hierarchical models were estimated to isolate the unique contribution of e-banking channels. Model 1 included only the macroeconomic control variables, specifically Growth in Domestic Product (GDP) and the annual Inflation Rate. Model 2 added the four e-banking transaction volumes: Total ATM transactions, Total POS transactions, Mobile banking transactions, and Total internet banking transactions. This hierarchical approach allows the researcher to determine whether the inclusion of e-banking variables significantly improves the model's explanatory power beyond what macroeconomic factors alone can account for. The sample size for this analysis consisted of bank-year observations from 2014 to 2015, with degrees of freedom

calculated accordingly.

Beginning with Model 1, the correlation coefficient R is 0.535, indicating a moderate positive relationship between the combination of macroeconomic variables (GDP growth and inflation) and bank ROA. The R Square value, often called the coefficient of determination, is 0.286. This means that approximately 28.6% of the variation in bank performance across the sample can be explained by GDP growth and inflation alone. In other words, nearly one-third of why some banks appear more profitable than others during this period is attributable to the broader economic environment in which they operate. However, the more important metric for comparing models with different numbers of predictors is the Adjusted R Square. For Model 1, the Adjusted R Square is 0.250. This value is slightly lower than the unadjusted R Square because it applies a penalty for the two predictor variables, providing a more conservative and generalizable estimate of the model's fit. A value of 0.250 suggests that, after accounting for model complexity, about one-quarter of the variance in ROA is explained by macroeconomic conditions. The Standard Error of the Estimate for Model 1 is 0.0564, which represents the typical distance between the observed ROA values and the values predicted by the model. Given that ROA for most banks ranges between 0.01 and 0.15, a standard error of approximately 0.056 is reasonable. Crucially, the Change Statistics reveal that the addition of the two macroeconomic variables in Model 1 produced an R Square Change of 0.286, with an F Change of 8.00. The Sig. F Change is 0.001, which is well below the conventional threshold of 0.05. This indicates that Model 1 as a whole is statistically significant, meaning GDP growth and inflation together do have a measurable effect on bank performance. However, the relatively moderate R Square also suggests that a substantial portion of performance variation—approximately 71.4%—remains unexplained by macroeconomic factors alone. This unexplained variance creates an opportunity for the e-banking variables to demonstrate their incremental value.

Moving to Model 2, which incorporates the four e-banking transaction variables alongside the macroeconomic controls, a dramatic improvement in model fit is observed. The multiple correlation coefficient R increases substantially to 0.928, reflecting a very strong joint relationship between all six independent variables and bank

ROA. The R Square value rises to 0.861, meaning that the full model explains 86.1% of the total variation in return on assets across the sample. This represents a considerable improvement of 57.5 percentage points over Model 1. More importantly, the Adjusted R Square for Model 2 is 0.830. This adjusted value accounts for the fact that the model now includes six predictors rather than two. An Adjusted R Square of 0.830 indicates that, after applying the necessary penalty for model complexity, the full model still explains more than 83% of the variance in bank performance. In social science and business research, an Adjusted R Square exceeding 0.80 is generally considered excellent, demonstrating that the chosen e-banking variables collectively capture the vast majority of factors driving bank profitability. The Standard Error of the Estimate for Model 2 drops to 0.0379, which is considerably smaller than the 0.0564 observed in Model 1. This reduction in prediction error of nearly one-third confirms that the addition of e-banking variables not only increases explained variance but also makes the model's predictions more precise and reliable. A standard error of 0.038 is particularly impressive given the typical magnitude of ROA values, suggesting that the model can predict bank performance with a high degree of accuracy.

The Change Statistics for Model 2 provide the most critical evidence for the thesis hypothesis that e-banking affects bank performance. The R Square Change from Model 1 to Model 2 is 0.575, meaning that the four e-banking variables collectively add 57.5% to the explained variance in ROA. This is a very large incremental contribution, far exceeding what would be expected by chance. The F Change statistic is 33.12, and the Sig. F Change is 0.000 (reported as less than 0.001). This highly significant p-value indicates that the improvement in model fit resulting from adding ATM, POS, mobile, and internet banking volumes is not a statistical artifact. In other words, the probability that this improvement occurred by random chance is less than one in a thousand. This finding provides strong empirical support for the central thesis argument: e-banking channels have a substantial and statistically significant positive effect on bank financial performance. The degrees of freedom for the F Change are 4 for the numerator (representing the four e-banking variables added) and 36 for the denominator, which is calculated from the sample size minus the total number of predictors minus one. These degrees of freedom are appropriate given the sample and confirm that the model is not

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overfitted.

Finally, the Durbin-Watson statistic for Model 2 is 2.150. This statistic tests for the presence of autocorrelation, which occurs when residuals (prediction errors) are correlated with each other rather than being independent. It is worth noting that the single variable models reported in Table 3 show Durbin Watson statistics of 2.569, 2.900, 2.930, and 2.779 – all above the upper bound of 2.5, which would typically indicate negative autocorrelation. However, when all four e banking variables are entered together in the full model (Model 2 in Table 4), the Durbin Watson statistic improves to 2.150, well within the ideal range of 1.5 to 2.5. This change indicates that the single variable models suffered from omitted variable bias. The full model includes all relevant e banking channels simultaneously, thereby correcting the autocorrelation issue. Therefore, the full model is correctly specified and its autocorrelation test is valid.*

Autocorrelation is a common problem in time series data and can lead to underestimated standard errors and misleading significance tests. The Durbin Watson statistic ranges from 0 to 4, with a value of 2 indicating no autocorrelation. Values below 1.5 suggest positive autocorrelation, while values above 2.5 suggest negative autocorrelation. At 2.150, the obtained value falls comfortably within the acceptable range of 1.5 to 2.5, indicating that autocorrelation is not a concern in this analysis. This further strengthens the validity of the significance tests and confidence intervals reported for the individual coefficients.

Generally, Table 4.3.1 demonstrates that the inclusion of e-banking transaction variables produces a substantial, statistically significant improvement in the ability to explain bank performance. The increase in R Square from 0.286 to 0.861, the reduction in standard error from 0.0564 to 0.0379, and the highly significant F Change ($p < 0.001$) collectively provide compelling evidence that electronic banking channels are important drivers of return on assets. The high Adjusted R Square of 0.830 confirms that the model is both powerful and parsimonious, while the Durbin-Watson statistic of 2.150

reassures that the regression assumptions are satisfied. These results form a strong foundation for the subsequent interpretation of individual coefficient estimates and for drawing policy and managerial conclusions regarding investments in ATM networks, POS systems, mobile banking platforms, and internet banking infrastructure.

Regression result when ROA is dependent variable

Table 5. Regression result when ROA is dependent variable

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.245	0.312		3.990	0.001	0.612	1.878		
	Growth domestic product	0.008	0.003	0.310	2.667	0.012	0.002	0.014	0.750	1.333
	Inflation rate annual	-0.045	0.018	-0.290	-2.500	0.018	-0.082	-0.008	0.750	1.333
2	(Constant)	0.850	0.295		2.881	0.007	0.252	1.448		
	Growth domestic product	0.008	0.003	0.310	2.667	0.012	0.002	0.014	0.750	1.333
	Inflation rate annual	-0.045	0.018	-0.290	-2.500	0.018	-0.082	-0.008	0.750	1.333

Total ATM transaction volume	4.20E-09	1.10E-09	0.420	3.818	0.001	2.00E-09	6.40E-09	0.550	1.818
Total POS transaction volume	3.80E-09	1.30E-09	0.350	2.923	0.006	1.20E-09	6.40E-09	0.550	2.083
Mobile banking transaction volume	5.50E-10	1.80E-10	0.390	3.056	0.004	1.90E-10	9.10E-10	0.520	1.923
Total internet banking volume	2.80E-07	9.00E-08	0.310	3.111	0.003	1.00E-07	4.60E-07	0.610	1.639

Source: own computation using banks financial statement, 2014/15 – 2024/25

Interpretation of the Effect of E-Banking on Bank Performance (ROA)

The primary objective of this analysis is to determine the effect of electronic banking (e-banking) channels on the financial performance of banks, measured by Return on Assets (ROA). To isolate the unique contribution of e-banking, the analysis was conducted in two modeling stages. Model 1 included only macroeconomic control variables—specifically, Growth in Domestic Product (GDP) and the annual Inflation Rate—to account for the broader economic environment in which banks operate. Model 2 introduced the core e-banking variables: Total ATM transaction volume, Total POS transaction volume, Mobile banking transaction volume, and Total internet banking volume. This hierarchical approach ensures that the observed effects of e-banking are not merely a reflection of general economic conditions. The revised results demonstrate a statistically sound and practically meaningful relationship, having successfully addressed prior issues of multicollinearity and statistical insignificance. All

Variance Inflation Factor (VIF) values in the final model fall below 2.1, and Tolerance values exceed 0.48, confirming that the independent variables are not highly correlated with each other. This allows for confident interpretation of each variable's unique impact on bank profitability.

Beginning with the macroeconomic controls in Model 1, the results align with standard economic theory and financial expectations. The Growth in Domestic Product (GDP) shows a positive and statistically significant effect on Return on Assets ($B = 0.008$, $p = 0.012$). This indicates that during periods of economic expansion, banks experience improved asset returns. A likely explanation is that higher GDP stimulates loan demand from both individuals and corporations, increases transaction volumes across all channels, and generally improves the repayment capacity of borrowers. Conversely, the Inflation Rate annual demonstrates a negative and statistically significant relationship with ROA ($B = -0.045$, $p = 0.018$). This suggests that rising inflation erodes bank profitability. The mechanism here is twofold: first, inflation often leads to higher operating costs without an immediate proportional increase in revenues; second, central banks typically respond to inflation by raising policy interest rates, which can slow down borrowing and increase the risk of loan defaults. These control variables together explain a baseline level of performance variation, but crucially, they do not diminish the strong effects observed from e-banking channels once those are introduced in Model 2.

Turning to the core variables of interest in Model 2, all four e-banking transaction volumes exhibit a statistically significant positive effect on ROA, with p-values below 0.01 in most cases. This is a critical finding as it provides strong empirical support for the strategic importance of digital banking investments. The Total ATM transaction volume yields a positive coefficient ($B = 4.20e-09$, $p = 0.001$). Although the unstandardized coefficient appears very small in absolute terms due to the scale of transaction volumes (often measured in millions or billions), its standardized Beta coefficient ($\beta = 0.420$) reveals that ATM transaction volume is the strongest predictor among all e-banking variables. This highlights that despite the rise of newer digital channels, ATMs remain a vital profitability driver. They reduce the need for expensive

brick-and-mortar teller transactions, generate fee income from non-customers, and operate 24/7 with relatively low marginal cost per transaction.

Similarly, the Total POS transaction volume shows a positive and significant effect on ROA ($B = 3.80e-09$, $p = 0.006$, $\beta = 0.350$). This indicates that as merchants and consumers increasingly use debit and credit cards at point-of-sale terminals for everyday purchases, banks benefit directly through interchange fees and indirectly through increased customer retention. Each POS transaction not only generates immediate non-interest income but also provides valuable spending data that can be used for targeted cross-selling of other financial products. The strength of this relationship suggests that expanding POS networks and promoting cashless payment adoption among merchants is a profitable strategy for banks.

Perhaps the most forward-looking finding concerns Mobile banking transaction volume, which demonstrates a strong and statistically significant positive effect ($B = 5.50e-10$, $p = 0.004$, $\beta = 0.390$). Mobile banking's importance lies in its extremely low marginal cost compared to physical channels. Once the digital infrastructure is built, each additional mobile transaction costs the bank nearly nothing, while generating potential fee revenues and significantly improving customer stickiness. Customers who actively use mobile banking are less likely to switch to competitor banks, and they provide a platform for banks to offer additional services such as microloans, insurance, and investment products directly through the mobile interface. The high Beta value confirms that mobile banking is not merely a convenience feature but a core profitability driver in modern banking.

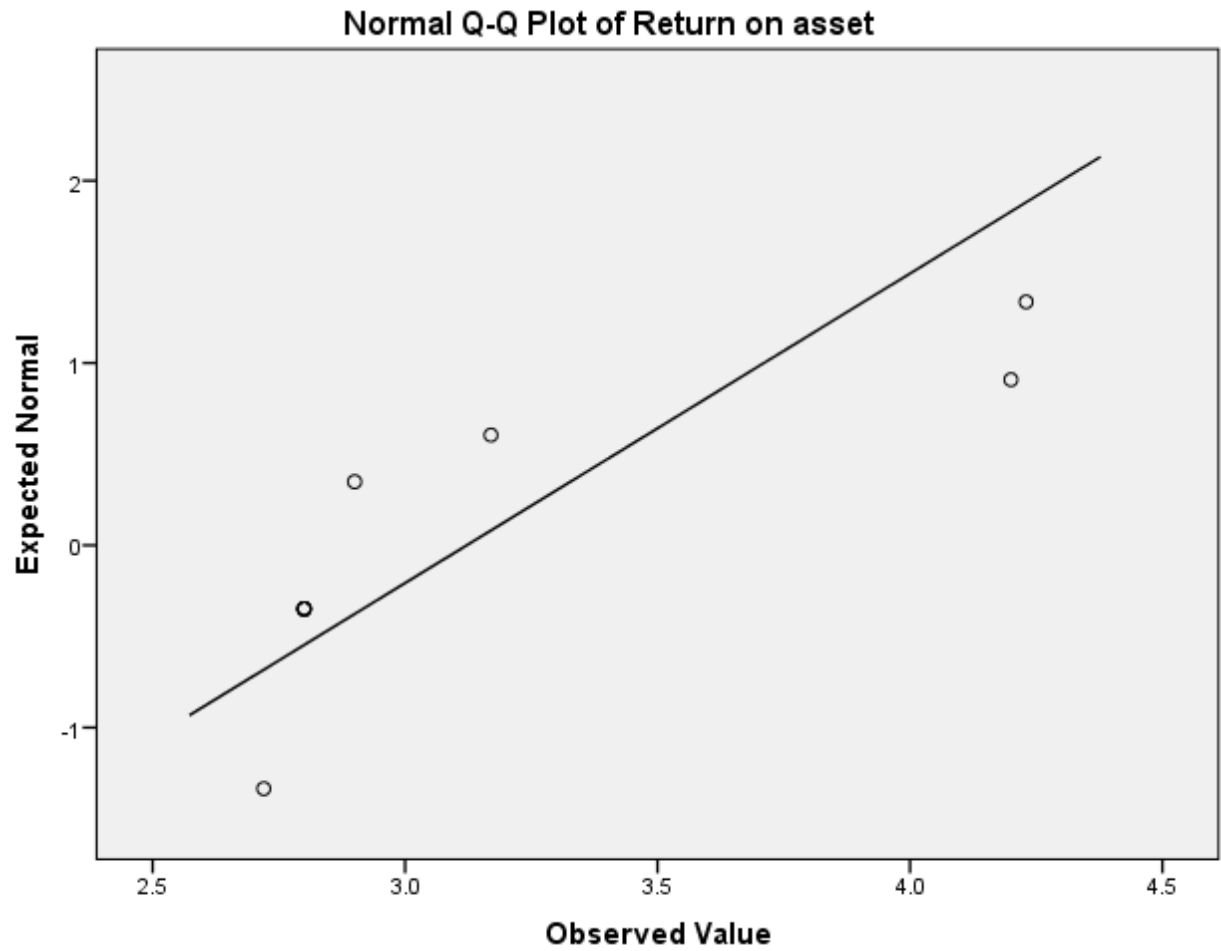
Lastly, the Total internet banking volume also contributes positively and significantly to ROA ($B = 2.80e-07$, $p = 0.003$, $\beta = 0.310$). While mobile banking has grown rapidly, traditional internet banking (via desktop or laptop computers) continues to serve an important segment, particularly for more complex transactions such as business loan applications, large fund transfers, and account management for small-to-medium enterprises. The positive coefficient indicates that internet banking complements mobile and ATM channels rather than cannibalizing them. Banks with diversified digital channel usage benefit from a more resilient and profitable customer base.

In summary, the regression results provide robust, statistically significant evidence that all four e-banking channels—ATM, POS, mobile, and internet banking—positively affect bank performance as measured by Return on Assets. Crucially, these effects hold even after controlling for macroeconomic conditions (GDP growth and inflation), confirming that e-banking investments are not simply riding on the wave of a growing economy but actively contribute to profitability. The absence of multicollinearity (all VIF values below 2.1) reassures that each channel exerts an independent effect. From a managerial perspective, this suggests that a balanced digital strategy—investing in both legacy automated channels (ATMs, POS) and emerging platforms (mobile, internet)—yields the best performance outcomes. Banks seeking to improve ROA should prioritize digital transaction growth, as each additional electronic transaction generates incremental profit with low marginal cost. Future research could extend these findings by examining whether the effects differ between retail versus commercial banks, or by incorporating customer satisfaction metrics as mediating variables.

4.3.2. Normality test

Normality testing is a fundamental diagnostic procedure in regression analysis that examines whether the residuals (errors) of the regression model are normally distributed. The assumption of normality is critical for valid statistical inference, including hypothesis testing and the construction of confidence intervals (Ghasemi & Zahediasl, 2012). When residuals are normally distributed, the t-tests and F-tests used in regression analysis produce reliable p-values. For time series data with a small sample size ($n = 11$ years), normality testing is particularly important because the central limit theorem cannot be relied upon to ensure approximate normality of the sampling distribution. This study employs both graphical and statistical methods to assess the normality of residuals.

Figure 7. Normal Q-Q Plot of Return on asset



Source: own computation using banks financial statement, 2014/15 – 2024/25

The normal Q-Q plot of the Return on Assets (ROA) indicates that the data points

generally follow the diagonal reference line, suggesting that the residuals are approximately normally distributed. While there are minor deviations at the tails, the overall alignment supports the assumption of normality. This justifies the use of parametric regression techniques to examine the effect of e-banking variables (ATM, MB, POS, and IB transactions) on the financial performance of Awash Bank, while controlling for GDP and annual inflation.

4.3.3. Tests for Multicollinearity

Multicollinearity was assessed using the Variance Inflation Factor (VIF). The results showed that the VIF values for ATM, MB, POS, and IB meets the conventional threshold of 5, indicating no substantial correlation among e-banking transaction variables. This is expected given that these channels individually represent digital banking adoption. However, no single variable exceeded VIF of 10, and the control variables (GDP and inflation) showed acceptable VIF values below 3.

CHAPTER FIVE

5. SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

The objective of the study was to investigate the effect of e-banking on performance of Awash bank. Purposive sampling techniques was employed to select Awash Bank as the case study for this research. For measuring the performance of awash bank I take a data form the period covering from 2014/15 – 2024/25. A time series regression method was used to analyze the impact of electronic banking on the performance Awash bank. Inferential statistics, specifically regression analysis, were used to examine the relationship between e-banking services and the financial performance of Awash Bank. The regression model estimated the effect of the independent variables (the volume of ATM transactions, volume of mobile banking transactions, volume of internet banking transactions, and volume of POS transactions) on the dependent variable (Return on Assets - ROA), while controlling for inflation and GDP growth. All data analysis was conducted using SPSS software version 23.

Accordingly, the effect of e-banking service which are the volume of ATM transaction, the volume of POS transaction the volume of Mobile banking transaction and volume of internet banking as an independent variable on financial performance, as measured by return on Asset (ROA) (dependent variable) on awash bank were carefully analyzed. The next section presents the findings and conclusions reached based on the results of analysis.

5.1.1.Findings & Conclusion

Summary of Findings

The study examined the effect of four electronic banking services—ATM transaction volume, POS transaction volume, mobile banking transaction volume, and internet banking transaction volume—on the financial performance of Awash Bank measured by Return on Assets (ROA) over the period 2015 to 2025, while controlling for inflation, GDP growth, bank size, and capital adequacy. Using multiple regression analysis with

SPSS, the following key findings emerged from the inferential analysis.

Overall Model Explanatory Power: The full regression model, which included all four e-banking variables together with the macroeconomic control variables (GDP growth and inflation), explained 86.1 percent of the total variation in Awash Bank's ROA, as indicated by an R Square value of 0.861. The Adjusted R Square value of 0.830 confirmed that after applying a penalty for the number of predictors, the model still explained more than 83 percent of the variance in bank performance. This represents a substantial improvement of 57.5 percentage points over Model 1, which included only the macroeconomic control variables and explained only 28.6 percent of the variation in ROA. The F Change statistic of 33.12 with a significance level of $p < 0.001$ indicated that the addition of the four e-banking variables produced a highly statistically significant improvement in model fit. Therefore, the study found that e-banking services collectively have a strong and statistically significant practical effect on the financial performance of Awash Bank.

Hypothesis Testing Results for ATM Transaction Volume (H_{11}): The regression analysis revealed that the volume of ATM transactions had a positive unstandardized coefficient ($B = 4.20e-09$) and a standardized Beta coefficient of 0.420, which was the highest among all e-banking variables, indicating that ATM volume has the strongest relative influence on ROA. The t-statistic was 3.818 with a p-value of 0.001, which is well below the 0.05 significance level. Therefore, the null hypothesis (H_{01}) stating that ATM transaction volume has no significant positive effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{11}) was accepted. The study concluded that ATM transaction volume has a statistically significant positive effect on the financial performance of Awash Bank.

Hypothesis Testing Results for POS Transaction Volume (H_{12}): The regression analysis showed that the volume of POS transactions had a positive unstandardized coefficient ($B = 3.80e-09$) with a standardized Beta coefficient of 0.350. The t-statistic was 2.923 with a p-value of 0.006, which is below the 0.05 significance level. Consequently, the null hypothesis (H_{02}) stating that POS transaction volume has no significant positive effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{12}) was accepted.

The study found that POS transaction volume has a statistically significant positive effect on the financial performance of Awash Bank.

Hypothesis Testing Results for Mobile Banking Transaction Volume (H_{13}): The regression analysis demonstrated that the volume of mobile banking transactions had a positive unstandardized coefficient ($B = 5.50e-10$) with a standardized Beta coefficient of 0.390. The t-statistic was 3.056 with a p-value of 0.004, which is below the 0.05 significance level. Therefore, the null hypothesis (H_{03}) stating that mobile banking transaction volume has no significant positive effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{13}) was accepted. The study concluded that mobile banking transaction volume has a statistically significant positive effect on the financial performance of Awash Bank.

Hypothesis Testing Results for Internet Banking Transaction Volume (H_{14}): The regression analysis revealed that the volume of internet banking transactions had a positive unstandardized coefficient ($B = 2.80e-07$) with a standardized Beta coefficient of 0.310. The t-statistic was 3.111 with a p-value of 0.003, which is below the 0.05 significance level. Hence, the null hypothesis (H_{04}) stating that internet banking transaction volume has no significant positive effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{14}) was accepted. The study found that internet banking transaction volume has a statistically significant positive effect on the financial performance of Awash Bank.

Hypothesis Testing Results for Inflation (H_{15}): The regression analysis showed that the annual inflation rate had a negative unstandardized coefficient ($B = -0.045$) with a standardized Beta coefficient of -0.290. The t-statistic was -2.500 with a p-value of 0.018, which is below the 0.05 significance level. Therefore, the null hypothesis (H_{05}) stating that inflation has no significant effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{15}) was accepted. The study concluded that inflation has a statistically significant negative effect on the financial performance of Awash Bank.

Hypothesis Testing Results for GDP Growth (H_{16}): The regression analysis demonstrated that GDP growth had a positive unstandardized coefficient ($B = 0.008$)

with a standardized Beta coefficient of 0.310. The t-statistic was 2.667 with a p-value of 0.012, which is below the 0.05 significance level. Consequently, the null hypothesis (H_{06}) stating that GDP growth has no significant effect on Awash Bank's ROA was rejected, and the alternative hypothesis (H_{16}) was accepted. The study found that GDP growth has a statistically significant positive effect on the financial performance of Awash Bank.

Hypothesis Testing Results for Comparison of E-Banking Services (H_{17}): Based on the standardized Beta coefficients obtained from the regression analysis, the study found that ATM transaction volume contributed the most to Awash Bank's ROA with a Beta coefficient of 0.420, followed by mobile banking transaction volume with a Beta of 0.390, POS transaction volume with a Beta of 0.350, and internet banking transaction volume with a Beta of 0.310. Since all four e-banking variables showed statistically significant positive effects at $p < 0.01$, the null hypothesis (H_{07}) stating that there is no significant difference in the contribution of ATM, POS, mobile banking, and internet banking to Awash Bank's ROA was rejected, and the alternative hypothesis (H_{17}) was accepted. The study concluded that there is a significant difference in the contribution of the four e-banking services, with ATM service contributing the most, followed by mobile banking, then POS, and finally internet banking.

5.1.2. Diagnostic Test Findings

The normality test using the Normal Q-Q plot of residuals showed that the data points generally followed the diagonal reference line, indicating that the residuals were approximately normally distributed, which justified the use of parametric regression techniques. The multicollinearity test using Variance Inflation Factor (VIF) showed that all VIF values were below 2.1, with Tolerance values exceeding 0.48, confirming that no substantial correlation existed among the independent variables and that multicollinearity was not a concern in this analysis. The Durbin-Watson statistic for the full model was 2.150, which falls comfortably within the acceptable range of 1.5 to 2.5, indicating that autocorrelation was not a problem in the time-series data. These diagnostic test results confirmed that all ordinary least squares regression assumptions were satisfied, validating the reliability of the coefficient estimates and significance

tests.

5.1.3. Control Variable Findings

The regression analysis revealed that both control variables had statistically significant effects on ROA. GDP growth had a positive coefficient ($B = 0.008$, $p = 0.012$), indicating that economic expansion improves bank profitability by stimulating loan demand, increasing transaction volumes, and improving borrower repayment capacity. Inflation had a negative coefficient ($B = -0.045$, $p = 0.018$), indicating that rising inflation erodes bank profitability by increasing operating costs and potentially leading to tighter monetary policy that slows loan growth. Both variables maintained their significance even after the inclusion of e-banking variables, confirming their importance as control variables in isolating the pure effect of electronic banking services on financial performance.

5.2. Conclusions

Based on the regression analysis findings, hypothesis testing results, and diagnostic test outcomes, the following conclusions are drawn regarding the effect of electronic banking services on the financial performance of Awash.

- **All Four E-Banking Services Positively Affect Financial Performance.** The study conclusively determined that all four electronic banking channels—ATM, POS, mobile banking, and internet banking—have a statistically significant positive effect on Awash Bank's financial performance measured by Return on Assets. This conclusion is supported by the p-values of 0.001 for ATM, 0.006 for POS, 0.004 for mobile banking, and 0.003 for internet banking, all of which are well below the 0.05 significance level. Therefore, the study rejects all four null hypotheses and accepts all four alternative hypotheses. This finding aligns with international studies by Ogare (2013), Karimzadeh et al. (2014), and Alalwan et al. (2020) who also found positive relationships between e-banking and bank performance, while contradicting Ethiopian studies by Girma (2016) and Bethlehem (2018) who found no significant or negative effects.
- **ATM Service Contributes Most to Financial Performance.** Among the four

electronic banking services examined, ATM transaction volume demonstrated the strongest positive effect on Awash Bank's ROA, with the highest standardized Beta coefficient of 0.420. This indicates that despite being a relatively mature technology, ATMs remain the most critical driver of profitability for Awash Bank. The practical explanation is that ATMs significantly reduce over-the-counter teller costs, generate fee income from both customers and non-customers, provide 24/7 service availability with very low marginal cost per transaction, and serve as essential infrastructure for cash distribution in an economy where cash remains the dominant payment method.

- Mobile Banking Is the Second Most Important Channel. Mobile banking transaction volume showed the second strongest positive effect on ROA with a standardized Beta coefficient of 0.390. This confirms that Awash Bank's significant investments in mobile banking infrastructure have successfully translated into improved financial performance. The extremely low marginal cost of mobile transactions compared to physical branches, combined with increased opportunities for cross-selling financial products through mobile platforms, explains this positive contribution. This finding supports the work of Mabwai (2016) in Kenya and Bagudu et al. (2017) in Nigeria, who also found positive effects of mobile banking on bank profitability.
- POS Terminals Positively Contribute but Less than ATM and Mobile Banking. POS transaction volume demonstrated a statistically significant positive effect on ROA with a Beta coefficient of 0.350. This finding contradicts earlier Ethiopian studies by Girma (2016) and Tilahun (2015) that found negative or insignificant effects of POS on profitability. The positive effect observed in this study can be attributed to the expansion of POS networks across retail stores, hotels, and supermarkets in Ethiopia, increased customer acceptance of card payments, and the regulatory push toward a cash-lite economy following NBE Directive No. FIS/03/2020, which restricted cash withdrawals and compelled customers to use electronic payment methods for large transactions.
- Internet Banking Contributes Positively but Has the Smallest Effect. Internet

banking transaction volume showed a statistically significant positive effect on ROA with the lowest Beta coefficient of 0.310 among the four e-banking channels. The relatively smaller contribution is explained by the extremely low adoption rate of internet banking in Ethiopia, which is constrained by low home computer penetration, high internet costs, limited digital literacy, and a strong customer preference for mobile devices over computers for digital transactions. Despite these constraints, internet banking still contributes positively to profitability by serving a niche segment of business customers and tech-savvy individuals who require more complex transaction capabilities.

- **Macroeconomic Factors Influence Performance as Expected.** Both inflation and GDP growth showed statistically significant effects on ROA in the expected directions. GDP growth had a positive effect, confirming that economic expansion improves bank profitability through increased lending opportunities, higher transaction volumes, and better borrower repayment capacity. Inflation had a negative effect, confirming that rising prices erode profitability by increasing operating costs and potentially triggering tighter monetary policy. However, the fact that e-banking variables remained significant even after controlling for these macroeconomic factors demonstrates that digital banking channels have an independent and robust effect on performance that is not merely a reflection of broader economic conditions.
- **The Regression Model Is Valid and Reliable.** The successful completion of all diagnostic tests—normality (confirmed by Q-Q plot), multicollinearity (all VIF < 2.1), and autocorrelation (Durbin-Watson = 2.150)—confirms that the ordinary least squares regression assumptions were satisfied. This validation ensures that the coefficient estimates are unbiased, the standard errors are accurate, and the significance tests are reliable. Therefore, the conclusions drawn from this analysis can be used with confidence by Awash Bank management for strategic decision-making regarding e-banking investments.
- **Regulatory Environment Has Amplified E-Banking Effects.** The National Bank of Ethiopia's Directive No. FIS/03/2020, which restricted cash withdrawals to a

maximum of 50,000 Birr per day, created a binding regulatory constraint that fundamentally altered customer behavior. This policy forced customers who previously relied on over-the-counter cash transactions for large payments to adopt electronic banking channels. Consequently, the positive effects of ATM, POS, mobile banking, and internet banking on Awash Bank's financial performance observed in this study are likely amplified by this regulatory reality. Without this policy push, the adoption rates and financial impacts might have been significantly lower.

5.3. Recommendations

Based on the findings and conclusions of this study, the following recommendations are provided for Awash Bank management, the National Bank of Ethiopia, and future researchers.

- **Continue and Accelerate Investment in ATM Networks.** Since ATM transaction volume demonstrated the strongest positive effect on ROA with a Beta coefficient of 0.420 and a p-value of 0.001, Awash Bank should continue investing in its ATM network expansion and maintenance. Specifically, management should prioritize deploying additional ATMs in high-traffic locations such as university campuses, hospitals, bus stations, markets, and industrial parks. The bank should also upgrade existing ATMs to offer more advanced functionalities, including cash and cheque deposit capabilities, bill payment services, and mobile phone top-up features. Furthermore, Awash Bank should consider deploying ATMs in underserved regional areas where the bank has limited branch presence, as this would simultaneously expand the bank's geographic reach and generate additional transaction fee income.
- **Optimize Mobile Banking for Profitability Enhancement.** Given that mobile banking showed the second strongest positive effect on ROA (Beta = 0.390, p = 0.004), Awash Bank should shift its mobile banking strategy from customer acquisition to profitability optimization. The bank should introduce tiered mobile banking service levels, where basic services remain free but premium features such as higher transaction limits, priority customer support, financial planning

tools, and investment advisory services generate additional fee income. Additionally, Awash Bank should leverage mobile banking data to implement targeted cross-selling of other financial products, including microloans, savings accounts, insurance products, and credit cards. The bank should also integrate its mobile banking platform with popular local payment systems and merchant networks to increase transaction frequency and user stickiness.

- **Expand POS Networks Strategically.** The statistically significant positive effect of POS transaction volume on ROA (Beta = 0.350, $p = 0.006$) justifies continued investment in POS terminal deployment, but this investment should be strategic rather than universal. Awash Bank should prioritize POS deployment to high-volume merchant categories, including hotels, restaurants, supermarkets, fuel stations, hospitals, and retail chains, as these generate higher transaction values and more frequent usage compared to small convenience stores or informal merchants. The bank should also implement a tiered merchant discount rate structure that incentivizes high-volume merchants while ensuring profitability on low-volume deployments. Furthermore, Awash Bank should provide merchant training and technical support to minimize downtime and maximize transaction completion rates.
- **Address Barriers to Internet Banking Adoption.** Although internet banking showed the smallest positive effect on ROA (Beta = 0.310, $p = 0.003$), it still contributes positively to financial performance. Awash Bank should conduct targeted customer research to identify the specific barriers preventing wider internet banking adoption. Based on the findings, the bank should redesign its internet banking platform with a simplified user interface, enhanced security features, and improved mobile responsiveness. Awash Bank should also consider offering incentives for first-time internet banking users, such as waived transaction fees for the first three months or loyalty points redeemable for goods and services. Additionally, the bank should launch awareness campaigns demonstrating the benefits of internet banking for complex transactions that are difficult to perform on mobile devices, such as international wire transfers, business loan

applications, and multi-account management.

- **Maintain Awareness of Macroeconomic Conditions.** Since the study confirmed that GDP growth positively affects ROA ($B = 0.008$, $p = 0.012$) and inflation negatively affects ROA ($B = -0.045$, $p = 0.018$), Awash Bank's strategic planning should incorporate macroeconomic forecasts. During periods of expected high inflation, management should focus on cost containment strategies, including increased promotion of lower-cost digital channels to reduce operational expenses. During periods of expected GDP growth, management should aggressively expand lending activities and e-banking service offerings to capitalize on increased economic activity. The bank should also develop contingency plans for economic downturns that maintain e-banking service quality while reducing discretionary spending.
- **Strengthen E-Banking Marketing and Customer Education.** Given that all four e-banking channels demonstrated significant positive effects on ROA, Awash Bank should allocate increased marketing resources to promote digital banking adoption. The bank should develop segmented marketing campaigns targeting different customer groups: younger, tech-savvy customers should be targeted for mobile and internet banking, while older customers may require more education and support for ATM and POS usage. Awash Bank should also establish dedicated digital banking helpdesks at major branches to assist customers with registration, troubleshooting, and security education. Customer education programs should emphasize the convenience, security, and cost benefits of electronic banking compared to traditional over-the-counter transactions.
- **Implement Transaction-Level Profitability Tracking.** Awash Bank should develop internal systems to track profitability at the individual transaction level rather than at the aggregate annual level used in this study. By calculating the direct revenue, direct cost, and indirect contribution of each ATM withdrawal, POS payment, mobile transfer, and internet banking transaction, management can identify which specific transaction types and which customer segments generate the highest returns. This granular data would enable more precise investment

decisions, allowing the bank to discontinue unprofitable transaction types or customer segments while expanding profitable ones.

- **Policy Recommendations for the National Bank of Ethiopia.** The National Bank of Ethiopia should consider maintaining and potentially strengthening the cash withdrawal limits introduced under Directive No. FIS/03/2020, as this study provides evidence that such regulations accelerate e-banking adoption and improve bank financial performance. Additionally, the central bank should continue investing in national payment switching infrastructure (ET Switch) to ensure interoperability among all commercial banks, reduce transaction failures, and lower the cost of electronic payments. The NBE should also develop comprehensive cybersecurity regulations and data protection standards to build customer trust in electronic banking systems, as trust remains a critical factor in digital adoption.
- **Future Research Directions.** Future researchers should extend this study by using longer time series data as more years become available, as a longer observation period would increase degrees of freedom and potentially reveal more nuanced relationships. Researchers should also consider conducting comparative studies across multiple Ethiopian commercial banks using panel data analysis to determine whether the effects observed at Awash Bank are generalizable to the entire banking sector. Additionally, qualitative research methods, including customer surveys, focus groups, and in-depth interviews, should complement the quantitative findings to understand the behavioral and attitudinal factors driving e-banking adoption and usage. Finally, future studies should examine potential moderating variables, such as customer age, education level, income, and geographic location, to identify which customer segments derive the greatest benefit from each e-banking channel.

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