

Research Article

# ATM Service Quality and Interest-Free Banking Customer Satisfaction at Bank of Abyssinia, Dire Dawa Branch, Ethiopia: An Empirical Investigation

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## Abstract

This study's objective was to investigate the influence of ATM service quality on customer satisfaction within the context of Interest-Free Banking (IFB) at the Bank of Abyssinia's Dire Dawa Branch. Using a descriptive and quantitative research approach, data was collected from 318 IFB customers via a structured questionnaire. The data was then analyzed using descriptive statistics and regression analysis to determine relationships between the variables. The key findings revealed that reliability, responsiveness, tangibility, and assurance all had a significant positive effect on customer satisfaction. This suggests that customers' satisfaction increased when they perceived the ATMs to be dependable (reliability), had quick transaction times (responsiveness), were physically well-maintained (tangibility), and felt secure (assurance). In contrast, the study found that service empathy did not have a significant impact on customer satisfaction in this specific context. Based on these findings, it is recommended that the Bank of Abyssinia prioritize continuous improvement in the reliability and responsiveness of its ATM services to align with the Islamic principle of 'amanah' (trust). The bank should also enhance the tangible aspects of the ATM environment to align with 'taharah' (purity). Finally, reinforcing assurance and implementing ongoing customer feedback mechanisms are crucial for building trust and adhering to the Islamic principle of consultation. This research offers valuable insights into customer satisfaction in the growing sector of Islamic banking.

## Keywords

ATM Service Quality, Interest-Free Banking, Customer Satisfaction, Reliability, Responsiveness, Tangibility, Assurance

## 1. Introduction

The banking sector has been significantly transformed by the introduction of various service delivery channels, most notably Automated Teller Machines (ATMs). ATMs have become a strategic technological cornerstone, fundamentally changing customer habits by providing 24/7 access to financial transactions without a human teller. This self-service

capability has dramatically increased the accessibility and convenience of banking, reducing reliance on conventional branches and offering greater autonomy to customers [47]. This shift has made the quality of ATM services a critical factor for banks aiming to maintain a competitive advantage and enhance customer satisfaction [1]. The use of technology

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for such purposes aligns with the broader goals of Islamic finance and its contribution to Sustainable Development Goals (SDGs) [22] and the use of research to map developments in areas like renewable energy in Islamic countries [33].

The introduction of ATMs, while offering undeniable convenience, has also brought forth challenges that require careful investigation. Specifically, concerns regarding service delivery and its subsequent impact on customer satisfaction have become increasingly prominent. One of the biggest issues is the prevalence of service disruptions and failures that hinder ATM reliability. A study by [7] highlighted customer complaints at Dashen Bank about long waiting lines, problems with the network system, and frequent ATM breakdowns. These operational inefficiencies cause inconvenience and lead to dissatisfaction, significantly deteriorating the entire banking experience. Such issues can also impact overall firm performance in the context of bank regulations in Ethiopian commercial banks [52] and are crucial to address to build trust, similar to the critical role of trust and institutions in influencing zakat payments [45]. Understanding the comprehensive relationship between ATM service quality dimensions and customer satisfaction presents another level of difficulty. Consequently, identifying which aspects of service quality are most critical can help banks focus on their improvements and allocate resources wisely.

Several studies have emphasized that a better ATM service delivery plays a significant role in customer satisfaction. For instance, [17] examined the significant impact of ATM service delivery on customer satisfaction, identifying key dimensions such as reliability, empathy, network, and price. A study by [4] also explored the dimensions of reliability, empathy, affordability, fulfillment, privacy, and ease of use and their impact on customer satisfaction. The significant role of ATM service delivery in enhancing customer satisfaction is further supported by a study from [47], which emphasized factors like price, network, reliability, and empathy.

In the Ethiopia context, there's an increasing investment in transaction technology, especially ATMs. Yet, some studies suggest that ATM development and implementation are not fully meeting customer demands. The availability of ATMs is not sufficient compared to the country's quickly growing urban population. This gap highlights the importance of thoroughly examining the ATM service delivery and its impact on customer satisfaction with the Ethiopian banks [1]. Similarly, [34] examined the influence of ATM service delivery on customer satisfaction in Ethiopian commercial banks. Research by [46] conducted the effect of ATM service quality on customer satisfaction. These studies consistently highlight the importance of reliable and efficient ATM services in maintaining customer satisfaction. Moreover, variations in service delivery across different banks and regions can lead to disparities in customer experience.

Many studies have investigated the broader implications of service quality impacts on the whole banking sector. It was

established by [10] that argues that in a very competitive banking environment, service quality is key to being different and building strong customer relationships and loyalty. Specific geographical locations do not limit the problems with ATM services. For instance, [28] revealed that customers in India are concerned about efficiency, security, responsiveness, cost-effectiveness, problem handling, and contact service in both public and private sector banks. A study by [32] emphasized the importance of banks in Malawi addressing factors affecting customer satisfaction to maintain a competitive advantage in ATM banking. It was emphasized by [35] emphasized that ATMs are a key part of modern banking and stressed that banks need to ensure their efficiency and customer-oriented operation. A study by [23] examined the relationship between ATM service delivery, customer satisfaction, and loyalty in Bangladesh. Furthermore [47], studied how electronic services, including ATMs, influence customer satisfaction in Kenya. Customer satisfaction is also influenced by other factors such as attitude and perceived behavioral control, as seen in studies on halal food purchasing behavior [42]. Similarly, studies in Ethiopia [1, 47] have also proved the significant impact of ATM service quality on customer satisfaction. This gap highlights the necessity for optimizing ATM service quality to meet the changing needs of the customer base, and this applies to all financial institutions, including those that provide Islamic microfinance services as a tool for poverty reduction [44].

For these reasons, a comprehensive investigation of ATM service delivery and its impact on customer satisfaction is of paramount importance in the ethical and service-oriented framework of Islamic banking. Therefore, this study is conducted to identify the determinants of ATM service delivery and its influence on customer satisfaction in the case of the Bank of Abyssinia's Dire Dawa Interest-Free Branch.

## 2. Literature Review

### 2.1. Theoretical Review

#### 2.1.1. The Concept of ATM

An ATM typically consists of a Central Processing Unit (CPU) that controls the user interface and transaction devices; a magnetic or chip card reader for identifying the customer; a display used by the customer to perform transactions; function buttons, and a record printer that provides the customer with a transaction receipt [13]. Most ATMs are connected to inter-bank networks, allowing people to withdraw and deposit money from machines not belonging to their bank or even located in a different country. An Automated Teller Machine (ATM) is a modern computerized telecommunication electronic device that enables customers to conduct financial transactions generally outside normal banking hours without the need for a human clerk. To ensure security, safety, privacy, and accuracy, banking authorities provide their customers

with a plastic ATM card containing a magnetic strip and a Personal Identification Number (PIN) [3]. This innovation in banking aligns with the principles of providing accessible and trustworthy financial services, which is a core tenet of Islamic banking and its broader objective of contributing to Sustainable Development Goals (SDGs) [22]. ATMs offer 24-hour banking services to bank customers, such as cash withdrawal, funds transfer, balance inquiry, and bill payment. In the context of e-banking, ATM services play an important role in enhancing customer satisfaction by making banking transactions easier for customers. ATMs are placed not only near or inside bank premises but also in locations such as shopping centers/malls, airports, and restaurants. These represent two types of ATM installations: on-premises and off-premises. Financial institutions and independent sales organizations (ISOs) deploy off-premises machines when there is a straightforward cash need [5].

### 2.1.2. Purpose of ATM

In today's world, Automated Teller Machines (ATMs) have become an invaluable asset, widely regarded as one of the most beneficial services provided by the banking sector to all account holders. Their hallmark is round-the-clock availability, granting customers the liberty to access cash, within specified limits, at any hour of the day or night [37]. From a service perspective, ATM banking embodies a product rich in features and attributes designed to fulfill both stated and unstated customer needs. In Islamic finance, achieving customer satisfaction through these services is a matter of fulfilling the ethical duty of providing excellent and accessible service (*amanah*) and building trust with the community [45]. Achieving customer satisfaction hinges on these attributes, delivering a level of service quality that meets or exceeds customer expectations. Consequently, for banks to truly satisfy their clientele through ATM services, managers must possess a profound understanding of the specific features and attributes of ATM banking that contribute to superior service quality [36]. Beyond everyday banking, ATMs offer significant advantages, particularly for travelers. They negate the necessity of carrying large sums of cash, providing a secure and accessible means to obtain local currency [2]. Additionally, ATMs extend their utility by enabling users to manage and pay their bills [50].

### 2.1.3. Customer Satisfaction

Customer satisfaction, the dependent variable in this study, refers to the degree to which customers feel satisfied with their experience with ATM services. It is a multi-dimensional construction that can be influenced by various factors. [7, 14] examined customer satisfaction in the context of ATM services in Ethiopia. A comparative study of customer satisfaction in ATM services between public and private sector banks in India was conducted by [28]. The impact of service quality on customer satisfaction was also studied by [29]. Customer satisfaction in the context of ATM usage can be defined as a

customer's overall feeling of contentment or pleasure with the ATM transaction experience. The customer shapes this feeling by comparing their expectations of the service with their actual experience. If the experience meets or exceeds expectations, the customer is satisfied. Conversely, if the experience falls short, the customer is dissatisfied. This concept of satisfaction is a key measure of the bank's adherence to its ethical responsibilities within an Islamic framework.

### 2.1.4. Service Delivery

Service delivery is a multifaceted concept that essentially reflects how well a delivered service meets or exceeds customer expectations [53]. It is not merely about the outcome of a service but also encompasses the entire service experience, including the interactions, the environment, and the reliability of the provider [18]. In today's intensely competitive business landscape, service quality emerges as a crucial differentiator, significantly influencing customer relationships and nurturing loyalty [10]. Researchers have proposed several models and dimensions to understand and measure service quality. One of the most widely recognized frameworks is the SERVQUAL model, which identified five key dimensions, often remembered by the acronym RATER [40].

**Reliability:** This dimension concerns the ability to perform the promised service dependably and accurately. In banking, this translates to accurate transaction processing, keeping promises regarding service delivery timelines, and error-free account statements. Reliability is fundamental to building trust and long-term customer relationships [53, 10].

**Responsive:** This term involves the willingness of service providers to help customers and provide prompt service. In banking, the term could mean the speed at which customer queries are addressed, the promptness of loan approvals, and the readiness of staff to assist with issues. In today's fast-paced environment, responsiveness is crucial for customer satisfaction [30, 40].

**Tangibles:** The term refers to the physical appearance of facilities, equipment, personnel, and communication materials. For instance, in a banking context, such factors could include the cleanliness and aesthetics of the branch, the modernness of ATMs, and the professional appearance of staff. These tangible elements create a first impression and influence customer perceptions of service quality [53, 18].

**Empathy:** The term focuses on the caring, individualized attention provided to customers. In banking, the term means understanding customer needs, providing personalized service, and showing care and concern. Demonstrating empathy can significantly enhance customer loyalty and create a positive service experience [30, 53].

**Assurance:** This adjective relates to the knowledge and courtesy of employees and their ability to inspire trust and confidence.

### 2.1.5. Service Delivery and Customer Satisfaction

The foundation of this review lies in the well-established

link between service quality and customer satisfaction. [40] developed the SERVQUAL model, which identifies key dimensions of service quality, including reliability, responsiveness, assurance, tangibles, and empathy. While not specific to ATMs, this model provides a valuable framework for understanding how customers evaluate service quality in various contexts, including banking. Furthermore [17], applies this framework in the context of ATM services. Additionally, [38] explored the cognitive, effective, and attribute satisfaction bases, providing further theoretical grounding for understanding how service delivery dimensions influence customer satisfaction in the context of ATM usage.

### 2.1.6. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) explains how users come to accept and use technology. Developed by [9], TAM suggests that perceived usefulness and perceived ease of use are the two main factors that influence an individual's intention to use a technology. In the context of ATM services, TAM can help explain why some customers are more satisfied than others. For example, if customers perceive ATMs as simple to use and useful for their banking needs, they are more likely to be satisfied with ATM services. This is consistent with studies that have examined how factors such as attitude and perceived behavioral control influence consumer behavior, such as in the case of halal food purchasing among Indonesian Muslim millennials [42]. In similar way [4] highlights the importance of ease of use as one dimension of ATM service delivery.

### 2.1.7. Self-Service Technology (SST) and ATM Service

ATMs are a prime example of self-service technology (SST), which has become increasingly prevalent in the banking industry. A study by [24] highlights the importance of SST in retail banking, noting that the interface between humans and machines is crucial in today's technology-driven world. The adoption of SST, such as ATMs, aims to enhance efficiency, reduce costs, and improve customer convenience. This convenience, in turn, is a key driver of customer satisfaction. As technology advances, understanding how customers perceive and interact with SST becomes essential for optimizing service delivery. This is especially relevant in the context of Islamic finance, where technological solutions like ATMs can be leveraged as a tool for economic development and poverty reduction through initiatives such as Islamic microfinance services [44].

## 2.2. Empirical Review

### 2.2.1. Studies Outside Ethiopia

A substantial body of empirical research conducted across the globe confirms the significant and positive impact of ATM service delivery on customer satisfaction. Initial studies set the stage by showing the important connection between

ATM service quality and customer satisfaction, as seen in the research by [23] in Bangladesh. This connection is paramount, as a bank's ability to provide reliable services is a fundamental component of building trust (amanah) with its clientele, a core principle in both conventional and Islamic finance [53]. Building upon this, subsequent studies have delved into the nuances of service quality, seeking to pinpoint the specific dimensions that most powerfully influence how customers evaluate their ATM experiences. For instance, [4], also in Bangladesh, identified a comprehensive set of eight key dimensions of ATM service quality and empirically demonstrated their strong correlation with overall client satisfaction. In a different geographical focus, [28] research in India illuminated the specific factors that customers prioritize when assessing the quality of ATM services.

The consistent relationship between ATM service quality and customer satisfaction has been observed and analyzed across a diverse range of geographical contexts, underscoring its universal relevance in the banking industry. Studies conducted in Rwanda, Nigeria, Kenya, and Brunei Darussalam all contribute to this global consensus [35, 11, 48, 6]. More recent empirical investigations reinforce these earlier findings. For instance, [26] not only reaffirmed the positive impact of ATM service quality on customer satisfaction in Bangladesh but also extended the analysis to demonstrate its positive influence on a bank's overall brand image. This positive brand image is crucial for all financial institutions, especially those operating under an ethical framework such as Islamic banking, where public perception is closely tied to the institution's commitment to social responsibility and its contribution to global goals, such as the Sustainable Development Goals (SDGs) [22]. A related study in Indonesia found that general risk significantly influences consumer trust, which in turn affects satisfaction and the intention to recommend a product or service, demonstrating that the principles of risk management, trust, and satisfaction are fundamental to customer relationships across various sectors, including the halal food industry [41]. This collective body of international research firmly establishes the critical role of ATM service quality in shaping customer perceptions and fostering positive outcomes for financial institutions worldwide.

### 2.2.2. Studies Inside Ethiopia

A concentrated body of research conducted within Ethiopia offers valuable, context-specific insights into the intricate relationship between ATM service delivery and customer satisfaction. It has been established that several key dimensions of ATM service quality significantly contribute to customer satisfaction within the Ethiopian banking context [10]. This is also significant in the context of the rise of Islamic finance in Ethiopia, where technological advancements and accessible services are seen as a tool for economic development and poverty reduction [44]. Building upon this foundational research, [34] used careful number-based methods to study Ethiopian commercial banks in

the Afar region and clearly showed that better ATM service quality leads to higher customer satisfaction. Providing a localized perspective, [14] specifically examined the factors influencing customer satisfaction with ATM services within the Commercial Bank of Ethiopia in Addis Ababa. Similarly, [48] delved into the impact of specific ATM service quality dimensions on customer satisfaction within Awash Bank branches, also located in Addis Ababa. This understanding was further contributed to by a study that explored the determinants of customer satisfaction with ATM services at United Bank S. C. [29]. The efficiency of ATM services can also have a direct impact on broader business operations, as highlighted by a study on bank regulations and firm performance in Ethiopian commercial banks [52]. Finally, [1] expanded the topic by looking into what influences how ATM services are set up in Ethiopian commercial banks, providing a better understanding of the strategic issues related to ATM networks in the country. Collectively, these studies conducted within Ethiopia consistently underscore the critical role of ATM service quality in shaping customer satisfaction within the country's banking sector, providing valuable, localized evidence and insights.

## 2.3. Research Gap

While the existing body of research, both globally and within Ethiopia, has extensively explored the relationship between ATM service delivery and customer satisfaction, several significant gaps remain, which this study is specifically designed to address. The introduction highlights that despite the strategic importance of ATMs and increasing investment in this technology, persistent operational challenges such as service disruptions, network problems, and frequent breakdowns continue to negatively impact customer experience [7]. This indicates a broader issue that existing studies have not fully resolved.

Firstly, although studies in Ethiopia, such as those by [1, 34, 47], acknowledge the importance of ATM service delivery, there is a distinct lack of research focused on the specific determinants of ATM service quality and their impact on customer satisfaction within the unique operational context of a single location, such as the Bank of Abyssinia's Dire Dawa Interest-Free Branches. The local situation, shaped by its specific geographical context and customer base, may present unique challenges and service needs that are not captured by broader national or regional studies.

Secondly, while previous Ethiopian studies have examined the influence of ATM service delivery on customer satisfaction, a comprehensive investigation that applies all five dimensions of the SERVQUAL model assurance, tangibility, empathy, reliability, and responsiveness is needed for this specific branch. Many existing studies may focus on only a subset of these dimensions or generalize findings from the broader banking sector, potentially overlooking the nuanced and relative impact of each

SERVQUAL dimension on customer satisfaction at this particular location.

Finally, bridging the issues highlighted in the problem statement such as system failures and network issues with a detailed analysis of how they directly translate into customer dissatisfaction remains a critical research gap. This study aims to provide a more granular understanding of the relationship between these practical, on-the-ground issues and customer perceptions of service delivery at the Bank of Abyssinia's Dire Dawa Interest-Free Branch, thereby offering actionable insights for the bank's management to improve service quality and align with the broader ethical framework of Islamic banking. In essence, this research aims to provide a focused and comprehensive analysis that addresses the limitations of broader studies, contributing valuable, localized knowledge to the existing body of literature.

## 2.4. Hypothesis Development

### 2.4.1. ATM Service Reliability and Customer Satisfaction

ATM service reliability is a cornerstone of service delivery, referring to the ability of automated teller machines to perform the promised service dependably and accurately on a consistent basis [40]. The term encompasses the dependable availability of cash, error-free transaction processing, consistent hardware and software functionality, and the reliable generation of transaction records [26]. When ATMs operate reliably, customers gain trust in their ability to handle financial transactions smoothly, which is a fundamental requirement in Islamic banking where transactions must be free from uncertainty (*gharar*) and deceit. This reliability minimizes inconvenience and fosters confidence in the bank [53]. Across various service industries, reliability is a cornerstone of customer satisfaction. In the context of ATMs, customers expect them to function without frequent interruptions, execute transactions accurately, and have sufficient cash available. Conversely, issues like downtime, inaccurate transactions, and lack of cash significantly diminish customer satisfaction.

Empirical studies consistently highlight reliability as a key determinant of ATM service delivery. Research in Ethiopia shows that reliability is very important for how customers view ATM services [10, 49, 34]. Similarly, studies on self-service banking technology show similar results [24]. The importance of ATM reliability is also confirmed by findings in Bangladesh, Rwanda, and Pakistan [4, 35, 8]. Even research focusing on other aspects like efficiency, security, and responsiveness implicitly highlights the necessity of underlying reliability for these factors to be effective in satisfying customers [28].

*H1: ATM service reliability positively affects customer satisfaction for Interest-Free Banking customers at the Dire Dawa Branch.*

### 2.4.2. ATM Service Responsiveness and Customer Satisfaction

ATM service responsiveness is a critical factor in shaping customer satisfaction, encompassing the bank's ability and willingness to promptly address customer inquiries, resolve problems, and provide efficient service [53]. This includes the speed and effectiveness of handling ATM malfunctions, delivering new cards, and addressing complaints. This commitment to meeting customer needs in a timely and effective manner is a key tenet of Islamic finance, as it builds trust and demonstrates a service-oriented approach. This ethical framework also ensures that the bank's responsiveness is transparent and fair, aligning with the principles of avoiding excessive uncertainty (*gharar*) and upholding justice (*'adl*) [39].

Studies consistently indicate that when banks demonstrate high levels of responsiveness, customers are more satisfied [40]. For instance, research on self-service technology in retail banking highlights responsiveness as a significant factor influencing customer satisfaction [24]. Similarly, a study by [10] on ATMs in Hawassa, Ethiopia, found that a bank's willingness to provide prompt service positively impacts customer satisfaction. The importance of responsiveness as a key element of overall service delivery is also underscored in research on Nigerian banks [11]. In their study on private banking in Bangladesh, [23] found responsiveness to be a crucial aspect of ATM service delivery affecting customer satisfaction and loyalty. Research in India implicitly suggests that a lack of responsiveness contributes to lower satisfaction levels [28]. Another study conducted by [46] further supports the link between how quickly and effectively banks address ATM-related issues and customer contentment.

*H2: ATM service responsiveness positively affects customer satisfaction for Interest-Free Banking customers at the Dire Dawa Branch.*

### 2.4.3. ATM Service Tangibility and Customer Satisfaction

In the context of Islamic banking, ATM service tangibility goes beyond a simple physical presence; it reflects a commitment to Islamic principles of purity, cleanliness, and professionalism. Tangibility refers to the physical elements of a service that customers can perceive through their senses, such as the ATM itself, the surrounding environment, and any related materials [40]. The professionalism and appearance of staff, as well as the cleanliness, lighting, and aesthetic appeal of the ATM area, contribute to this perception. Positive perceptions of tangibility create a sense of trust, security, and comfort that align with the ethical values of Islamic finance. Conversely, negative perceptions can lead to dissatisfaction and cause customers to seek alternative, Sharia-compliant service providers.

Studies have consistently shown that when customers perceive the tangible elements of a service positively, their overall satisfaction is significantly influenced. Research fo-

cusing on the visual appeal of ATMs and their surroundings demonstrates that these tangible cues play a crucial role in shaping customer attitudes and feelings about the service experience. The importance of tangibility on customer satisfaction, particularly in the context of ATM services, has been examined in studies across various contexts. This research underscores the importance of maintaining and enhancing the physical aspects of service delivery to create a favorable customer experience [7, 29, 47].

*H3: ATM service tangibility positively affects customer satisfaction for Interest-Free Banking customers at the Dire Dawa Branch.*

### 2.4.4. ATM Service Empathy and Customer Satisfaction

In the context of Islamic banking, ATM service empathy, a crucial aspect of customer interaction, embodies the bank's capacity to understand and address the unique needs and perspectives of ATM users. It moves beyond mere functionality to demonstrate care, individualized attention, and anticipation of potential challenges [18, 53]. This empathetic approach manifests in an intuitive interface design, proactive issue resolution through on-screen guidance and accessible support, and a commitment to ensuring safe and consistently operational environments, transparent communication, and fair complaint resolution. These elements are particularly important as they align with the Islamic principles of trust, transparency, and fairness.

Empirically, while "empathy" in ATM service isn't always explicitly measured, its influence on customer satisfaction is evident in studies focusing on related service quality dimensions. For example, [24] identified responsiveness conceptually linked to empathy through its focus on understanding and promptly addressing customer needs as a key driver of customer satisfaction. Significant dimensions such as fulfillment, ease of use, and security and privacy were also highlighted by [8]; efficient, user-friendly, and secure ATMs demonstrate an implicit understanding of customer needs, which in turn leads to higher satisfaction. The significant impact of overall service quality, including elements akin to empathy, is further supported by studies [17, 25]. Consequently, it can be inferred that ATM service quality dimensions that reflect an understanding of customer needs and a commitment to a positive experience (i.e., empathy) positively influence customer satisfaction.

*H4: ATM service empathy positively affects customer satisfaction for Interest-Free Banking customers at the Dire Dawa Branch.*

### 2.4.5. ATM Service Assurance and Customer Satisfaction

ATM service assurance, within the Islamic banking context, refers to the financial institution's ability to convey trust and confidence in the reliability, security, and competence of its

automated teller machine services [40]. Fundamentally, this assurance is rooted in the bank's strict adherence to Sharia compliance, which ensures all transactions are free from prohibited elements such as interest (*riba*), excessive uncertainty (*gharar*), and gambling (*maisir*). This dual commitment to both operational reliability and religious principles is crucial for building customer satisfaction.

The continuous availability of cash, the quality of notes, and the completeness of transactions are essential factors in providing this assurance. A lack of these elements can lead to customer dissatisfaction. Tangible aspects of ATM assurance include well-maintained and functioning machines, clear and professional signage, and a secure environment [26]. Intangibly, assurance is conveyed through the perceived reliability of the ATM in processing transactions accurately and consistently, the protection of customer data and privacy during transactions, and the availability of knowledgeable and courteous staff who can instill confidence and trust [3].

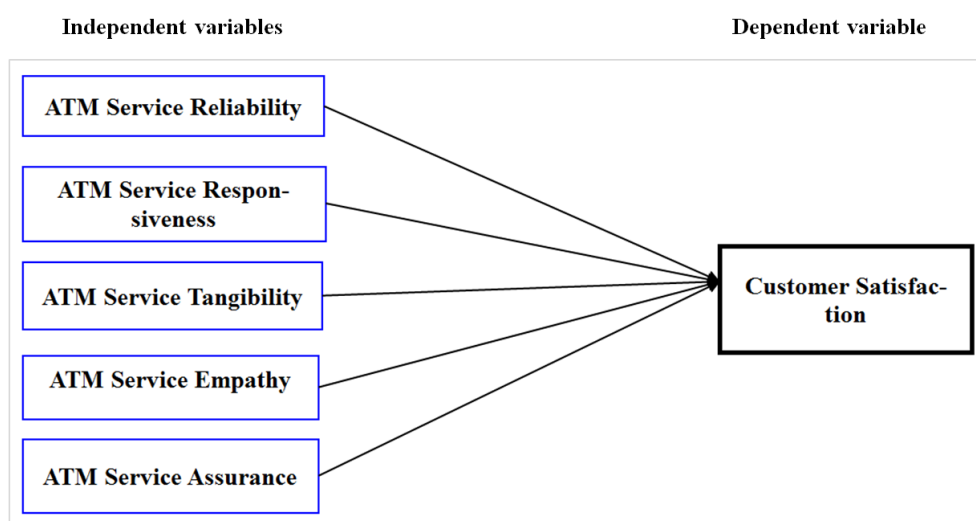
Studies have explored the impact of ATM service quality dimensions like credibility, completeness, and security on customer satisfaction [46]. The idea that ATM service quality significantly contributes to customer satisfaction is also supported by research that encompasses factors like reliability,

convenience, and security [10]. Additionally, [32] emphasizes the importance of ATM banking as a key channel for delivering banking products and services, further highlighting the link between ATM service and customer satisfaction.

*H5: ATM Service assurance positively affects customer satisfaction for Interest-Free Banking customers at the Dire Dawa Branch.*

## 2.5. Conceptual Framework

The conceptual framework for this study is built upon the SERVQUAL model, with the aim of exploring how ATM service delivery factors affect customer satisfaction. This study specifically focuses on the Bank of Abyssinia's Dire Dawa Interest-Free banking windows and uses the five key dimensions of the SERVQUAL model: reliability, responsiveness, tangibility, empathy, and assurance. This framework is adapted to the context of Interest-Free Banking. The following diagram illustrates the conceptual framework of the study, showing how these independent variables are expected to influence the dependent variable, customer satisfaction. Hence the next diagram illustrates the conceptual framework of the study.



Source: Authors' Own.

**Figure 1.** Conceptual framework.

## 3. Material and Methods

The study primarily employed a robust quantitative methodology to investigate the effect of ATM service delivery on customer satisfaction for Interest-Free Banking customers at Bank of Abyssinia's Dire Dawa Branch. This approach utilized a descriptive and explanatory research design to identify associations and clarify cause-and-effect relationships between variables. The descriptive component aimed to provide

a comprehensive overview of the current state of ATM service quality and customer satisfaction at the Dire Dawa Branch, while the explanatory component sought to delve deeper, exploring how changes in the independent variables (ATM service delivery quality) could impact the dependent variable (customer satisfaction).

From a total population of 5,122 customers at the Dire Dawa Abyssinia Bank Branch, the study's target population was the 3,265 Muslim customers. A representative sample size of 356 was determined using [51] formula for a known population, ensuring a 95% confidence level. Due to the study's specific

focus, a two-stage purposive sampling technique was employed. This method involved first classifying customers as Muslim or non-Muslim. From the Muslim clients, researchers then intentionally selected only those who were active ATM users to participate in the study, distributing questionnaires until the required sample size of 356 was reached. This approach was chosen to ensure the data collected was directly representative of the target population for this study.

Data collection was facilitated through structured, self-administered questionnaires, meticulously designed by adapting items from previous studies. A five-point Likert scale was incorporated for both dependent and independent variables to capture nuanced responses. To ensure the content validity of the questionnaire, a pilot study was conducted with 30 respondents, leading to essential wording adjustments and alignment with the study's objectives. Furthermore, the reliability for internal consistency was rigorously examined using Cronbach's alpha, with all variables successfully surpassing the acceptable threshold of 0.7. The data collected were then analyzed using the Statistical Package for Social Science (SPSS) Version 26.0. Both descriptive statistics (frequency, mean, standard deviation) and a Multiple Linear Regression Model were employed to comprehensively examine how independent variables, such as ATM reliability, network stability, and ease of use, influence the dependent variable of customer satisfaction.

To make the study's goal come true, a linear regression model will be created and tested. This model will look at how incentives, organizational culture, the working environment for employees, employee recognition, and job security affect organizational performance. In this regard, the following model will be developed:

$$Y = \alpha + \beta^1 X^1 + \beta^2 X^2 + \beta^3 X^3 + \beta^4 X^4 + \beta^5 X^5 + \mu_i$$

Where,

Y = dependent variable (customer satisfaction)

$\alpha$  = constant

$\beta^i$  = Independent variable coefficient

$X_i$  = Independent variable

$\mu_i$  = Error terms

$X^1$  = Service Reliability

$X^2$  = Service Responsiveness

$X^3$  = Service Tangibility

$X^4$  = Service Empathy

$X^5$  = Service Assurance

## 4. Result and Analysis

### 4.1. Reliability Statistics

Reliability is a measure of the consistency of a research instrument. This study established the reliability of its questionnaire by employing Cronbach's alpha, with results calculated using SPSS 26. The questions for each variable were

designed to consistently assess their intended concepts. According to [49], an acceptable Cronbach's alpha level typically ranges from 0.70 to 0.95. The alpha values for all five variables, ATM service reliability, responsiveness, tangibility, empathy, and assurance, were found to be between 0.732 and 0.877. These results, presented in table 1 below, demonstrate that the questionnaire used to measure customer satisfaction among Interest Free Banking customers at the Bank of Abyssinia's Dire Dawa Branch is reliable.

**Table 1.** Reliability Test (Cronbach's Alpha).

| Variables             | Number of items | Cronbach's Alpha |
|-----------------------|-----------------|------------------|
| Reliability           | 5               | 0.783            |
| Responsiveness        | 5               | 0.771            |
| Tangibility           | 5               | 0.877            |
| Empathy               | 5               | 0.732            |
| Assurance             | 5               | 0.831            |
| Customer Satisfaction | 5               | 0.750            |

Source: Authors' Own.

### 4.2. Demographic Results and Descriptive Statistics

This section presents the quantitative analysis of the survey responses. To mitigate potential non-response bias, a total of 356 structured questionnaires were distributed to the selected sample. The researcher's maximum effort in the data collection process resulted in a high response rate of 89.3%, which yielded 318 usable questionnaires after removing 38 non-returned or incomplete submissions. According to [31], the response rate of 50% is adequate, 60% is good, and 90% and above is considered excellent for analysis and reporting. Therefore, the high response rate achieved in this study falls within the good to excellent range and provides a highly representative sample suitable for robust statistical analysis. This section is divided into two parts: respondent demographics and a presentation of the survey results.

#### 4.2.1. Respondent's Demographic Socio-economic Characteristics

This foundational section aims to establish a clear understanding of the sample's composition and its context within the study on Interest-Free Banking (IFB) customers. The questionnaire commenced with a section on demographic characteristics to profile the respondents' socio-economic backgrounds.

The sample's gender distribution revealed a notable male

majority, with 196 (61.6%) males compared to 122 (38.4%) females. Analyzing the age of the respondents, the findings indicate a strong concentration of participants in the young to middle-aged categories, as a significant 75.2% of the sample fell within the 18 to 40-year age bracket. The most substantial group of participants was aged 31 to 40 years, comprising 124 individuals (39%). This demographic profile is crucial as it underscores the prominent role of these age cohorts in shaping the study's findings on digital service quality.

Concerning educational status, the data showed that a significant majority of the respondents, 74.9%, had attained a diploma or higher, implying that the insights gathered are

largely from individuals with post-secondary education. Most respondents indicated having a savings account with the Bank of Abyssinia, a category that encompassed 240 individuals (75.5%). This finding highlights the prevalence of savings accounts among the customer base surveyed. Lastly, the frequency with which customers utilize the bank's services revealed that the most active segment interacts with the bank on a daily basis, comprising 134 respondents (42.1%). This pattern indicates that a considerable portion of the study participants are regular and frequent users, suggesting their experiences and perceptions are well-formed and based on consistent interaction with the bank's services.

**Table 2.** Demographic and Socio-economic Characteristics of Respondents.

| Features                    | Category       | Frequency | Percent |
|-----------------------------|----------------|-----------|---------|
| Gender                      | Male           | 196       | 61.6    |
|                             | Female         | 122       | 38.4    |
|                             | Total          | 318       | 100     |
| Age                         | 18- 30         | 115       | 36.2    |
|                             | 31-40          | 124       | 39      |
|                             | 41-50          | 56        | 17.6    |
|                             | Above 50       | 23        | 7.2     |
|                             | Total          | 318       | 100     |
| Educational Status          | Below grade 12 | 80        | 25.1    |
|                             | Diploma        | 123       | 38.7    |
|                             | Degree         | 101       | 31.8    |
|                             | MSc and above  | 14        | 4.4     |
|                             | Total          | 318       | 100     |
| Account Type                | Current        | 61        | 19.2    |
|                             | Saving         | 240       | 75.5    |
|                             | Others         | 17        | 5.3     |
|                             | Total          | 318       | 100     |
| Frequency of using the Bank | Daily          | 134       | 42.1    |
|                             | Twice a week   | 65        | 20.5    |
|                             | Weekly         | 70        | 22      |
|                             | Monthly        | 49        | 15.4    |
|                             | Total          | 318       | 100     |

Source: Authors' Own.

#### 4.2.2. Descriptive Statistics

Table 3 presents a descriptive overview of several key

service delivery dimensions and customer satisfaction, utilizing mean scores and standard deviations derived from a five-point scale administered to 318 respondents. The interpretation of these scores is facilitated by categorizing them

into low (below 2), moderate (2 to below 3), and high (3 and above) perception levels [43].

Examining the variable of Reliability, its mean signifies a high level of perceived service dependability and accuracy, with a standard deviation indicating a moderate consistency in responses. Similarly, respondents perceive Responsiveness as high, with a high mean and a standard deviation reflecting a consistent positive view. Tangibility stands out with a moderate mean, placing it in the moderate perception category, and its higher standard deviation reveals the most diverse range of opinions among the assessed service delivery dimensions. Empathy registers the highest perception level with

a high mean, and its standard deviation suggests a relatively consistent positive view. Assurance is also perceived as high, with a high mean and a standard deviation reflecting consistency. Finally, Customer Satisfaction registers a high overall level of satisfaction, with a standard deviation reflecting a moderate spread in responses. Overall, the data shows that most respondents have a positive view of the service delivery aspects, with tangibility being the only area seen as average and having the most varied responses. Furthermore, the overall level of customer satisfaction is also high among the respondents.

**Table 3.** Descriptive statistics.

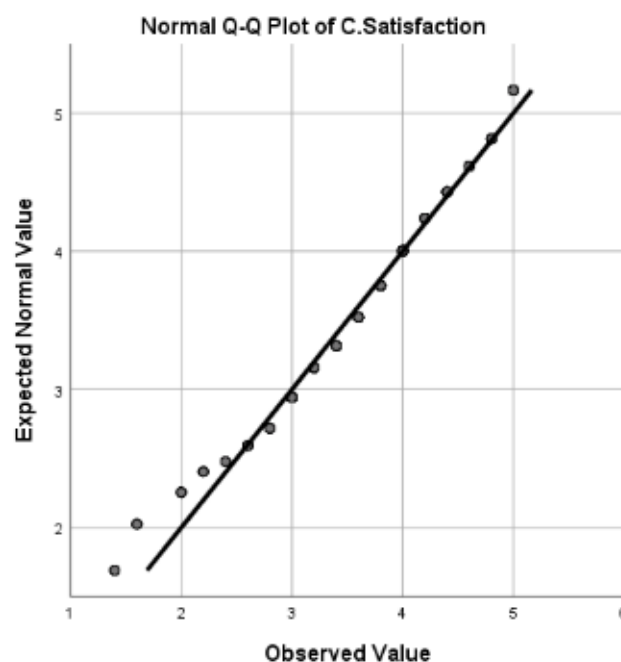
| Variables             | N   | Mean   | Std. Deviation |
|-----------------------|-----|--------|----------------|
| Reliability           | 318 | 3.50   | .852           |
| Responsiveness        | 318 | 3.49   | .827           |
| Tangibility           | 318 | 2.91   | .987           |
| Empathy               | 318 | 3.81   | .772           |
| Assurance             | 318 | 3.70   | .833           |
| Customer Satisfaction | 318 | 3.5824 | .764           |

Source: Authors' Own.

### 4.3. Test for the Linear Regression Model Assumption

#### 4.3.1. Linearity

According to [20], the linearity test for the connection between variables is conducted using the correlation method. This relationship can be visually represented using a scatter plot, where pairs of values for two metric variables are mapped as individual points, with the aim of identifying a straight-line trend in the plotted data. [15] explains that homoscedasticity means the amount of error is the same no matter the level of the predictor variables. In simple terms, when looking at a dependent variable, homoscedasticity means that the spread of variance is the same across all levels of the predictor variables, which can be considered a cloud of dots on a scatter plot. On the other hand, non-homoscedasticity is usually considered a funnel shape, which shows that the error variance goes up (or down) in a regular way as the dependent variable changes. Figure 2 below illustrates the study's linearity results. This pattern suggests that the distribution of customer satisfaction is approximately normal.



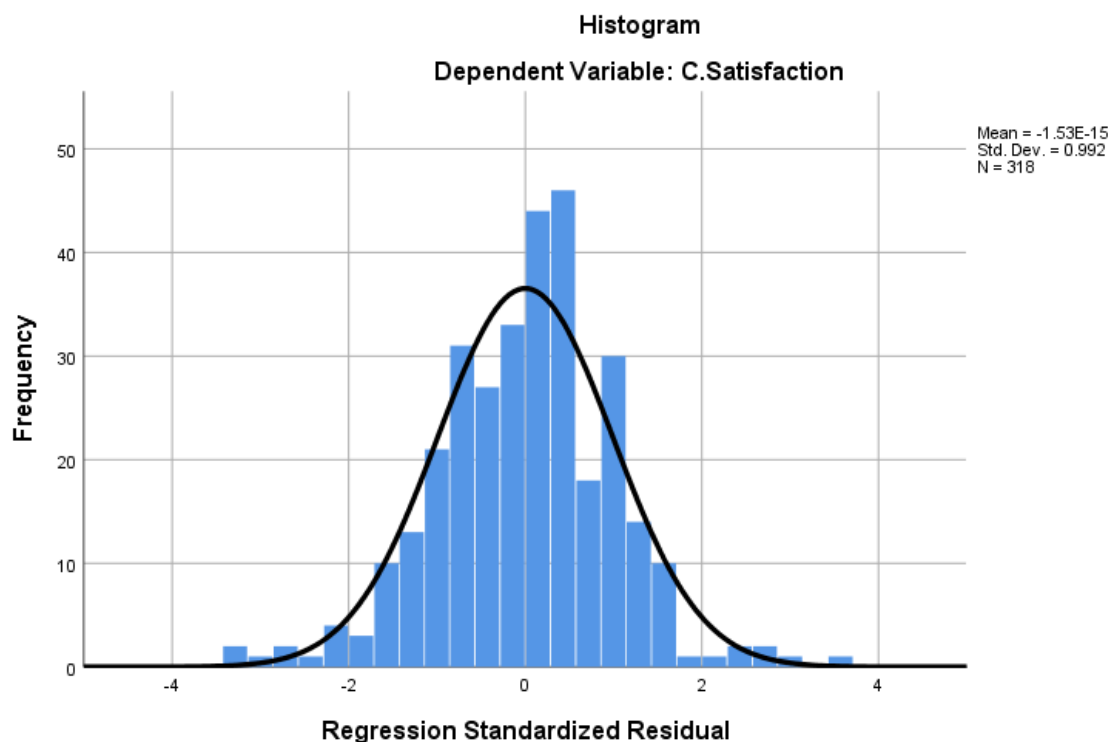
Source: Authors' Own.

**Figure 2.** Linearity.

### 4.3.2. Normality

The histogram shows how the regression standardized residuals for customer satisfaction are spread out, along with a normal distribution curve. This visual assessment helps in

evaluating whether the residuals are approximately normally distributed, a key assumption for many linear regression analyses [19]. Therefore, Figure 3 presents a histogram suggesting approximately normally distributed residuals.



Source: Authors' Own.

Figure 3. Histogram.

### 4.3.3. Multicollinearity

#### (i). Variance Inflation Factor (VIF)

According to [20], multicollinearity occurs when one variable exhibits a strong relationship with another. The more pronounced this inter-correlation, the more challenging it becomes to understand the individual impact of each variable in an analysis. Their close association makes it difficult to isolate the specific effect of any single predictor. In multiple regression analysis, a general rule is that multicollinearity isn't a big issue if the tolerance value for each variable is over 0.10 and the Variance Inflation Factor (VIF) is under 10. Additionally, if two variables have a high correlation coefficient ( $r$ ) above 0.8, it can be a warning sign of multicollinearity. The following Table 4 presents the results of the multicollinearity test. The researcher examined the Variance Inflation Factor (VIF), and Table 4 shows that all VIF values ranged from 1.046 to 1.824. Because these values are all lower than the generally accepted cutoff of 5 [21], it can be concluded that multicollinearity did not significantly affect this analysis.

Table 4. Multicollinearity test.

| Model          | Collinearity Statistic |       |
|----------------|------------------------|-------|
|                | Tolerance              | VIF   |
| Constant       |                        |       |
| Reliability    | .552                   | 1.810 |
| Responsiveness | .548                   | 1.824 |
| Tangibility    | .654                   | 1.530 |
| Empathy        | .956                   | 1.046 |
| Assurance      | .550                   | 1.818 |

Source: Authors' Own.

#### (ii). Correlation Matrix

Correlation may be expressed as the degree of relationship present between two or more variables [26]. The linear corre-

lation coefficient ( $r$ ) is a measure of the degree of co-variability of the variables. The strength and the direction of a linear relationship between the two variables (dependent and independent) are measured by the linear correlation coefficient ( $r$ ). The values that the correlation coefficient may assume vary from -1 to +1. There is a positive correlation between the variables when  $r$  is positive.  $r=+1$  implies that there is a perfect positive correlation between variables. When  $r$  is negative, there exists a negative correlation between the variables.  $r=-1$  implies that there is a perfect negative correlation between variables. When  $r$  is zero, there is no correlation between the variables. The following table 5, presents the Pearson correlation matrix.

The Pearson correlation analysis reveals significant positive relationships between several factors and Customer Satisfaction within the study's sample of 318 participants. All correlations are statistically significant at the 0.01 level ( $p<0.01$ ), indicating a low probability of these relationships occurring by chance. Notably, Reliability demonstrates the strongest positive correlation with Customer Satisfaction

( $r=.658$ ), suggesting a strong association between higher service reliability and better customer outcomes. Responsiveness ( $r=.648$ ) and Tangibility ( $r=.617$ ) also exhibit strong positive correlations with Customer Satisfaction, implying that increased responsiveness and tangible features are significantly linked to improved customer satisfaction. Assurance ( $r=.594$ ) shows a moderate-to-strong positive correlation, indicating that a feeling of security is also significantly associated with better Customer Satisfaction. Empathy ( $r=.227$ ) shows a weak but significant positive correlation.

Furthermore, the analysis reveals intercorrelations among the independent variables themselves, suggesting that these factors are interrelated to varying degrees. For instance, Responsiveness and Tangibility show a strong positive correlation ( $r=.554$ ). In conclusion, the findings strongly suggest that improvements in Reliability, Responsiveness, Tangibility, Assurance, and Empathy are all associated with enhanced Customer Satisfaction within this specific context. However, it is crucial to remember that correlation does not establish causation.

**Table 5.** Pearson Correlation.

| Correlations    |                     | Reliability | Responsiveness | Tangibility | Empathy | Assurance | C. Satisfaction |
|-----------------|---------------------|-------------|----------------|-------------|---------|-----------|-----------------|
| Reliability     | Pearson Correlation | 1           | .539**         | .427**      | .169**  | .616**    | .658**          |
|                 | Sig. (2-tailed)     |             | .000           | .000        | .003    | .000      | .000            |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |
| Responsiveness  | Pearson Correlation | .539**      | 1              | .554**      | .170**  | .539**    | .648**          |
|                 | Sig. (2-tailed)     | .000        |                | .000        | .002    | .000      | .000            |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |
| Tangibility     | Pearson Correlation | .427**      | .554**         | 1           | .175**  | .440**    | .617**          |
|                 | Sig. (2-tailed)     | .000        | .000           |             | .002    | .000      | .000            |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |
| Empathy         | Pearson Correlation | .169**      | .170**         | .175**      | 1       | .152**    | .227**          |
|                 | Sig. (2-tailed)     | .003        | .002           | .002        |         | .007      | .000            |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |
| Assurance       | Pearson Correlation | .616**      | .539**         | .440**      | .152**  | 1         | .594**          |
|                 | Sig. (2-tailed)     | .000        | .000           | .000        | .007    |           | .000            |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |
| C. Satisfaction | Pearson Correlation | .658**      | .648**         | .617**      | .227**  | .594**    | 1               |
|                 | Sig. (2-tailed)     | .000        | .000           | .000        | .000    | .000      |                 |
|                 | N                   | 318         | 318            | 318         | 318     | 318       | 318             |

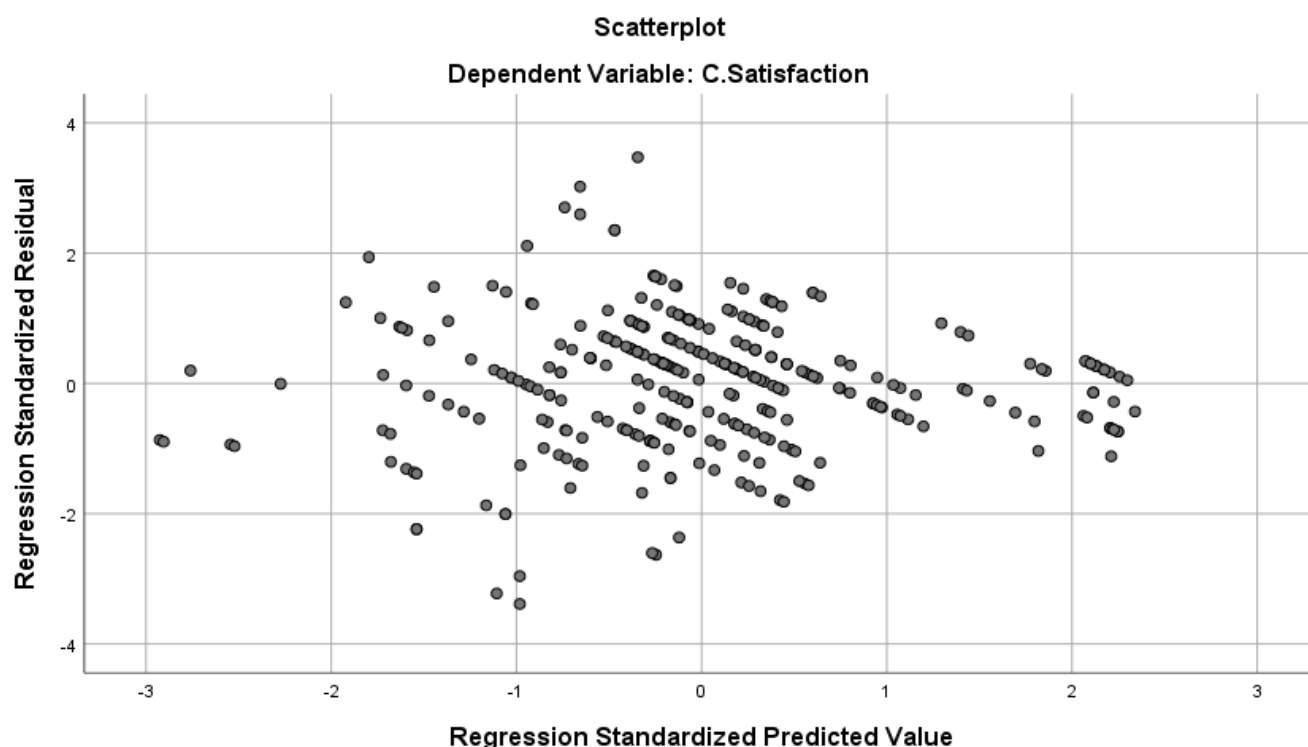
\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: Authors' Own.

#### 4.3.4. Homoscedasticity

Homoscedasticity means that the amount of "noise" or random error in our regression model is consistent across all predicted values of our dependent variable, Customer satisfaction. Figure 4 (the scatterplot) allows us to visually check this assumption. If the spread of the points (representing the errors) is roughly the same across the entire range of predicted values, then homoscedasticity is likely present. In Figure 4, the points appear randomly scattered without forming a dis-

tinct pattern like a funnel or a widening/narrowing band. This evidence suggests that the error variance is relatively constant across the predicted values of organizational performance. So, looking at Figure 4, it appears that the assumption of homoscedasticity is satisfied, which means our regression analysis is likely reliable [12, 16]. If homoscedasticity is violated (heteroscedasticity), meaning the error variance changes with different predicted values, it can impact how accurate our predictions are and how valid our statistical tests are.



Source: Authors' Own.

**Figure 4.** Homoscedasticity.

The researcher developed the following linear regression using the variables considered in the model.

$$CS = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \mu$$

The R-squared value shows how well the regression model accounts for changes in the dependent variable, while the beta coefficient indicates each variable's level of influence on the dependent variable, which can be either positive or negative. The P-value indicates the probability that the observed results are due to chance.

As shown in Table 6, the adjusted R-squared value of 62.4%

means that the independent variables, which are the ATM service quality dimensions of reliability, responsiveness, tangibility, empathy, and assurance, together explain 62.4% of the customer satisfaction among Interest-Free Banking (IFB) customers. The remaining 37.6% of customer satisfaction is influenced by other variables not included in the model.

Table 7 shows that the regression model is statistically significant, with a p-value less than 0.05. This finding indicates that the model significantly predicts the dependent variable, providing a satisfactory fit for the data.

**Table 6.** Model summary.

| Model Summary |                   |          |                   |                            |
|---------------|-------------------|----------|-------------------|----------------------------|
| Model         | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1             | .794 <sup>a</sup> | .630     | .624              | .46849                     |

a. Predictors: (Constant), Reliability, Responsiveness, Tangibility, Empathy, Assurance

b. Dependent Variable: Customer Satisfaction

Source: Authors' Own.

**Table 7.** ANOVA test.

| ANOVA <sup>a</sup> |            |                |     |             |         |                   |
|--------------------|------------|----------------|-----|-------------|---------|-------------------|
| Model              |            | Sum of Squares | df  | Mean Square | F       | Sig.              |
| 1                  | Regression | 116.702        | 5   | 23.340      | 106.341 | .000 <sup>b</sup> |
|                    | Residual   | 68.479         | 312 | .219        |         |                   |
|                    | Total      | 185.181        | 317 |             |         |                   |

a. Dependent Variable: Customer Performance

a. Predictors: (Constant), Reliability, Responsiveness, Tangibility, Empathy, Assurance

Source: Authors' Own.

**Table 8** presents the results of the model predicting performance using the variables of reliability, responsiveness, tangibility, empathy, and assurance. All of these variables were found to have a positive and significant effect on the outcome at a 95% confidence level. The unstandardized coefficient (beta value) for each variable indicates its degree of importance in influencing the dependent variable.

**Table 8.** Regression result.

| Coefficients |                |                             |            |                           |       |      |
|--------------|----------------|-----------------------------|------------|---------------------------|-------|------|
| Model        |                | Unstandardized Coefficients |            | Standardized Coefficients | T     | Sig. |
|              |                | B                           | Std. Error | Beta                      |       |      |
| 1            | (Constant)     | .484                        | .173       |                           | 2.804 | .005 |
|              | Reliability    | .282                        | .042       | .314                      | 6.784 | .000 |
|              | Responsiveness | .220                        | .043       | .238                      | 5.109 | .000 |
|              | Tangibility    | .216                        | .033       | .278                      | 6.537 | .000 |
|              | Empathy        | .063                        | .035       | .064                      | 1.807 | .072 |
|              | Assurance      | .129                        | .043       | .140                      | 3.024 | .003 |

a. Dependent Variable: Customer Satisfaction

Source: Authors' Own.

Regression Model Equation results are presented as follows.

$$\text{Customer Satisfaction} = 0.484 + 0.282 \text{ Reliability} + 0.220 \text{ Responsiveness} + 0.216 \text{ Tangibility} + 0.063 \text{ Empathy} + 0.129 \text{ Assurance} + \mu$$

## 4.4. Discussion

### 4.4.1. ATM Service Reliability and IFB Customer Satisfaction

ATM service reliability, a fundamental aspect of service delivery, refers to the extent to which automated teller machines consistently deliver their promised services dependably and accurately [40]. The term encompasses the dependable availability of cash, error-free transaction processing, and the consistent functionality of hardware and software [26]. For IFB customers, this reliability is crucial as it builds customer trust (*amanah*) and ensures transactions are free from excessive uncertainty (*gharar*), a key principle of Islamic finance. This dependability minimizes inconvenience and fosters confidence in the bank [53].

The findings of this study, presented in Table 8, demonstrate a substantial positive and significant impact of ATM service reliability on customer satisfaction ( $\beta = 0.282$ ,  $p < 0.001$ ). A 1% increase in perceived ATM service reliability is expected to increase customer satisfaction by a notable 28.2%. For instance, studies conducted within Ethiopia consistently underscore the importance of reliability. [10] established that several key dimensions of ATM service quality, including reliability, significantly contribute to customer satisfaction within the Ethiopian banking context. Likewise, [49, 34] confirmed that reliability is very important for how customers view ATM services in the country.

This finding also resonates with international research. The crucial role of reliability in shaping customer satisfaction in their study in Rwanda [35]. Similarly, [8], in their research in Pakistan, also found that reliability plays a key role. [4], in a study on banks in Bangladesh, found that ATM service quality, including reliability, directly influences client satisfaction. This link is also reinforced by [23], who found that reliable ATM performance is intrinsically linked to higher customer satisfaction and loyalty. Similarly, [26] highlighted that reliability is a core aspect of ATM service quality that drives positive perceptions and enhances a bank's brand image. This underscores that, much like a consistent product builds brand trust, reliable ATM services build customer confidence and are essential for a positive banking experience.

### 4.4.2. ATM Service Responsiveness and Customer Satisfaction

ATM service responsiveness is a critical dimension of service delivery, referring to the willingness and ability of the ATM system and bank support to provide prompt service [40]. In the context of ATMs, this includes fast transaction processing, clear error messages, prompt resolution of technical issues, and accessible support contact information

[24]. For IFB customers, this commitment to timely and effective service is a key tenet that builds trust and aligns with the principles of avoiding excessive uncertainty and upholding justice.

The results in Table 8 demonstrate that ATM service responsiveness has a positive and significant impact on customer satisfaction, with a  $\beta$  coefficient of 0.22 and a p-value of 0.000. This evidence suggests that a 1% increase in perceived responsiveness corresponds to a 22% increase in customer satisfaction. This finding is consistent with a substantial body of research that links responsiveness to positive customer outcomes. For instance, studies in Ethiopia have shown that a bank's willingness to provide prompt service positively impacts customer satisfaction. Another study of [10], in Hawassa, established this link, while [14, 47] confirmed similar findings in their research on factors affecting ATM services in Addis Ababa. Beyond the Ethiopian context, [11] underscored the importance of responsiveness as a key element of overall service delivery in Nigerian banks.

Global studies further reinforce this relationship. Responsiveness has been found to be a significant factor in self-service technology in retail banking [24]. Studies by [4, 23] in Bangladesh also confirm the crucial link between ATM responsiveness and not only satisfaction but also customer loyalty. Similarly, [28]'s research in India implicitly suggested that a lack of responsiveness contributes to lower satisfaction levels. The collective findings underscore that a swift and effective response from the ATM system or support channels can mitigate dissatisfaction, build confidence, and contribute to a positive banking experience.

### 4.4.3. ATM Service Tangibility and IFB Customer Satisfaction

ATM service tangibility, an important part of service quality, refers to the physical features of the ATM service that customers can perceive, such as the machines themselves, the area around them, and visible signs of service quality [40]. The term encompasses the cleanliness and maintenance of the ATM, the clarity of the screen display, and the presence of adequate lighting and security features [32]. For IFB, tangibility reflects a commitment to the ethical principles of purity, cleanliness, and professionalism, which builds customer trust and a sense of security. The results in Table 8 demonstrate that the perceived tangibility of ATM services has a positive and significant impact on customer satisfaction ( $\beta = 0.278$ ,  $p = 0.000$ ). This result indicates that a 1% increase in perceived tangibility corresponds to a 27.8% increase in customer satisfaction. This finding is consistently supported by empirical research.

For instance, studies by [4, 23] in their research on private banking in Bangladesh found that the physical appearance, functionality, and security of ATMs contribute significantly

to overall service quality, satisfaction, and loyalty. Tangibility was also recognized as a key element in their study on ATM service quality's impact on satisfaction [8]. Furthermore, [26] highlighted that the tangibility of ATMs contributes to the overall perception of quality and can enhance a bank's brand image. Beyond Bangladesh, [32] explicitly mentions the physical environment of the ATM as a contributing factor to customer perceptions, emphasizing that a clean, safe, and user-friendly ATM area significantly enhances satisfaction. Studies also confirm that positive perceptions of tangible elements play a crucial role in shaping customer attitudes and feelings about the service experience in Ethiopia [7, 29, 47]. The collective evidence highlights that well-maintained and modern ATMs can positively influence the banking experience, aligning with a bank's image of professionalism and reliability.

#### 4.4.4. ATM Service Empathy and IFB Customer Satisfaction

ATM service empathy, a crucial dimension of service quality, refers to the individualized attention provided to customers and the effort to understand their needs [8, 40]. Within the context of self-service technology, this is conveyed through the system's ability to be efficient, user-friendly, and secure, which demonstrates an implicit understanding of customer needs. For IFB, a system that demonstrates this understanding aligns with the ethical principles of fairness and transparency, which are essential for building trust.

The findings presented in Table 8 indicate a positive, though not statistically significant, relationship between ATM service empathy and customer satisfaction ( $\beta = 0.064$ ,  $p = 0.072$ ). This suggests that while empathy may have a positive effect, it does not reliably predict customer satisfaction at the conventional confidence level. This finding may be attributed to several factors. First, the automated nature of ATMs inherently limits the opportunity for the direct, personalized interaction that is a core component of traditional empathy. As suggested by [9], customers may primarily evaluate self-service technologies based on perceived usefulness and ease of use, prioritizing efficiency over a sense of "caring" from the machine itself.

Second, this result appears to contradict the implications of several other studies that focus on related service quality dimensions. For instance, research indicates that user-friendly and supportive ATMs, which indirectly reflect empathy, do contribute to customer satisfaction in Ethiopia [10, 14, 27]. Similarly, research shows that good communication, easy problem-solving, and understanding customer needs are important factors in how people view ATM service quality in Bangladesh [4, 8, 23]. The low statistical significance in this study may reflect that other dimensions, such as reliability and responsiveness, are more salient to customers in the context of their routine ATM transactions.

#### 4.4.5. ATM Service Assurance and IFB Customer Satisfaction

ATM service assurance, a key dimension of service quality, refers to the ability of a service provider to convey trust and confidence to customers [25]. In the context of ATMs, this translates to customers' confidence in the reliability and security of the ATM system and the bank's support for its users. For Interest-Free Banking, assurance is fundamental, as it aligns with the core principles of ethical conduct, trustworthiness (*amanah*), and risk mitigation.

The findings presented in Table 8 indicate a positive and statistically significant relationship between ATM service assurance and customer satisfaction ( $\beta = 0.140$ ,  $p = 0.003$ ). This result suggests that a 1% increase in perceived assurance associated with ATM services corresponds to a 14% increase in customer satisfaction. This evidence is consistently supported by empirical research. For instance, studies in Ethiopia have shown a clear link between assurance and customer satisfaction. [10] demonstrated that customers' perception of the security and reliability of ATM services significantly influences their satisfaction. Similarly, [27]'s work on Ethiopian commercial banks reinforces this link by examining how assurance-related factors, such as the bank's competence and courtesy in handling issues, impact customer satisfaction.

Research in other countries also supports this by [4], in a study on banks in Bangladesh, emphasizes that a bank's reputation and the clarity of ATM instructions are key factors in enhancing customer confidence. In parallel, [8] found that customers who feel confident in the security and reliability of ATM transactions are more likely to be satisfied and loyal. The exploration of private banking in Bangladesh, also reinforces that the ATM service and its support mechanisms play a crucial role in conveying trust. The collective evidence highlights that a bank's ability to provide a secure and trustworthy ATM service is crucial for building customer confidence [23].

## 5. Conclusion

The aim of this study was to investigate the effect of ATM Service Quality on Interest-Free Banking (IFB) customer satisfaction at the Bank of Abyssinia, Dire Dawa Branch. Following that, the study concludes that several key dimensions of ATM service quality, specifically reliability, responsiveness, tangibility, and assurance, exert a significant positive influence on customer satisfaction among IFB customers at Bank of Abyssinia. The evidence indicates that when these customers perceive these aspects of the ATM service as being of high quality, their overall satisfaction levels tend to increase.

The findings reveal that reliability, tangibility, and responsiveness are the most critical drivers of customer satisfaction. Assurance also demonstrated a significant positive impact. While empathy also showed a positive relationship with customer satisfaction, its impact was not statistically significant in

this particular study. The strong and significant effects of the other four dimensions underscore their importance as critical drivers of customer satisfaction in the context of automated banking services for IFB customers. These findings highlight the need for the Bank of Abyssinia to prioritize and maintain high standards across these service quality dimensions to foster positive customer experiences and enhance overall satisfaction with their ATM offerings for their IFB clientele.

## 6. Policy Recommendations

Based on the study's findings on IFB customer satisfaction at the Bank of Abyssinia, Dire Dawa Branch, the following recommendations are proposed to enhance their ATM services.

- 1) The bank should prioritize maintaining and improving the reliability and responsiveness of their ATM services. A lack of reliability, such as frequent breakdowns and long queues, can be seen as a failure to uphold the principle of 'amanah' (trusteeship) and causes unnecessary inconvenience, which goes against the ethical service principles of Islamic banking.
- 2) Efforts should be directed toward improving the tangible aspects of the ATM experience, including cleanliness, functionality, and security features. A clean and well-maintained physical environment reflects the Islamic principle of 'taharah' (purity and cleanliness), and robust security features uphold the bank's responsibility to protect the customer's assets.
- 3) The Bank of Abyssinia should continue to build and maintain customer trust and confidence to enhance assurance. This directly aligns with the fundamental Islamic principles of 'amanah' (trust) and avoiding 'gharar' (excessive uncertainty) in transactions, which are cornerstones of ethical Islamic banking.
- 4) While not statistically significant in this study, the bank could explore indirect ways to enhance perceived empathy through user-friendly interfaces and clear communication within the ATM system. This effort reflects the broader Islamic principle of 'ihsan' (doing things with excellence and kindness) and shows a commitment to treating customers with respect and care.
- 5) Implementing mechanisms for continuous customer feedback on ATM services is crucial for identifying areas for improvement and tracking the effectiveness of implemented changes. This practice is supported by the Islamic principle of 'shura' (consultation) and demonstrates a commitment to transparency and accountability to the customer base.

## Abbreviations

|     |                          |
|-----|--------------------------|
| ATM | Automated Teller Machine |
| IFB | Interest-Free Banking.   |

SPSS Statistical Package for the Social Sciences

## Author Contributions

**Mubarek Sadik Hussen:** Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, X Supervision, Writing – original draft

**Abdo Dabaso Jaldesa:** Data curation, Project administration, Resources, Software, Validation, Visualization, Writing – review & editing

## Conflicts of Interest

The author declares no conflicts of interest.

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