Agent-based banking model and service satisfaction among small-scale entrepreneurs in Dodoma Urban, Tanzania

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ABSTRACT

Despite the increasing adoption of agent-based banking by commercial banks to minimize operational costs, the perspectives of small-scale entrepreneurs, who mostly depend on this cost-effective model, are often overlooked. This paper empirically examines the interplay between agent-based banking and service satisfaction, drawing on the experience of small-scale entrepreneurs in Tanzania. Underpinned by the Technology Acceptance Model (TAM) and the Service Quality (SERVQUAL) Model as theoretical frameworks, this paper explores how service quality, convenience, and responsiveness of bank agents influence entrepreneurs' satisfaction. The target population comprised 15,388 residents in Makole (10,571) and Majengo (4,817) wards in Dodoma Urban. Due to the absence of a specific database of agent-banking users, convenience sampling was used to collect data from 330 small-scale entrepreneurs through a cross-sectional survey. Data were analyzed using descriptive statistics and a multiple linear regression model. Findings reveal a significant correlation between agent-based banking and perceived service satisfaction. Specifically, bank agents' service quality ($p < 0.05$) accounted for 59% of the variance in satisfaction, followed by convenience (55.4%) and responsiveness (53.7%), both of which were statistically significant ($p < 0.05$). Descriptive statistics results indicate that over 70% of entrepreneurs reach bank agent outlets within 20 minutes and find their locations convenient. The study concludes that bank agents deliver high-quality services that significantly enhance the satisfaction of small-scale entrepreneurs in simplifying cash flow management and access to credit facilities. The findings underscore the potential of agent-based banking models in fostering inclusive economic growth in developing countries. The findings present actionable insights for commercial bank officials and local government authorities to improve agent-based banking services and enhance financial inclusivity in Tanzania.

Keywords: Agent-based Banking Model, Bank Agents, Banking Services, Service Satisfaction

I. INTRODUCTION

The agent-based banking model is increasingly emerging as a transformative strategy for financial inclusion in developing countries, where traditional banking infrastructure remains limited (Alom *et al*., 2025; Nzilano and Magoti, 2025; Sohrab *et al.*, 2023). This innovative model enables commercial banks to partner with local agents, most of whom are small-scale entrepreneurs themselves, in delivering basic financial services, such as payments and account management, on their behalf (Pazarbasioglu *et al*., 2020). Unlike the traditional branch banking system, characterized by sparse distribution, long travel distances, crowded facilities, extended waiting times, and sub-optimal service quality (Ezeocha, 2024), the agent-based banking model operates in areas where brick-and-mortar branches are economically unviable (Iwedi *et al*., 2022; Jahan and Shahria, 2022). Besides bridging the gap between unbanked or underbanked populations and formal financial institutions (Zanden, 2023), the agent-based banking model enhances access to financial services (Alom *et al*., 2025) and improves financial inclusion (Nzilano and Magoti, 2025).

Agent-based banking model offers significant benefits, such as reduced transaction costs, greater convenience, and improved accessibility to financial services, which collectively enhance customer experience, satisfaction, and loyalty (Shaikh *et al*., 2024; Mwababa and Hapompwe, 2024). Furthermore, the model creates income opportunities for bank agents through commissions (Sohrab *et al.*, 2023) and empowers small-scale entrepreneurs by facilitating access to financial tools critical for managing cash flows, securing credit, purchasing inventory, and seizing business opportunities (Demirgüç-Kunt *et al*., 2018; Kaur *et al*., 2021). However, despite the observed advantages, empirical evidence on customer perceptions, particularly small-scale entrepreneurs, as major users of agent-based banking and its impact on service satisfaction in the African context remains limited (Mwababa and Hapompwe, 2024; Iwedi *et al*., 2022). Given its relatively newness in developing economies, the model is subject to rapid evolution and varying customer perceptions, which may influence its adoption and effectiveness (Thakuri *et al*., 2022; Iwedi *et al*., 2022).

Customer perceptions of service quality are fundamental to the success of the agent-based banking model, particularly in developing economies where small-scale enterprises dominate (Endris and Kassegn, 2022). High-quality services characterized by reliability, accessibility, and user-friendliness foster trust and encourage adoption among entrepreneurs (Li *et al*., 2024; Shaikh *et al*., 2024). Conversely, dissatisfaction with factors, such as agent reliability, transaction costs, technological barriers, or trust in the system, can lead to skepticism and resistance, which reduce the usage of agent-based banking services (Shaikh *et al*., 2024; Nzilano and Magoti, 2025). Such resistance may limit small-scale entrepreneurs' access to financial resources essential for starting and growing their ventures. This can undermine the potential of the agent-based banking model to promote economic empowerment and financial inclusion (Alom *et al*., 2025; Berenji *et al*., 2024; Ezeocha, 2024).

Being relatively innovative, the agent-based banking model may cause varied customer perceptions and attitudes (Shaikh *et al*., 2024; Kaur *et al*., 2021) and potentially impact service satisfaction (Alabboodi, 2018). In developing economies, where small-scale enterprises are dominant (Endris and Kassegn, 2022), high-quality services of bank agents are crucial for enhancing service satisfaction and promoting their adoption (Li *et al*., 2024; Shaikh *et al*., 2024). This is because small-scale entrepreneurs rely on bank agents to manage cash flows, access credit, purchase inventory, and capitalize on business opportunities (Demirgüç-Kunt *et al*., 2018). However, successful model adoption depends on service satisfaction, influenced by agent reliability, transaction costs, technological accessibility, and trust in the system (Alom *et al*., 2025; Shaikh *et al*., 2024; Zanden, 2023; Zaffar *et al*., 2019).

In Tanzania, where small-scale enterprises form the economic backbone for most communities (Mdee *et al*., 2021), agent-based banking is viewed as a strategic tool for empowering small-scale entrepreneurs in urban (Nzilano and Magoti, 2025) and rural settings (Mufungo and Ngonyani, 2024). Being the country's administrative capital, Dodoma Urban is considered an ideal context for studying agent-based banking due to the abrupt growth in the entrepreneurship ecosystem and financial infrastructure (Bank of Tanzania, 2024). Empirical evidence suggests that financial inclusion increased from 67% in 2017 to 75.5% in 2023 (Ugulumu *et al*., 2023). Despite these developments, fairly limited empirical studies investigated how small-scale entrepreneurs perceive and experience service satisfaction with agent-based banking in Dodoma Urban. This paper empirically attempts to narrow this gap by evaluating the interplay between agent-based banking and service satisfaction of small-scale entrepreneurs in Dodoma Urban, Tanzania.

1.1 Statement of the Problem

While small-scale entrepreneurs play vital roles in the country's economy, they face significant challenges in accessing adequate banking services specifically tailored to their needs, such as flexible loan terms, affordable transaction costs, and personalized support (Mufungo and Ngonyani, 2024). Traditional branch banking falls short in addressing these needs, which limits entrepreneurs' ability to manage cash flows and grow their business ventures (Alom *et al*., 2025; Demirgüç-Kunt *et al*., 2018). Since agent-based banking utilizes local agents to deliver financial services, there is potential for improving service accessibility and convenience (Nzilano and Magoti, 2025; Kaur *et al*., 2021). However, trust in bank agents, service reliability, convenience, transaction costs, and access to technology play a critical role in shaping entrepreneurs' satisfaction with this model (Shaikh *et al*., 2024; Kaur *et al*., 2021; Jahan and Shahria, 2022).

Despite improved technology and digital banking infrastructure in Tanzania (Bank of Tanzania, 2024) and Dodoma Urban in particular (Ugulumu *et al*., 2023), empirical evidence to substantiate their influence on service satisfaction among small-scale entrepreneurs as major users of agent-based banking remains limited (Mufungo and Ngonyani, 2024; Kimario, 2019). This paper empirically investigates the effectiveness of agent-based banking in meeting small-scale entrepreneurs' financial needs in Dodoma Urban. Specifically, it examines factors affecting small-scale entrepreneurs' service satisfaction with agent-based banking. The findings could provide actionable insights for policymakers, academics, financial institutions, and bank agents in designing user-friendly services that enhance satisfaction, promote adoption, and empower small-scale entrepreneurs or inclusive economic growth across the country.

1.2 Research Objectives

This study aims to achieve the following specific objectives:

i. To examine small-scale entrepreneurs' satisfaction with the service quality of agent-based banking in Dodoma Urban.
ii. To measure small-scale entrepreneurs' perceptions of the convenience of agent-based banking services in Dodoma Urban.
iii. To investigate small-scale entrepreneurs' perceptions of the responsiveness of agent-based banking services in Dodoma Urban.

II. LITERATURE REVIEW

2.1 Theoretical Review

The paper hinges on the Technology Acceptance Model (TAM), developed by Davis (1989), and the Service Quality (SERVQUAL) Model by Parasuraman *et al*. (1988) as a theoretical framework for assessing the interplay between the agent-based banking and service satisfaction among small-scale entrepreneurs. TAM has widely been used as a theoretical lens to assess the user acceptance and adoption of technology-related innovations, such as agent-based banking (Li *et al*., 2024; Shaikh *et al*., 2024; Berenji *et al*., 2024). TAM posits that the adoption of a certain technology or system largely depends on users' *Perceived Usefulness (PU)*, which reflects the degree to which they believe such technology or system enhances their performance. The *Perceived Ease of Use (PEOU)* indicates how users perceive that using the technology or system requires less effort (Davis, 1989). The PU and PEOU jointly shape users' attitudes toward the technology or system, leading to behavioral intention and actual usage (Davis, 1989).

The choice of TAM as a theoretical framework centers on the fact that agent-based banking is a technology-driven innovation that can facilitate access to financial services (Shaikh *et al*., 2024). Small-scale entrepreneurs' satisfaction with the service quality of this model depends on their perceptions and experiences of its usefulness in the potential to facilitate cash flow management and access to credit, critical for exploiting business opportunities to improve their livelihoods (Li *et al*., 2024). Small-scale entrepreneurs feel satisfied when they perceive agent-based banking services as accessible, user-friendly, and time-efficient (Alom *et al*., 2025; Shaikh *et al*., 2024). The responsiveness and reliability of bank agents' services further enhance entrepreneurs' perceived value and usability, leading to greater trust in the innovative technology or system (Shaikh *et al*., 2024; Jahan and Shahria, 2022).

To complement TAM's assumptions, the paper uses the SERVQUAL Model, a widely used model in assessing customer satisfaction with service quality across various industries, including banking (Mwababa and Hapompwe, 2024; Jahan and Shahria, 2022). The model evaluates service quality through five dimensions: reliability, responsiveness, assurance, empathy, and tangibles (Parasuraman *et al*., 1988). Specifically, the model assesses entrepreneurs' level of satisfaction with bank agents' services in terms of their quality, reliability, and responsiveness. Reliable and responsive bank-agent services that meet or exceed entrepreneurs' expectations can enhance service satisfaction (Mwababa and Hapompwe, 2024; Alom *et al*., 2025; Shaikh *et al*., 2024).

Furthermore, user-friendly and accessible bank agents' services enhance convenience while their prompt and effective responses address entrepreneurs' needs efficiently (Iwedi *et al*., 2022; Zaffar *et al*., 2019). Understanding these insights has the potential to guide commercial bank officials in designing services and products that are aligned with evolving customer expectations, leading to improved service delivery (Iwedi *et al*., 2022). Despite their potential, these dimensions have largely been used in hospitality contexts, which limits their generalizability potential (Rwanyarare and Kalimba, 2021; Babakus and Mangold, 1992). This study extends their applicability to the banking industry, drawing on the experience and perspectives of small-scale entrepreneurs in Dodoma Urban, Tanzania.

2.2 Empirical Reviews

Several empirical studies explored the relationship between agent-based banking and customer satisfaction, both within and outside Tanzania. For instance, Kazeem (2023) investigated the impact of agency banking on customer satisfaction in Nigeria. The study discovered that service reliability, quality, and convenience significantly and positively correlated with customer satisfaction. Similarly, Rwanyarare and Kalimba (2023) reported that empathy, reliability, and tangibles significantly influenced customer satisfaction in Kigali, Rwanda. However, challenges like long queues at automated teller machines (ATMs) and banking halls, insufficient liquidity, and limited e-money float balances hindered transaction efficiency, leading to deteriorated customer satisfaction. Additionally, the lack of modern banking skills, inadequate tangibles, and suboptimal agent outlet locations posed further obstacles to service satisfaction among customers (Alom *et al*., 2025).

In Nepal, Thakuri *et al*. (2022) assessed factors affecting customer satisfaction with mobile banking services, drawing on the experience of commercial banks in Kathmandu Valley. The study uncovered that security, responsiveness, and convenience were significant drivers of customer satisfaction, while cost and relative advantage had no significant impact ($p < 0.05$). Similarly, Mwababa and Hapompwe (2024) examined digital banking services in the Central Business District in Lusaka, Zambia. The study revealed that customers valued the reliability and responsiveness of bank agents but expressed significant security concerns. In Tanzania, Mongi and Mokaya (2018) studied the influence of agency banking on customer satisfaction at the National Microfinance Bank (NMB) in Arusha. The study discovered strong positive correlations between agency banking services and customer satisfaction in terms of service quality, convenience, location, and reliability.

Moreover, Mchomba (2018) explored electronic banking and customer satisfaction in Tanzania's banking industry, focusing on NMB as a case study. It was discovered that accessibility, timeliness, availability, user-friendliness, and security were key determinants of customer satisfaction. However, challenges such as network failures,

limited withdrawal amounts, lack of immediate support during transaction issues, and insufficient cash in ATMs during weekends were major barriers. In a similar study, Khamis and AbRashid (2018) examined service quality and customer satisfaction in Islamic banks in Zanzibar, Tanzania. The study reported that compliance, empathy, and reliability of bank agents had a significant influence on customer satisfaction. Customers were particularly drawn to the banks' compliance with Islamic principles, tangibles, and reliability.

Kimario (2019) investigated the impact of e-banking on customer satisfaction in Tanzania. The study revealed that reliability, flexibility, accessibility, security, and privacy significantly influenced customer satisfaction, accounting for 85% of its variance. The study further noted that ATMs were the most often used service, followed by Internet banking, credit cards, and mobile banking. The preceding discussion provides valuable insights for understanding the interplay between agent-based banking and customer satisfaction. However, the analysis suggests that these studies overlooked the experience and perceptions of small-scale entrepreneurs who largely depend on agent-based banking services to pursue entrepreneurial activities. The review further highlights common challenges, such as security concerns, network issues, liquidity shortages, and inadequate agent training or infrastructure. Against these flaws, this paper is an empirical attempt to narrow this gap by drawing on the experience and percptions of small-scale entrepreneurs in Dodoma Urban. Specifically, the study hypothesizes that:

H_o1: The service quality of agent-based banking does not significantly influence small-scale entrepreneurs' satisfaction in Dodoma Urban.

H_o2: The convenience of agent-based banking services does not significantly influence small-scale entrepreneurs' satisfaction in Dodoma Urban.

H_o3: The responsiveness of agent-based banking services does not significantly influence small-scale entrepreneurs' satisfaction in Dodoma Urban.

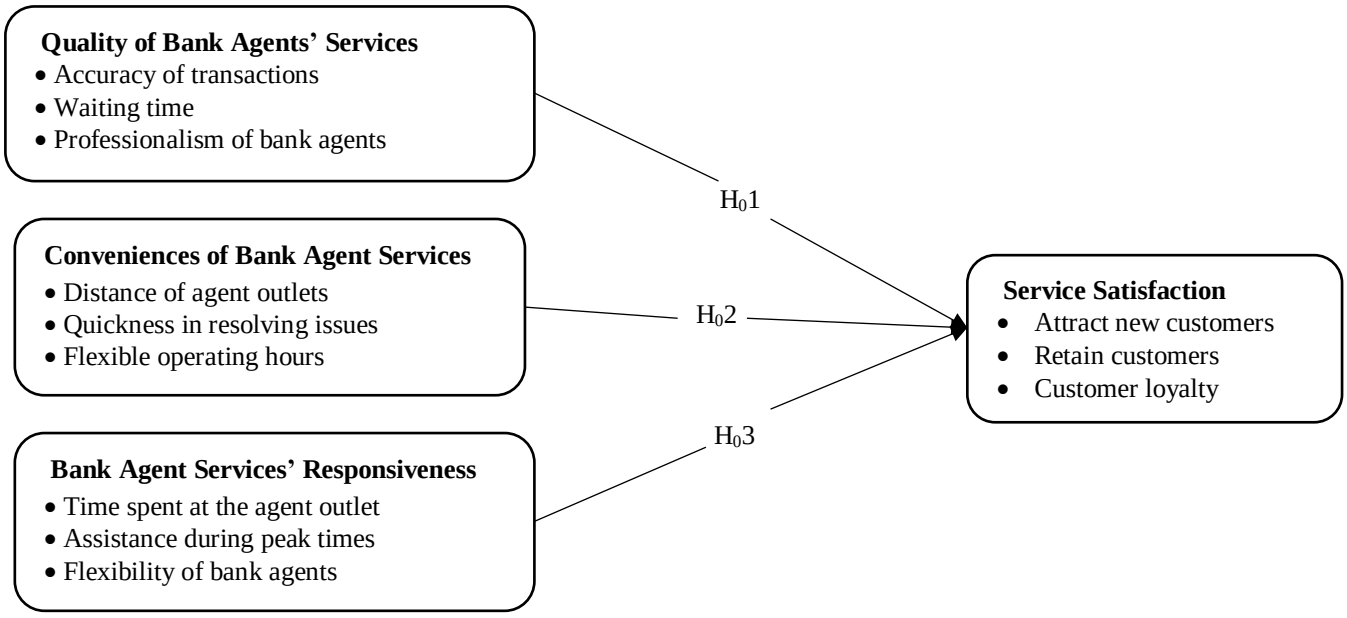

Figure 1
Variable Relationships

III. METHODOLOGY

3.1 Study Area

This study was conducted in Dodoma Urban, within the Dodoma City Council, the capital city of Tanzania. Dodoma is the fifth largest city in the country, following Mbeya, Arusha, Mwanza, and Dar es Salaam, located at approximately -6.161184 latitude and 35.74542 longitude. Major cities such as Dar es Salaam, Mwanza, Mbeya, and Dodoma host several commercial banks (Bank of Tanzania, 2024). In this context, Dodoma was selected due to the presence of commercial bank branches and their agents. Additionally, the relocation of government functions from Dar es Salaam to Dodoma enhances its suitability as a study area. The study targeted Makole and Majengo wards, selected purposively for their vibrant business environments. These wards host several main and mini-bus terminals, making them commercial hubs with numerous small-scale entrepreneurs relying on agent-based banking services.

3.2 Research Design

The study employs a cross-sectional research design, with data being gathered at one point in time through a survey method. The survey approach was chosen because the study targeted small-scale entrepreneurs as the primary unit of analysis. Cross-sectional design is suitable for empirical studies that explore the interrelationships among multiple variables through mathematical models, theories, and hypotheses (Creswell, 2014).

3.3 Study Population, Sample Size, and Sampling Procedures

The target population from whom the sample size was drawn involved 15,388 citizens residing in Makole (10,571) and Majengo (4,817) wards in Dodoma City (National Bureau of Statistics, 2022). All residents had an equal chance of participating in this study. The bank agents represented several commercial banks, such as CRDB Bank, NMB Bank, and Equity Bank, among others. The sample size was estimated using Yamane's (1967) formula as follows:

Sample: $\mathbf{n = \frac{N}{1+N(e)^2}}$ ……..……..……..……..……....(1)

Whereby;

n = sample size,
N = total population,
(e) = the margin of error (5%).

From equation (1), the sample size (n) = $\frac{15,388}{1+15,388(0.05)^2}$ = 389.87 ≈ 390 respondents.

The sub-sample for each ward was estimated using the proportionate formula by Fisher *et al*. (1991) as follows:

$$\text{Sample Size per ward} = \frac{\text{Estimated Sample Size (n)}}{\text{Total Population (N)}} \text{ x Population per ward (N)} \quad \text{.....(2)}$$

From equation (2), the sub-sample for each ward was computed as follows:

Makole $= \frac{390}{15,388}$ x 10,571 = 267.9 ≈ **268** and Majengo $= \frac{390}{15,388}$ x 4,817 = 122.08 ≈ **122**

Table 1

Sub-Sample Size per Ward

Ward Name	Population	Sub-sample	Percent (%)
Makole	10,571	268	68.7
Majengo	4,817	122	31.3
Total	**15,388**	**390**	**100**

Convenience sampling was used to select small-scale entrepreneurs. Although the total population residing in the study area was known in advance, the actual number of users of agent-based banking services could not be accurately defined. In addition, stratified sampling was used to select small-scale entrepreneurs from each ward to ensure equal representation.

3.4 Data Collection Methods and Reliability Analysis

Data were collected in person using a self-administered questionnaire distributed to small-scale entrepreneurs in the surveyed area. Respondents were provided two weeks to fill-in the given questionnaire. Five-point Likert scale generic continuum responses ranging from (1 = "Strongly Disagree" to 5 = "Strongly Agree") were used to measure small-scale entrepreneurs' agreement or disagreement with the quality of agent-based banking services. The scale has the potential to reduce respondents' frustration, enhance completion rate and response quality, and improve reliabilities (Babakus and Mangold, 1992). The constructs and items were evaluated for their reliability and validity, using Cronbach's Alpha (α) as a common assessment technique of internal consistency (Cronbach, 1951).

Table 2

Reliability Analysis of the Measurement Items

Construct Name	Number of Items	Cronbach Alpha-value	Reliability Levels
Quality of agent-based banking services	7	0.769	Good reliability
Conveniences of agent-based banking services	7	0.744	Good reliability
Responsiveness of agent-based banking services	7	0.717	Good reliability
Service satisfaction	9	0.709	Good reliability

Table 2 presents the reliability analysis results, with Cronbach's Alpha values ranging from 0.709 to 0.769, all surpassing the minimum threshold of ≥ 0.70 (Hair *et al.*, 2019; Cronbach, 1951). These findings demonstrate that the constructs and items are consistent, reliable, and appropriate for inferential analysis.

3.5 Data Analytical Approaches

The study employed both descriptive and inferential statistical methods for data analysis. Descriptive statistics were used to evaluate the frequency of occurrences related to the phenomenon under investigation. A multiple linear regression model was used to analyse factors affecting the quality of bank agents' services and their impact on entrepreneurs' satisfaction. According to Ozili (2023), a model is considered acceptable with an R-squared value of at least 0.1 (10%), provided some or most predictors are statistically significant. The adjusted R-squared values of this study, which ranged from 53% to 58.8%, attained the minimum threshold for social science research (Ozili, 2023). Regression coefficients were used to assess the predictive strength of each independent variable on the dependent variable (Pallant, 2020). The following multiple regression model was employed:

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_p X_p \qquad (3)$$

Whereby;

$\hat{Y}$ = The predicted dependent variable: Service satisfaction
$X_1 - X_p$ = The independent variables: Service quality, responsiveness, and convenience
b_0 = The value of Y when all of the independent variables (X_1 through X_p) are equal to zero;
$b_1 - b_p$ = The estimated regression coefficients.

IV. FINDINGS & DISCUSSION

4.1 Descriptive Statistics of Demographics

4.1.1 Respondents' Return Rate

Of 390 distributed questionnaires, 330 were successfully returned, achieving an 84.6% response rate. This exceeds the minimum recommended response rate of at least 60% for paper-based survey studies (Livingston and Wislar, 2012). This confirms the suitability of the dataset for inferential analysis (*ibid*).

4.1.2 Respondents' Demographics

Descriptive statistics were conducted to assess the demographics of the small-scale entrepreneurs, covering sex, age, marital status, education level, and monthly income, offering a clear profile of the study participants.

Table 3
Respondents' Demographics

Variable Name	Category	Frequency	Percent (%)
Sex	Male	221	67.0
	Female	109	33.0
Age	Below 25	19	5.8
	26 – 35	97	29.8
	36 – 45	153	46.4
	> 46	61	18.5
Marital status	Single	102	30.9
	Married	200	60.6
	Divorced	14	4.2
	Widow/widower	14	4.2
Levels of education	No formal education	6	1.8
	Secondary education	63	19.1
	College/university education	261	79.1
Monthly Income (TZS)	Below 150,000	71	21.5
	150,000 – 450,000	121	36.7
	450,000 – 1,000,000	115	34.8
	>1,000,000	23	7.0

Key: TZS – Tanzanian Shilling

The demographic analysis of the 330 respondents reveals a diverse yet distinct profile of small-scale entrepreneurs in Dodoma Urban. The sample is predominantly male (67.0%), with females comprising 33.0%. Age

distribution shows a concentration in the 36–45 age group (46.4%), followed by 26–35 (29.8%). This indicates a mature working population, with only 5.8% being below 25 and 18.5% above 46. Marital status seems to be skewed toward married individuals (60.6%), with 30.9% single and smaller proportions divorced or widowed (4.2% each). This suggests that married entrepreneurs use bank agents' services than single entrepreneurs.

Education levels are fairly high, with 79.1% holding a college or university education, 19.1% with secondary education, and only 1.8% lacking formal education. This demonstrates their understanding of the relevance of agent-based banking services. This explains why non-educated individuals experience high financial exclusion compared to educated groups (Omar and Yusoff, 2019). The monthly income distribution indicates financial diversity, with 36.7% earning 150,000–450,000 TZS, 34.8% earning 450,000–1,000,000 TZS, 21.5% below 150,000 TZS, and 7.0% above 1,000,000 TZS. This reflects predominantly low to middle-income entrepreneurs. This demographic profile underscores relatively educated, middle-aged, and financially modest entrepreneurs. This can potentially influence their engagement with agent-based banking, which justifies the suitability for this study.

4.2 Diagnostic Tests

Before performing the multiple linear regression analysis, essential assumptions were examined to confirm the suitability of the dataset. Tests for normality, multicollinearity, and homoscedasticity were conducted, complemented by a histogram analysis to validate regression assumptions. The Normal P-P Plot of standardized residuals was utilized to determine if the residuals adhered to a normal distribution, a fundamental prerequisite for linear regression.

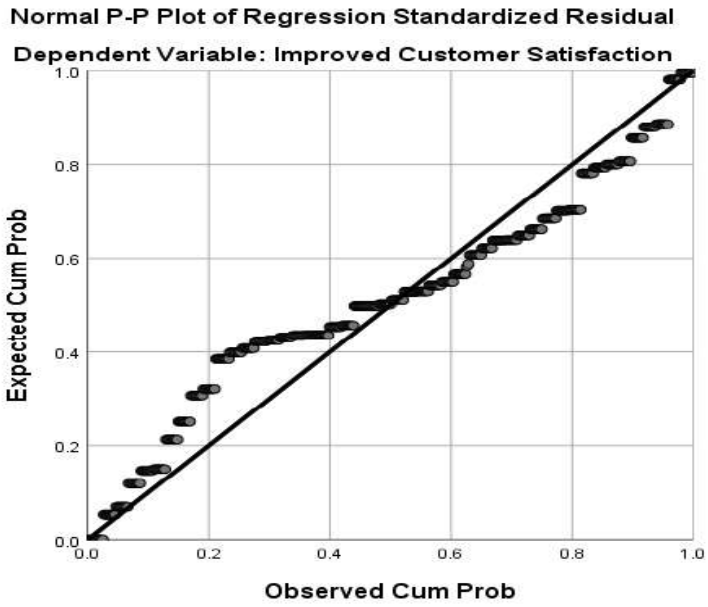

Figure 2
Normality Test Analysis

Figure 2 reveals that the Normal P-P plot of regression standardized residuals is approximately normally distributed, with most data points closely following the diagonal line and only slight deviations at the tails. This indicates the regression model is reliable for further analysis. Moreover, multicollinearity was evaluated using the Variance Inflation Factor (VIF) and tolerance levels (Table 4).

Table 4
Testing the Multicollinearity Assumption

Model		Collinearity Statistics	
		Tolerance	VIF
1	Service quality of agent-based banking	0.813	1.23
	Conveniences of agent-based banking	0.813	1.23
	Responsiveness of agent-based banking	0.813	1.23

Table 4 presents the multicollinearity test results for three variables in the regression model. The presence of multicollinearity with independent variables being highly correlated undermines the reliability of regression coefficients (Hair *et al*., 2019). The collinearity statistics showed a Tolerance of 0.813 and a Variance Inflation Factor (VIF) of 1.23, both fall within the acceptable threshold (VIF < 5), implying minimal multicollinearity (Pallant, 2020). This confirms

that the variables are not significantly correlated. This suggests the reliability of the regression model's results without interference from correlated predictors (Hair *et al*., 2019; Pallant, 2020). Furthermore, a scatterplot of standardized predicted values against standardized residuals was used to evaluate the model's fit (Figure 3).

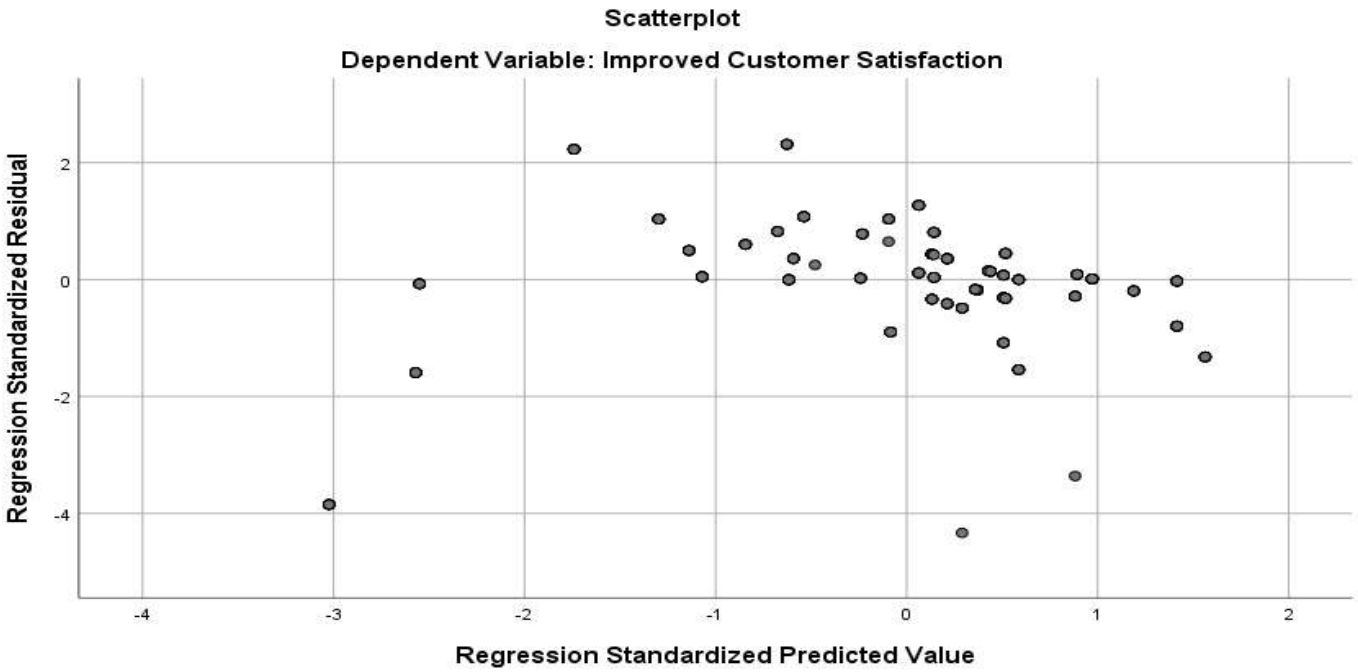

Figure 3
Scatter Plot for Homoscedasticity Test

Figure 3 shows that the residuals are distributed closely around the zero line without a discernible systematic pattern. This indicates that the regression model's assumptions of linearity and homoscedasticity are adequately satisfied.

4.3 Interplay Between Agent-based Banking and Service Satisfaction

4.3.1 Quality Agent-based Banking Services and Service Satisfaction

First, the paper examines the quality of agent-based banking services on small-scale entrepreneurs' perceived satisfaction levels. Table 5 presents the descriptive statistics of the quality of agent-based banking services.

Table 5
Perceived Quality of Agent-based Banking Services

S/No	Statement	Very Unsatisfied		Unsatisfied		Satisfied		Very Satisfied		Mean (M)	Standard Dev. (SD)
		F	%	F	%	F	%	F	%		
1.	Bank agent services are readily available in my area.	14	4.2	7	2.1	247	74.8	62	18.8	4.02	0.81
2.	Speed of agent-based banking model services.	7	2.1	12	3.6	242	73.3	62	18.8	4.03	0.739
3.	Relationship between bank agents and customers.	-	-	6	1.8	206	62.4	97	29.4	4.19	0.628
4.	Availability of power at the bank agent.	-	-	13	3.9	195	59.1	83	25.2	4.05	0.725
5.	Availability of adequate funds all the time.	-	-	18	5.5	189	57.3	90	27.3	4.06	0.767
6.	The distance from home to the bank agent outlet.	-	-	26	7.9	215	65.2	76	23.0	4.03	0.765
7.	Network availability at the bank agent.	-	-	18	5.5	202	61.2	89	27.0	4.10	0.737

Key: F = Frequencies, % = percentages

Table 5 suggests that strong service satisfaction exists across all aspects of agent-based banking services, with mean scores ranging from 4.02 to 4.19. The findings reflect positive perceptions among small-scale entrepreneurs on the quality of bank agents' services. The agent-customer relationship is the highest dimension of satisfaction with service (M = 4.19), while service availability is the least (M = 4.02). Standard deviations ranging between 0.62 – 0.81 suggest relatively consistent respondents' responses. However, there is a slight variation, particularly for the service availability of agent bank services. The absence of *"Very Unsatisfied"* responses for most statements and *"Low Unsatisfied"* percentages (1.8%–7.9%) indicates the effectiveness of agent-based banking services in meeting small-scale entrepreneurs' financial needs. However, minor concerns around distance and funding availability for a small subset of respondents indicate dissatisfaction.

The descriptive statistics results were supplemented with a multiple regression to determine the relationship between the quality of agent-based banking and service satisfaction among small-scale entrepreneurs. Table 6 presents multiple regression results on the impact of the quality of bank agents' services on entrepreneurs' satisfaction.

Table 6

Regression Results Summary of Quality of Bank Agency Services

Model Summary						
Model		**R**	**R-Square**	**Adjusted R-Square**	**Std. Error of the Estimate**	
1		.536[a]	0.590	0.588	0.35296	
ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	12.587	1	12.587	106.959	.000[b]
	Residual	42.862	328	0.125		
	Total	55.449	329			
Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**		
		β	**Std. Error**	**Beta**	***t***	**Sig.**
1	(Constant)	2.926	0.157		18.626	.000
	Quality of Agent-based Banking Services	0.536	0.038	0.536	10.773	.000

[a.] **Dependent Variable:** Service Satisfaction

[b.] **Predictors:** (Constant), Quality of Agent-based Banking Services

The regression analysis in Table 6 reveals a moderate positive correlation (R = 0.536) between the quality of agent-based banking services and entrepreneurs' satisfaction. Specifically, the quality of agent-based banking accounted for 59% of the variance in service satisfaction (R^2 = 0.590, Adjusted R^2 = 0.588). The precision of the model is supported by a standard error of 0.35296, and its statistical significance is confirmed by analysis of variance (ANOVA) results ($F(1, 328) = 106.959$, $p < 0.05$). The unstandardized coefficient ($\beta = 0.536$, SE = 0.038, $t = 10.773$, $p < 0.05$) suggests that for every unit increase in entrepreneurs' perceived bank agents' service quality, satisfaction rises by 0.536 units. The baseline is 2.926 ($t = 18.626$, $p < 0.05$), representing the satisfaction when service quality is zero.

Based on the findings, the study failed to reject the null hypothesis (H_o1). Implicitly, the quality of bank agents' services significantly predicts the satisfaction of small-scale entrepreneurs. The findings align with Kazeem (2021) in Nigeria, who reported that service quality in terms of reliability and convenience significantly impacted customer satisfaction (R^2 = 0.55). Similarly, the findings support Rwanyarare and Kalimba (2023) in Rwanda, who discovered that service reliability and accessibility were the major drivers of customer satisfaction, accounting for 52% of the variance. The findings also correspond with Shaikh *et al*. (2024), who observed that high-quality agent services, such as responsiveness and assurance, significantly enhance user satisfaction in developing economies.

The findings underscore the role of quality service and customer experience as drivers of service satisfaction and competitive advantage of commercial banks (Kaur *et al*., 2021; Khamis and AbRashid, 2018). The R^2 value of service quality of bank agents' services in this study (59%) is slightly higher than that reported by Endris and Kassegn (2024) in Ethiopia (R^2 = 0.47). The stronger predictive relationship could be attributed to the urban setting of this study and the fair level of education among respondents, with 79.1% having a college or university education. The findings underscore the critical role of service quality of bank agents' services in promoting financial inclusion among small-scale entrepreneurs in developing countries. These findings correspond with the assumptions of the Technology Acceptance Model (TAM) and SERVQUAL framework (Davis, 1989; Parasuraman *et al*., 1988).

4.3.2 Convenience of Agent-based Banking and Service Satisfaction

The second objective was to examine the convenience of agent-based banking services on entrepreneurs' satisfaction. Table 7 presents the descriptive statistics of the perceived convenience of agent-based banking services.

Table 7

Distance and Waiting Time

S/No.	Distance from home/office to reach the bank agent		
	Category	**Frequency**	**Percent**
1.	Less than 200 meters	94	28.5
2.	Between 250-500 meters	187	56.7
3	Between 500-700 meters	49	14.8
	Waiting time to receive bank agents' services		
1.	1-10 minutes	103	31.2
2.	10-20 minutes	157	47.6
3.	20-30 minutes	56	17.0
4.	30-40 minutes	14	4.2
Total		**330**	**100.0**

Table 7 shows that bank agents' services are accessible, with the majority of respondents (56.7%) located 250–500 meters from the outlet and 28.5% within 200 meters, which suggests good physical proximity. However, service efficiency varies, as 47.6% of entrepreneurs reported a waiting time of 10–20 minutes, while 31.2% were served within 1–10 minutes. A smaller part (21.2%) experienced longer delays of over 20 minutes. This supplements Kazeem (2021), who reported that traditional branch systems are associated with long waiting hours, contributing to customer dissatisfaction. The convenience and accessibility of bank agents' services provide an avenue for entrepreneurs to concentrate on productive activities (Jahan and Shahria, 2022). This increases the chances of improving socio-economic well-being rather than queuing in commercial banks to seek financial services. Moreover, small-scale entrepreneurs were also asked about their perceived convenience of agent-based banking services.

Table 8

Perceived Conveniences of Agent-Based Banking Services

S/No	Statement	Strongly Disagree		Disagree		Agree		Strongly Agree		Mean (M)	Standard Dev. (SD)
		F	%	F	%	F	%	F	%		
1.	I easily get to the agent bank quickly and easily from home/office.	-	-	40	12.1	214	64.8	76	23.0	3.99	0.847
2.	The bank agents are conveniently located.	-	-	13	3.9	247	74.8	63	19.1	4.09	0.602
3.	The agent bank operates convenient hours.	-	-	6	1.8	206	62.4	104	31.5	4.24	0.613
4.	I complete my transactions more quickly at the agent than traditional bank branch.	-	-	20	6.1	186	56.4	124	37.6	4.25	0.745
5.	Bank agents quickly resolve any problems I encounter as a customer after transacting.	-	-	34	10.3	139	42.1	144	43.6	4.19	0.924

Key: F = Frequencies, % = percentages

Table 8 shows high service satisfaction with agent-based banking services like accessibility, convenience, and efficiency. Most respondents (87.8%) agree that bank agents' services are conveniently located and easily reachable from home or office, with mean scores of 4.09 and 3.99, respectively. Additionally, bank agents were praised for operating at convenient hours (M = 4.24) and completing transactions faster than traditional bank branches (M = 4.25). This indicates that agent-based banking is an innovative solution to traditional branch systems with crowded banking halls and long queues leading to customer dissatisfaction (Kazeem, 2021).

Moreover, the majority of entrepreneurs (85.7%) felt that bank agents effectively resolve post-transaction issues (M = 4.19). These findings correspond with those of Khamis and AbRashid (2018), who lamented that the flexibility of bank agents in operating hours and quickness in addressing customers' challenges enhance customer satisfaction. The study found that bank agents' services are accessible, time-saving, and responsive to customer needs. Besides the descriptive statistics results, multiple regression analysis was conducted to determine the relationship between the conveniences of agent-based banking services and the satisfaction of small-scale entrepreneurs (Table 9).

Table 9

Regression Results Summary of Conveniences of Agent-based Banking

Model Summary[b]						
Model		**R**	**R-Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1		.604[a]	0.554	0.552	0.3457	
ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	15.854	1	15.854	114.633	.000[b]
	Residual	44.595	328	0.117		
	Total	**60.449**	**329**			
Coefficients of the Regression Model						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		β	**Std. Error**	**Beta**		
1	(Constant)	2.423	0.178		13.649	.000
	Conveniences of Bank Agent Services	0.533	0.05	0.505	10.59	.000

a. **Dependent Variable:** Improved Service Satisfaction

b. **Predictors:** (Constant), Conveniences of Agent-based Banking

Table 9 shows a moderate positive correlation (R = 0.604) between the conveniences of agent-based banking and service satisfaction. The conveniences of bank agents' services explained 55.4% of the variance in service satisfaction (R^2 = 0.554, Adjusted R^2 = 0.552). This indicates that over 50% of the variability in service satisfaction is accounted for by the conveniences of agent-based banking services. The model's precision is supported by a standard error of the estimate of 0.3457, suggesting relatively accurate predictions. The statistical significance of the model is confirmed by the analysis of variance (ANOVA) [F (1, 328) = 114.633, $p < 0.05$]. The findings suggest rejection of the null hypothesis (H_o2).

By rejecting the null hypothesis, it suggests that the convenience of bank agent services significantly predicts the satisfaction of small-scale entrepreneurs. The unstandardized coefficient (β = 0.533, SE = 0.05, t = 10.59, $p < 0.05$) indicates that for every one-unit increase in the convenience of bank agents' services, satisfaction level increases by 0.533 units. The constant (β = 2.423, t = 13.649, $p < 0.05$) establishes a baseline satisfaction level of 2.423 when the convenience of agent-based banking services is zero. The convenience of agent-based banking services significantly predicts customer satisfaction among small-scale entrepreneurs. The findings support Tindi and Bogonko's findings (2017), who found that the conveniences of agency banking services significantly affected customer satisfaction in Kenya.

Similarly, Mongi and Mokaya (2018) discovered that the convenience of bank agents' services had a significant influence on customer satisfaction in Arusha Municipality. However, the findings contradict Rwanyarare and Kalimba (2023), who reported customer queues in the ATMs and banking halls due to a lack of liquidity and e-money float balances to meet customer transaction demands. It can be inferred that bank agents have the potential to significantly reduce waiting, contrary to the traditional branch systems characterized by crowded banking halls, long queues, and poor service quality (Kazeem, 2021). Similar to Mongi and Mokaya (2018), the quality of agency banking services in terms of location and service reliability positively and strongly correlated with customer satisfaction. Empirically, it is evidenced that customers spend less time accessing agent-based banking services, allowing them to concentrate more on productive activities for personal and national benefits.

4.3.3 Responsiveness of Bank-Agent Banking and Service Satisfaction

Third and last, the study examines small-scale entrepreneurs' perceptions of the responsiveness of bank agents' services. Table 10 presents the descriptive statistics on the entrepreneurs' perceived responsiveness to agent-based banking services.

Table 10

Conveniences of Agent-based Banking and Service Satisfaction

S/No.	Statement	Strongly Disagree		Disagree		Agree		Strongly Agree		Mean (M)	Standard Dev. (SD)
		F	%	F	%	F	%	F	%		
1.	Bank agents have the knowledge and skills neededfor their job.	-	-	27	8.2	192	58.2	105	31.8	4.14	.804
2.	Bank agents are responsive to the needs of customers.	-	-	14	4.2	142	43.0	167	50.6	4.4	.734
3.	I am satisfied with the bank agent officers' appearances.	-	-	6	1.8	194	58.8	117	35.5	4.3	.605
4.	I spend less time waiting for financial services at the bank agent outlet.		-	13	3.9	124	37.6	173	52.4	4.38	.772
5.	The behaviour of bank agents' employees instills confidence.	-	-	14	4.2	213	64.5	84	25.5	4.11	.686
6.	The location of the bank agents is convenient.	-	-	6	1.8	166	50.3	146	44.2	4.37	.645
7.	The bank agents' system functions at all times without fail.	-	-	26	7.9	269	81.5	-	-	3.74	.594

Key: F = Frequencies, % = percentages

Table 10 shows positive perceptions of the responsiveness of bank agents' services among small-scale entrepreneurs. Many respondents (90%) agree that the bank agents are knowledgeable about banking services (M = 4.14 and SD = 0.804), and 93.6% feel they effectively respond to their needs (M = 4.40 and SD = 0.734). These findings align with the responsiveness dimension of SERVQUAL (Parasuraman *et al*., 1988). Moreover, 94.7% of entrepreneurs had confidence in the outlook of agent bank offices (M = 4.30 and SD = 0.605), and 90% spent less time accessing financial services (M = 4.38 and SD = 0.772). Lastly, 90% of entrepreneurs had confidence in bank agents' behaviours (M = 4.11 and SD = 0.686), and 81.5% agreed and strongly agreed that many bank agents smoothly operate without unnecessary stoppage (M = 3.74 and SD = 0.594). In addition, the relationship between agent-based banking services' responsiveness and service satisfaction was tested through multiple regression analysis (Table 11).

Table 11

Regression Results for the Responsiveness to Agent-based Banking

Model Summary[b]						
Model		**R**	**R-Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1		.657[a]	0.532	0.53	0.29553	
ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	25.802	1	21.802	249.616	.000[b]
	Residual	34.647	328	0.087		
	Total	**60.449**	**329**			
Coefficients of the Regression Model						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**		
		β	**Std. Error**	**Beta**	***t***	**Sig.**
1	(Constant)	2.035	0.144		14.149	.000
	Responsiveness of bank agents	0.537	0.034	0.657	15.799	.000

a. **Dependent Variable:** Improved Service Satisfaction

b. **Predictors:** (Constant), Responsiveness of Agent-based Banking

Table 11 reveals a moderate to strong positive correlation (R = 0.657) between the responsiveness of bank agents' services and the satisfaction of small-scale entrepreneurs. Specifically, the responsiveness of bank agents' services explained 53.2% of the variance in service satisfaction (R^2 = 0.532, Adjusted R^2 = 0.530). This implies that over 50% of the variability in entrepreneurs' service satisfaction is attributed to the responsiveness of bank agents. The precision of the model is supported by a standard error of the estimate of 0.29553, which indicates highly accurate

predictions. The statistical significance of the model is confirmed by the analysis of variance (ANOVA) results ($F(1, 328) = 249.616$, $p < 0.05$).

The unstandardized coefficient ($\beta = 0.537$, SE = 0.034, $t = 15.799$, $p < 0.05$) indicates that for every one-unit increase in the perceived responsiveness of bank agents, entrepreneurs' service satisfaction increases by 0.537 units. Moreover, the constant ($\beta = 2.035$, $t = 14.149$, $p < 0.05$) establishes a baseline service satisfaction level of 2.035 when the responsiveness is zero. Based on the findings, the study failed to accept the null hypothesis (H_o3). This suggests that the responsiveness of bank agents significantly predicts the service satisfaction of small-scale entrepreneurs in Dodoma Urban. The findings correspond with Shaikh *et al.* (2024), who reported that the responsiveness of agent-based banking significantly predicted customer satisfaction. Similar to Kazeem (2023), the responsiveness of agency banking services positively and significantly correlated with customer satisfaction in Nigeria.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This paper examines the interplay of the agent-based banking model and its impact on service satisfaction among small-scale entrepreneurs in Dodoma Urban, Tanzania. The study concludes that the agent-based banking model is an effective tool in enhancing service satisfaction for small-scale entrepreneurs in Dodoma Urban. Specifically, the quality of bank agents' services strongly predicts service satisfaction of small-scale entrepreneurs. This aligns with the reliability dimension of the SERVQUAL model. These findings emphasize the importance of commercial banks to consistently maintain high-quality agent-based banking services to foster customer trust and promote the adoption potential of agent-based banking in enhancing financial inclusivity.

The convenience of bank agents' services significantly influences the satisfaction of small-scale entrepreneurs. These findings reflect the ease-of-use principle of the Technology Acceptance Model (TAM). This highlights the need for commercial banks to optimize agents' outlet locations and streamline processes to minimize waiting time to allow entrepreneurs to focus on productive activities. Additionally, the responsiveness of bank agents, characterized by prompt service and efficient delivery, significantly predicts the service satisfaction of small-scale entrepreneurs. This underscores the need for commercial banks to continuously train bank agents to sustain responsiveness and reinforce customer confidence. By shedding light on the accessibility, reliability, and efficiency of financial services provided through agent-based banking, the paper contributes to the broader discourse on financial inclusion and entrepreneurship development in emerging economies such as Tanzania.

5.2 Recommendations

To enhance the effectiveness of agent-based banking, the paper recommends the following to various stakeholders. *Academics* should consider conducting longitudinal studies to explore the long-term impact of the agent-based banking model on small-scale entrepreneurs' perceived service satisfaction and financial inclusion to address the cross-sectional limitations of this study. *Financial institutions* should *first* regularly train bank agents to improve their skills in service delivery and problem resolution to ensure high service quality for customers.

Second, financial institutions should upgrade their technological infrastructure to address occasional network issues and ensure consistent cash availability at agent outlets. *Bank agents* should maintain strong customer relationships and adhere to convenient operating hours to sustain trust and efficiency. *The City Council* should launch an awareness campaign among small-scale entrepreneurs to boost trust and adoption of the agent-banking model to enhance financial inclusion. *Small-scale entrepreneurs* should strongly adopt the agent-based banking given its convenience and efficiency in cash flow management and access to credit facilities to venture into income-generating opportunities to improve their well-being.

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