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Examining the effect of electronic banking service quality on customer satisfaction and loyalty: an implication for technological innovation

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Abstract

In this ever-growing competitive banking industry, understanding the effect of electronic banking service quality on customers' satisfaction and loyalty is the secret to being competitive and successful in the sector. In Ethiopia, measuring service quality in the banking sector is a new paradigm. The primary purpose of this research was to examine the effect of electronic banking (e-Banking) service quality on customer satisfaction in Ethiopia's emerging banking industry. Data were obtained using a closed-ended structured questionnaire from a total of 385 participants selected using a convenience sampling technique. Frequencies, percentage distributions, group modes, standard deviations, Chi-square correlations, and multinomial logistic regression were employed to analyze the quantitative data. The results confirmed a significant effect of the variables responsiveness, reliability, security and privacy, speed, and convenience on customer satisfaction. Similarly, customer satisfaction with the electronic banking service quality has a significant effect on customer loyalty. System availability, easiness to use, and service charge, on the other hand, have no statistically significant impact on customer satisfaction. Hence, based on the findings of this study, it is recommended that banks should focus on the factors related to responsiveness, reliability, system availability, and speed to maximize customer satisfaction and loyalty. The adoption of electronic banking service that offers a meaningful guarantee takes care of problems promptly, provides services precisely as promised, is always available and quick delivery enables customers to be better satisfied and thus create committed and loyal customers.

Keywords: Technological innovation, e-Banking, Service quality, Customer satisfaction, Customer loyalty

Introduction

The development of technology in the financial services industry has been accelerating in recent years and swiftly becoming the norm rather than the exception (Khera et al., 2022). The adoption of technological innovation over the last two decades is drastically altering the way businesses are operated by eliminating geographical, regulatory, and

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industrial barriers (Zafar et al., 2011). The majority of banks, if not all, adopted the use of electronic banking for transactions as the winds of change started to blow (Chauhan et al., 2022; Singh, 2023). This technological innovation has also brought a level playing field in the banking industry by creating value for both banks and customers, that it enables customers to perform banking transactions without having to visit a physical bank (Khan, 2017). These innovations include internet banking, mobile banking, automated teller machines (ATMs), POS terminals (point of sales) and any online banking services popularly referred to as e-Banking (Khan, 2017). According to (Shamsuddoha, 2008), electronic banking (e-Banking) is transforming the financial services industry by supporting growth, promoting innovation and enhancing competitiveness. e-Banking has enabled banking institutions to compete more effectively in the global environment by extending their products and services beyond the restriction of time and space (Turban et al., 2004). Singh (2023) defined e-Banking as the practice of providing banking services to clients electronically, either at their place of business or house. According to Abid and Noreen (2006), e-Banking provides retail and small-value banking products and services through electronic channels as well as large-value electronic payment and other wholesale banking services delivered electronically.

According to Drigă and Isac (2014), the banking industry has been more competitive in recent years, and banks are adopting unique tools and approaches to maintain customer retention and satisfaction, with e-Banking being one of them. Globalization, competition, and innovation, as well as client demands, are reshaping the banking business. The scholar added that banking services have seen significant changes in the previous 10 years as a result of the growth of a knowledge-based economy and society as information and communication technology has improved (Drigă & Isac, 2014).e-Banking has been widely used in developed countries and is rapidly expanding in developing countries (Fekadu, 2009). Today, physical branch banking has been replaced by e-Banking, whereby customers can obtain service through the internet from their homes or at work rather than physically visiting the branch (Drigă & Isac, 2014; Poon, 2008). This transformation to e-service has provided both banks and customers with several benefits, such as personalized services, transaction security, speed of processing transactions, and overall better service quality (Abdulfattah, 2012).

In Ethiopia, the banking industry is one of the fastest-growing sectors (Banke & Yitayaw, 2022). The sector shows notable changes from single state-owned in 1990 to 18 banks in 2018. As of June 2018, there are 4757 public and private bank branches, improving the population-to-bank branch ratio from 1 branch to 126,000 in June 2008 to 20,000 in 2018 (Asratie, 2021). Despite the growth of the sector, Ethiopian banks continue to conduct most of their banking transactions using traditional methods. Cash is still the most dominant medium of exchange, and electronic payment systems are in the infant stage (Teka, 2017).

Literature in the area of service marketing stresses the effect of electronic banking on customer satisfaction and loyalty reports inconsistent results. Hammoud et al. (2018), Hoseini and Dangoliani (2015), Liébana-Cabanillas et al. (2013), Shankar and Jebarajakirthy (2019), Zafar et al. (2011), and Zouari and Abdelhedi (2021) stated that of the electronic banking service quality dimensions, responsiveness, reliability, accessibility, trust, ease of use and usefulness along with privacy and security is crucial to building

successful customer satisfaction and loyalty. Tiruneh (2017) identified the relative importance of the service quality dimensions, such as tangibility, reliability, responsiveness, assurance, and empathy towards customer satisfaction. The study concluded that empathy was found to have the most substantial impact on customer satisfaction, followed by responsiveness and reliability, respectively. In the same vein, Ayinaddis (2022) revealed that a service firm's capacity to achieve customer satisfaction and loyalty intention is determined by its service innovation significantly and positively. Moreover, Mohamud (2017), Supriyanto et al. (2021), and Toor (2016) also attempted to examine the effect of electronic banking on customer satisfaction. Their study revealed that electronic service quality dimensions are significantly and positively related to customer satisfaction, whereas others argued that there is no significant relationship between quality of service and customer satisfaction among customers (Aghdaie et al., 2015). Similarly, Munusamy et al. (2010) reported no significant association between reliability and responsiveness with customer satisfaction. Some studies have not carefully demonstrated the relationship, apart from such inconsistent research outcomes. Therefore, the current study contributes to the literature in the following ways:

First, the majority of prior studies that looked at the relationship between e-Banking quality dimensions and customer satisfaction focused on one of the e-Banking services, such as automated teller machines, point-of-sale terminals, and mobile banking or internet banking. Compared to previous studies, the researcher believes that the present study would address a critical gap in understanding the effect of e-banking service quality dimensions on customer satisfaction and loyalty, particularly regarding the rationales and benefits of a range of e-banking service items.

Second, as far as the author's knowledge, no similar study has been carried out so far to address the effect of e-banking service quality on customer satisfaction in the study area, which makes this study more significant. The researcher also believes that the study addresses an important gap in understanding the effect of e-banking service quality on customer satisfaction in the emerging economy of Ethiopia. From a theoretical point of view, there is minimal research on e-Banking in the emerging banking sector of Ethiopia as compared to other e-Banking innovations. The findings from this study are relevant to banks, the general business community, academics, and other stakeholders.

It is important to note that the measurement of service quality in the banking sector is a new paradigm in Ethiopia. As a result of the rapid development of banking services and customer relationships, it is necessary to investigate and research the service quality provided by banks through e-Banking.

Theoretical literature review

Technological innovation

Customers' wants and requirements are met through innovation, which ranges from new products, processes, procedures, marketing and organizational innovations (Al-Otaibi & Al-Zahrani, 2009). In their research, YuSheng and Ibrahim (2019) described innovation as the creation and adoption of new processes, products, and procedures. In the context of technological innovation, all scientific, technological, organizational, financial, and commercial actions that lead to, or are intended to lead to, the implementation of

technologically innovative or enhanced products or services are referred to as technological innovation (Carayannis et al., 2015; OECD, 2005).

Technological innovation is a new technology that comprises changes in production methods that results in a new or improved product or process whose technical characteristics are significantly different from before, hence new opportunities for the industry (Assimakopoulos et al., 2011; Carayannis et al., 2015). Based on the definitions provided above, e-Banking services such as mobile banking, internet banking, ATM, and POS that enable bank customers, and businesses to access accounts, transact business, or obtain information on financial products and services over technology are regarded as technological innovation (Awara & Anyadighibe, 2014).

Electronic banking (e-Banking)

Scholars define e-banking in various ways. According to Salehi et al. (2008), e-Banking is an electronic connection between banks and clients to prepare, manage, and control financial transactions. For Timothy (2012), e-Banking refers to using a remote conveyance used by customers to access a bank account, transfer funds and make payments. As a generic term, Abid and Noreen (2006) and Awara and Anyadighibe (2014), describe e-Banking as the provision of retail banking services via electronic channels as well as a large value electronic payment and other wholesale banking services delivered electronically.

E-banking, according to Mohamud (2017), is a type of distance banking that handles not only the flow of information between customers' "living spaces" and the bank's physical facilities, but also solicitation, sales, distribution, and service access, all without requiring the customer and the financial institution representative to be in the same physical location at the same time. Most electronic business experts agree that E-banking provides access to all types of financial transactions 24 h a day, 7 days a week, through any advanced information system (Automated Teller Machines, Personal Computers, Internet, mobile phones, etc.) and for all types of financial transactions (Mohamud, 2017). e-Banking, to Daniela and Dosoinescu (2004), is the access of the customers to bank services by secure intermediaries without any physical presence.

The concept of service quality

Services are intangible and impalpable interactions between a provider and a user that affect the user's condition (Kimita et al., 2009). Early studies defined quality as a judgment resulting from an evaluation process in which customers compare their exceptions with the service they perceive to have received (Grönroos, 1984). While a rising number of studies are shedding light on service quality, most of them define it based on a customer's overall impression of the product or service (Parasuraman et al., 1985, 2005).

Service quality is essential in the banking industry, since it ensures high levels of customer satisfaction, making it a key to competitive advantage (Almossawi, 2012). The quality of service is assessed, while it is provided in the service industry (Parasuraman et al., 2005). Services quality, in the banking industry, can be defined as a measure of how well the level of service provided meets customer expectations, resulting from a comparison between customers' prior expectations about the service and their after-perceptions of the actual experience of service performance (Sewaka et al., 2023).

Parasuraman et al. (2005) developed the E-S-QUAL model to analyze consumer perceptions of service quality in service and retailing firms. The conceptualization of service quality includes both the service outcome and the service delivery process. As a result, the service outcome is a customer's assessment of the result of service production, whereas the service delivery process is concerned with how the process's ultimate impact is communicated to the user (Lehtinen & Lehtinen, 1991; Parasuraman et al., 1985).

Review of prior empirical studies

Various studies have investigated the effect of service quality dimensions on several factors that determine customer satisfaction and loyalty. Therefore, some of the empirical research mentioned complies with:

Beshir and Zelalem (2020) carried out research in Ethiopia to study the effect of e-banking service quality on customer satisfaction and loyalty using the Structural Equation Model. The study used customer satisfaction as a dependent variable and found efficiency, responsiveness, easiness, privacy and commission found to be significant predictors of customer satisfaction at a 5% level of significance. The results of the study also showed that customer satisfaction has a significant positive impact on customer loyalty. The finding of Zavareh et al. (2012) indicated that efficient and reliable services, fulfilment, security/trust, site aesthetics, responsiveness/contact, and ease of use have a significant positive relationship with customer satisfaction in internet banking in Iran.

Hammoud et al. (2018) critically examined the impact of e-Banking service quality on customer satisfaction in the Lebanese banking sector; adopted a descriptive survey research design was adopted. The study indicates variables such as reliability, efficiency, ease of use, responsiveness and communication, and security and privacy have a significant impact on customer satisfaction, with reliability being the dimension with the strongest impact. Similarly, variables such as ease of use and accessibility positively affected customers' satisfaction and maintained longstanding customer loyalty (Liébana-Cabanillas et al., 2013).

Shankar and Jebarajakirthy (2019) attempted to find the influence of e-Banking service quality dimensions on customer loyalty from a sample of 1028 e-banking users in India. The study found that reliability along with privacy and security are the strongest significant predictors of customer satisfaction and loyalty. In line with this, other researchers also revealed that there is a statistically significant association between the service quality dimension and customer satisfaction concerning e-Banking service (Sharma et al., 2020).

Mohamud (2017) study recognized that the service quality of e-banking has a significant positive effect on customer satisfaction. The study indicated that there was a linear relationship between e-banking service qualities, and therefore, factors such as ease of use, usefulness and cost directly influence customer satisfaction. In addition, the study concluded that service quality dimensions such as security, aesthetics, reliability, responsiveness and efficiency should not be overlooked in an attempt to obtain better-satisfied customers.

Hoseini and Dangoliani (2015) studied the effect of e-Banking services quality on customer satisfaction in the selected province of Keshavarzi bank of Golestan area

through a descriptive research approach. Results from the study exhibit that e-Banking has an impact on customer satisfaction. The researcher accepted all the hypothetical statements stating that efficiency, fulfillment, system availability, privacy, assurance (trust), and service quality aesthetics impact customer satisfaction. Other findings indicated that customer satisfaction has a significant and positive correlation with customer loyalty is confirmed (Aghdaie et al., 2015).

Dsouza et al. (2018) studied the quality of e-Banking services in the Goa banking industry and found that six factors, such as value-added service, responsiveness, accessibility, services assured, bank charges, and convenience, were identified that influence customer satisfaction. However, no significant difference between customers of public and private sector banks was observed concerning the demographic profile of study participants. Furthermore, based on the standardized beta coefficients, the researcher concluded service quality dimensions together explain 58.8% of the variance in customer satisfaction and loyalty.

Furthermore, Tetteh (2022) examined the impact of electronic banking service quality on customer satisfaction and customer loyalty using structural equation modelling. The results show that the dimensions of service quality, namely, convenience, ease of use, accessibility, and affordability were found to be significant positive drivers of customer satisfaction. The study also found that customer satisfaction fully mediates the relationship between all four electronic banking service quality dimensions and customer loyalty. In the same vein, the findings of Mwiya et al. (2022) indicate that security, website attribute, privacy, responsiveness, efficiency, fulfilment and reliability are indeed relevant to electronic service quality and they affect customer satisfaction positively.

A study was conducted by Sewaka et al. (2023) to analyze the relationship between service quality, customer satisfaction, and loyalty intention among e-Banking users. The results of this study demonstrated that there is a positive and significant relationship between service quality and customer satisfaction; service quality and customer loyalty; and customer satisfaction, and loyalty intention.

Based on Firdous and Farooqi (2017) study, each of the dimensions of service quality with regard to e-Banking, namely, efficiency, system availability, fulfilment, privacy, contact, responsiveness, and contact, individually contribute 70% to overall customer satisfaction in internet banking. The study provides empirical evidence to show that the internet banking service quality dimensions are an important factor to satisfy customers, since each of them is positively related to customer satisfaction.

Based on the above discussion, we have proposed the following hypotheses:

H1 Responsiveness has a positive statistically significant effect on customer satisfaction.

H2 Reliability has a positive statistically significant effect on customer satisfaction.

H3 Security and privacy has a positive significant effect on customer satisfaction.

H4 Availability has a positive statistically significant effect on customer satisfaction.

H5 Easiness of e-banking services has a positive statistically significant relationship with customer satisfaction.

H6 Speed of e-banking service has a positive statistically significant relationship with customer satisfaction.

H7 Convenience has a positive statistically significant relationship with customer satisfaction.

H8 Service charge has a positive statistically significant effect on customer satisfaction.

H9 Customer satisfaction has a positive statistically significant relationship with customer loyalty.

Materials and methods

This study employed a quantitative research approach with a descriptive research design to achieve the objectives. The reason for choosing the quantitative research approach was to meet the purpose of examining how an independent variable affects a dependent variable quantitatively. The study population consisted of all customers of private and public banks in Woldia City who were using any of the e-Banking facilities and, therefore, were considered respondents.

According to Saunders et al. (2012), the sample size is mostly determined by the size of the entire population, the acceptable margin of error, the confidence interval we expect in the data, and the type of study. Because the number of ATM users in the study area is unknown and infinite, the researcher employed a precision rate and confidence table approach to determine the size. The sample size determination formula of Cochran (1977) was used to determine the representative number of samples:

$$n = \left(\frac{z}{e}\right)^2 pq = \left(\frac{1.96}{0.05}\right)^2 (0.5)(0.5) = 384.16 \approx 385,$$

where n = sample size to be calculated, p = Percentage or presence of the study characteristics ($p = 0.5$, maximum variability), when it is not known a conservative value of $p = 0.5$ is assumed, $q = 1 - p$, e = accepted margin of error ($\pm 5\%$ of precision), $z = 1.96$ (95% of confidence level).

Therefore, the representative number of respondents (e-Banking users) is 385. To get these service users, Adago and piazza areas were selected as suitable places for this study based on the assumption that these areas are where potential customers live, work, and shop. Because it could not obtain access to a list of e-Banking customers to conduct random sampling, the study used convenience sampling during data collection.

In terms of the data sources, the study used both primary and secondary sources. Based on the nature, scope, objectives, and availability of time and resources, the researchers employed a questionnaire. The respondents who are the branch banks' clients were asked for cooperation and given the questionnaire when they were receiving the service of a specific branch. Structured questionnaires were developed containing closed-ended and the respondents could easily understand them.

Measurement of study variables

In designing the survey instrument, several important issues need to be dealt with regarding the details of the items used to measure each construct. This study used a total of 41 close-ended questionnaires that were measured using five-point Likert scale response categories ranging from strongly disagree (1) to strongly agree (5). Variables such as responsiveness (8 items), reliability (3 items), security and privacy (3 items), system availability (4 items) were measured based on the adapted version E-S-QUAL model developed by Depusoy et al. (2020), and Parasuraman et al. (2005). Four items to measure easyness to use was adapted from Tharanikaran et al. (2017). The remaining independent variables, speed, convenience, and service charge 3 items for each, were measured by the adapted items from Depusoy et al. (2020). Furthermore, the intervening and dependent variables customer satisfaction and loyalty were measured by 5 items each developed by Hammoud et al. (2018) and Parasuraman et al. (2005).

All of the variables were assessed on a five-point Likert scale. First, the Likert scale was divided into five categories: strongly disagree, disagree, neutral, agree, and strongly agree for different statements that represent the dependent and independent variables. The five categories were then grouped into three categories negative, neutral, and positive response groups. The negative category contains responses given as strongly disagree and disagree, while the positive category includes responses given as agree and strongly agree. The summary measures are then created by assigning a value of "1" if respondents answered negatively to the statements, a value of "2" if they responded neutrally, and a value of "3" if respondents answered positively to the statements.

Method of data analysis and model specification

It is necessary to transform and analyze the collected data into meaningful information, figures and statements. As a result, it was processed, analyzed, and interpreted in accordance with the nature of data. Statistical Package for Social Science (SPSS) software version 20 was employed to analyze and present the data through the statistical tools used for this study, namely, descriptive analysis, correlation and Chi-square statistics. The descriptive statistical results were presented by tables, frequency distributions and Percentages to give a condensed picture of the data.

Furthermore, Chi-square statistics were used to test the associations' significance between the studies variables. Pearson's Chi-squared test is used to determine whether there is a statistically significant difference between the expected frequencies and the observed frequencies in one or more categories of a contingency table. Besides, multinomial logistic regression was used to determine the effect of each of the dimensions of the independent variables on the dependent variable (customer satisfaction). In fact, the multinomial logistic regression (MLR) model is a fairly straightforward generalization of the binary model, and both models depend mainly on logit analysis or logistic regression. Logit analysis, in many ways, is the natural complement of ordinal linear regression whenever the response is a categorical variable.

Results and discussion

Descriptive analysis of the study

Table 1 presents the descriptive results of the study variables. With regard to responsiveness, 55 (16.1%) of customers responded "less responsive", 39 (11.4%) of respondents were "neutral", and 247 (72.4%) of customers responded that the e-Banking service quality was "more responsive". Similarly, in terms of reliability majority of customers responded that the e-Banking service quality was "more reliable" (82.1%); in terms of security and privacy majority of the customers responded "secure" (89.4%). In terms of system availability majority of customers responded "available" (78%), in terms of easiness to use majority of customers responded "complex" (67.7%), in terms of speed majority of customers responded "fast" (71%), in terms of convenience majority customers responded "more convenient" (46.9%), and with regard to service charge majority customers responded "more expensive" (52.2%).

Table 1 Descriptive statistics

Study variables	Categories	Frequency	Marginal percentage
Responsiveness (RSP)	Less responsive	55	16.1%
	Neutral	39	11.4%
	More responsive	247	72.4%
Reliability (RLB)	Less reliable	36	10.6%
	Neutral	25	7.3%
	More reliable	280	82.1%
Security and privacy 9SAP)	Less secure	22	6.5%
	Neutral	14	4.1%
	More secure	305	89.4%
System availability (SAV)	Less available	54	15.8%
	Neutral	21	6.2%
	More available	266	78.0%
Easiness to use (ETU)	Easy	76	22.3%
	Neutral	34	10.0%
	Complex	231	67.7%
Speed (SPD)	Late	64	18.8%
	Neutral	35	10.3%
	Fast	242	71.0%
Convenience (CON)	less convenient	144	42.2%
	Neutral	37	10.9%
	More convenient	160	46.9%
Service charge (SRC)	Less expensive	97	28.4%
	Neutral	66	19.4%
	More expensive	178	52.2%
Customer satisfaction (CST)	Dissatisfied	31	9.1%
	Neutral	8	2.3%
	Satisfied	302	88.6%
Customer loyalty (CLT)	Less loyal	46	13.5%
	Neutral	14	4.1%
	More loyal	281	82.4%
Valid		341	100.0%

Source Own survey (2022)

With respect to customer satisfaction Table 1 also clearly depicts 31 (9.1%) of respondents were dissatisfied, 8 (2.3%) were neutral, and 302 (88.6%) were satisfied with any type of e-Banking system. Moreover, concerning customer loyalty, 46 (13.5%) of customers were less loyal, 14 (4.1%) gave "neutral" responses, and 281 (82.4%) were loyal.

Association analysis of the study variables

Based on the results of Table 2, the relationship between responsiveness and customer satisfaction revealed that 73.2% of customers were "more responsive" and "satisfied" with e-banking. In contrast, no customer responded as "neutral" and "dissatisfied" with e-banking service quality. This result showed that responsiveness has a significant association with customer satisfaction, since the *p* value is 0.016 level of significance.

Again, the relationship between reliability and customer satisfaction depicted that those customers whose reliability status is "more reliable" and have "satisfied" with E-banking 254 (84.1%) have a greater proportion from all categories. at the same time, there is a single customer whose reliability status was "neutral" and has a "dissatisfied" response to e-Banking. In addition, the Chi-square association between reliability and customer satisfaction was positive and significant at a *p* value of 0.01.

Table 2 Association between variables

Variable	Categories	Customer satisfaction			Chi square	*p* value	Phi and Cramer's *v*
		Dissatisfy	Neutral	Satisfy			
RSP	Less responsive	8 (25.8%)	2 (25.0%)	45 (14.9%)	12.216	0.016	0.189
	Neutral	0 (0%)	3 (37.5%)	36 (11.9%)			0.134
	More responsive	23 (74.2%)	3 (37.5%)	221 (73.2%)			
RLB	Less reliable	7 (22.6%)	2 (25.0%)	27 (8.9%)	19.59	0.01	0.240
	Neutral	1 (3.2%)	3 (37.5%)	21 (7.0%)			0.170
	More reliable	23 (74.2%)	3 (37.5%)	254 (84.1%)			
SAP	Less secure	5 (16.1%)	1 (12.5%)	16 (5.3%)	7.509	0.111	0.148
	Neutral	0 (0%)	0 (0%)	14 (4.6%)			0.105
	More secure	26 (83.9%)	7 (87.5%)	272 (90.1%)			
SAV	Less available	8 (25.8%)	2 (25.0%)	44 (14.6%)	10.11	0.038	0.172
	Neutral	0 (0%)	2 (25%)	19 (6.3%)			0.122
	More available	23 (74.2%)	4 (50%)	239 (79.1%)			
ETU	Easy	9 (29%)	4 (50%)	63 (20.9%)	8.01	0.091	0.153
	Neutral	3 (9.7%)	2 (25%)	9 (9.6%)			0.108
	Complex	19 (61.3%)	2 (25%)	210 (69.5%)			
SPD	Late	6 (19.4%)	5 (62.5%)	53 (17.5%)	10.557	0.032	0.176
	Neutral	3 (9.7%)	0 (0%)	32 (10.6%)			0.124
	Fast	22 (71%)	3 (37.5%)	217 (71.9%)			
CON	less convenient	13 (41.9%)	6 (75%)	125 (41.4%)	3.953	0.412	0.108
	Neutral	4 (12.9%)	0 (0%)	33 (10.9%)			0.076
	More convenient	14 (45.2%)	2 (25%)	144 (47.7%)			
SRC	Less expensive	10 (32.3%)	4 (50%)	83 (27.2%)	2.999	0.559	0.094
	Neutral	6 (19.4%)	2 (25%)	58 (19.2%)			0.066
	More expensive	15 (48.4%)	2 (25%)	161 (53.3%)			

Source Own survey (2022)

Table 3 Association between customer satisfaction and loyalty

Variable	Categories	Customer loyalty			Chi square	*p* value
		Less loyal	Neutral	More loyal		
Customer satisfaction	Dissatisfied	24 (77.4%)	0 (0%)	7 (22.6%)	194.46	0.000
	Neutral	2 (25%)	5 (62.5%)	1 (12.5%)		
	Satisfied	20 (6.6%)	9 (3%)	273 (90.4%)		

Source Own survey (2022)

Table 4 Model fitting information

Model	Model fitting criteria	Likelihood ratio tests		
	− 2 log likelihood	Chi-square	*df*	Sig.
Intercept only	183.513			
Final	127.118	56.395	32	.005

Source Own survey (2022)

The result also showed that system availability and customer satisfaction were positive and significant. When we see that customers who responded that the e-Banking service was "more available" and "satisfied" are greater in number 239 (79.1%). In contrast, there were no customers who responded "neutral" and "dissatisfied" with e-banking. As we can see from Table 2 again, the relationship between speed and customer satisfaction, those customers who are satisfied with the speed of e-banking constituted the largest proportion. In contrast, there were only three customers who are "dissatisfied" and responded "neutral".

The results show that responsiveness, reliability, system availability, and speed, have a statistically significant relationship with customer satisfaction, because their p values are 0.05 (level of significance). Furthermore, among the significant variables, reliability has a strong positive relationship with customer satisfaction (Phi = 0.240 and Crammers' $v = 0.170$), while system availability has a weaker positive relationship (Phi = 0.172 and Crammers' $v = 0.122$). However, it was confirmed that security and privacy, easiness to use, conveniences, and service charge have no association with customer satisfaction, because their p values are less than 0.05 level of significance.

Based on the results presented in Table 3, the relationship between customer satisfaction and loyalty positive and significant. Those customers whose satisfaction status is "satisfied" and "less loyal" with E-banking service quality 90.4% have a greater proportion from all categories, while there was no customer whose satisfaction status is "dissatisfy" and has "neutral" response.

Effect analysis of the study variables

Goodness-of-fit of multinomial logistic regression

As illustrated in Table 4, the model fitness was assessed using Chi-square statistics. The Chi-square value was 56.395 and the p value was less than 0.05. This proves that there is a significant relationship between the dependent variable and independent variables in the final model.

Table 5 Goodness-of-fit

	Chi-square	*df*	Sig.
Pearson	228.397	270	.969
Deviance	95.439	270	1.000

Source Own survey (2022)

Table 6 Pseudo R^2 test

Cox and Snell	.152
Nagelkerke	.271
McFadden	.200

Source Own survey (2022)

The Pearson 228.397 and deviance 95.439 statistics test proves that the model is fit. Since the test is not statistically significant, that is the p value is greater than 0.05 (Table 5).

The pseudo R^2 measures Cox and Snell 0.152, Nagelkerke's 0.271 and McFadden 0.200. The model accounts for 20–27.1% of the variance and represents a relatively decent-sized effect (Table 6).

Multinomial logistic regression results

Table 7 demonstrated that the variable responsiveness was found to affect customer satisfaction. The odds of e-Banking reliability were 0.036. Considering other variables constant, with regard to e-Banking service responsiveness, participants who responded "neutral" preferring "satisfied" rather than "neutral" were 0.036 times less likely to be "more responsive". Therefore, the hypothesis stating "responsiveness has a statistically significant effect on customer satisfaction" was supported.

The other variable reliability was found to effect customer satisfaction. The odds of electronic banking reliability were 0.010. This revealed that e-Banking service reliability participants who responded "neutral" preferring "dissatisfied" rather than "neutral" were 0.010 times less likely to be "more reliable". Therefore, the hypothesis stating "reliability has a statistically significant effect on customer satisfaction" was supported.

The other variable security and privacy has a significant effect on customer satisfaction. The odds of e-Banking security and privacy were 64.51. In terms of security and privacy of e-Banking service quality, participants who responded "less secure" preferring "dissatisfied" rather than "neutral" were 64.51 times more likely "more secure". Therefore, the hypothesis stating "security and privacy has a statistically significant effect on customer satisfaction" was supported.

Besides, the variable speed has a significant effect on customer satisfaction. The odds of e-Banking speed were 10,681,052. In terms speed of e-Banking service quality participants who responded "neutral" preferring "dissatisfied" rather than "neutral" were 10,681,052 times more likely "fast". Therefore, the hypothesis stating "speed has a statistically significant effect on customer satisfaction" was supported.

Furthermore, the variable convenience has a significant effect on customer satisfaction. The odds of e-Banking convenience were 377,122,911. Therefore, the

Table 7 Multinomial logistic regression

Customer satisfaction[a]	*B*	Std. Error	Wald	*df*	Sig.	Exp(*B*)
Dissatisfied						
Intercept	4.451	1.515	8.632	1	.003	
[RSP = 1]	− 1.415	1.428	.981	1	.322	.243
[RSP = 2]	− 22.467	5270.202	.000	1	.997	1.749E−010
[RSP = 3]	0[c]			0		
[RLB = 1]	− 1.920	1.524	1.588	1	.208	.147
[RLB = 2]	− 4.593	1.724	7.099	1	**.008**	.010
[RLB = 3]	0[c]			0		
[SAP = 1]	4.167	2.005	4.321	1	**.038**	64.511
[SAP = 2]	.051	11,325.423	.000	1	1.000	1.053
[SAP = 3]	0[c]			0		
[SAV = 1]	1.328	1.443	.847	1	.357	3.775
[SAV = 2]	− 20.298	7085.216	.000	1	.998	1.530E−009
[SAV = 3]	0[c]			0		
[ETU = 1]	− 1.487	1.301	1.306	1	.253	.226
[ETU = 2]	− .683	1.872	.133	1	.715	.505
[ETU = 3]	0[c]			0		
[SPD = 1]	− 2.521	1.352	3.476	1	.062	.080
[SPD = 2]	16.184	.849	363.788	1	**.000**	10,681,052.047
[SPD = 3]	0[c]			0		
[CON = 1]	1.207	1.391	.754	1	.385	3.345
[CON = 2]	19.748	.690	818.738	1	**.000**	377,122,911.722
[CON = 3]	0[c]			0		
[SRC = 1]	− 1.195	1.350	.784	1	.376	.303
[SRC = 2]	.106	1.465	.005	1	.942	1.112
[SRC = 3]	0[c]			0		
Satisfied						
Intercept	6.728	1.483	20.574	1	.000	
[RSP = 1]	− 1.219	1.310	.866	1	.352	.296
[RSP = 2]	− 3.320	1.205	7.591	1	**.006**	.036
[RSP = 3]	0[c]			0		
[RLB = 1]	− 2.517	1.366	3.393	1	.065	.081
[RLB = 2]	− 3.446	1.319	6.824	1	**.009**	.032
[RLB = 3]	0[c]			0		
[SAP = 1]	2.702	1.786	2.290	1	.130	14.915
[SAP = 2]	18.475	7725.687	.000	1	.998	105,628,696.804
[SAP = 3]	0[c]			0		
[SAV = 1]	.907	1.303	.485	1	.486	2.478
[SAV = 2]	− 1.135	1.758	.417	1	.519	.322
[SAV = 3]	0[c]			0		
[ETU = 1]	− 1.402	1.160	1.461	1	.227	.246
[ETU = 2]	− 1.321	1.708	.599	1	.439	.267
[ETU = 3]	0[c]			0		
[SPD = 1]	− 2.052	1.150	3.181	1	.074	.129
[SPD = 2]	16.578	.000		1		15,839,362.081
[SPD = 3]	0[c]			0		
[CON = 1]	1.193	1.270	.882	1	.348	3.297
[CON = 2]	19.057	.000		1		189,023,036.027
[CON = 3]	0[c]			0		
[SRC = 1]	− 1.182	1.208	.958	1	.328	.307
[SRC = 2]	− .145	1.349	.012	1	.914	.865
[SRC = 3]	0[c]			0		

Table 7 (continued)

Source Own survey (2022) Note: The p-value (sig. in bold) describes the explanatory variable which significantly affects the response variable (satisfaction of customers).

[a] describes the dependent variable,[b] indicates the floating-point overflow occurred while computing the statistic,[c] describes the reference category of the dummy variable

Table 8 Effect of satisfaction on customer loyalty

Customer loyalty	*B*	Std. Error	Wald	*df*	Sig.	Exp(*B*)
Less loyal						
Intercept	− 2.427	.214	128.571	1	.000	
[CST = 1]	5.572	.928	36.051	1	.000	262.877
[CST = 2]	1681.281	.000		1		.[b]
[CST = 3]	0[c]			0		
Loyal						
Intercept	− 3.373	.335	101.463	1	.000	
[CST = 1]	− .461	6.086	.006	1	.940	.631
[CST = 2]	− 1351.288	.000		1		.000
[CST = 3]	0[c]			0		

Source Own survey (2022). Note: [b] indicates the floating-point overflow occurred while computing the statistic.[c] describes the reference category of the dummy variable

convenience of e-Banking service quality participants who responded "neutral" preferring "dissatisfied" rather than "neutral" were 10,681,052 times more likely to be "more convenient". Therefore, the hypothesis stating "convenience has a statistically significant effect on customer satisfaction" was supported.

Overall, responsiveness, reliability, security and privacy, speed, and convenience significantly affect customer satisfaction. On the other hand, the study confirmed that system availability, easiness to use, and service charge, have no statistically significant effect on customer satisfaction.

From Table 8 below, the *p* value is less than 0.05 demonstrated that customer satisfaction has a significant effect on customer loyalty.

Discussion

The study's main objective is to examine the effect of service quality in using e-banking on customers' satisfaction and loyalty. The research was conducted using a questionnaire consisting of 385 sample respondents accessed while using any e-Banking services.

The overall descriptive results indicated that from the total of 341 respondents, 302 (88.6%) are satisfied with the e-banking service. In contrast, 31 (9.1%) are dissatisfied with e-banking, and the rest, 8 (2.3%) of the respondents are neutral for giving a response about whether they are satisfied or not.

The Chi-square statistical analysis results also indicated that there was a positive relationship between e-Banking service quality variables of responsiveness, reliability, system availability, speed and customer satisfaction with the bank. In addition, the correlation between customer satisfaction and loyalty was found positive and

significant. This indicates that the present study is consistent with previous studies conducted by Engdaw (2020), Hoseini and Dangoliani (2015), and Ismail and Alawamleh (2017). Mohamud (2017) reiterates the importance of service quality dimensions such as reliability, responsiveness and speed should not be overlooked in an attempt to obtain better-satisfied customers. In line with this, Tiruneh (2017) identified the relative importance of the service quality dimensions such as reliability, and responsiveness towards customer satisfaction.

On the other hand, the result revealed no statistically significant correlation between the variables security and privacy, convenience to use, easiness to use and service charge with customer satisfaction. The study results are inconsistent with the findings of Hammoud et al. (2018), Liébana-Cabanillas et al. (2013), Poon (2008), and Shankar and Jebarajakirthy (2019). They argued that the e-Banking dimension of security and privacy, easiness to use, and convenience had a positive and significant effect on customer satisfaction. The present study's finding also indicates that the highest relationship was found between reliability and customer satisfaction, while the lowest relationship was found between system availability and customer satisfaction. In support of the findings of Aghdaie et al. (2015) and Nguyen et al. (2020), this study confirmed a strong relationship between customer satisfaction and loyalty.

The multinomial logistic regression result confirmed a significant effect of the variables responsiveness, reliability, security and privacy, speed, and convenience have a significant effect on customer satisfaction. Similarly, customer satisfaction with the e-banking service quality significantly affects customer loyalty. Scholars like Sewaka et al. (2023) support that Satisfaction is a target and a marketing tool, where it is hoped that the perceived satisfaction will make consumers loyal to the product or service. This implied that when the level of responsiveness, reliability, system availability and speed of e-banking services rise the customer's satisfaction increases too, which enhances the loyalty of the customers towards e-banking technology. This study confirmed that the variables of system availability, easiness to use, and service charge, on the other hand, have no statistically significant effect on customer satisfaction.

Conclusion and managerial implication

Customers are the most important stakeholders for banks. This study employed a quantitative research approach with a descriptive research design aimed to examine the effect of e-Banking service quality on customer satisfaction and loyalty. Data were obtained using a closed-ended structured questionnaire from a total of 385 participants selected using a convenience sampling technique. Frequencies, percentage distributions, group modes, standard deviations, Chi-square correlations, and multinomial logistic regression were employed to analyze the quantitative data. The descriptive analysis revealed that customers were satisfied with the e-Banking service quality provided by the banks in the study area.

From the statistical analysis, concerning the relationship between the dimensions of e-Banking service quality, the Chi-square statistics showed a significant association between responsiveness, reliability, system availability, and speed with customer satisfaction. The finding also revealed that the strongest relationship was found between reliability and customer satisfaction, while a weak relationship was found between system availability

and customer satisfaction. However, the result indicates that security and privacy, convenience to use, easiness to use, and service charge was not significantly associated with the dependent variable of customer satisfaction. Furthermore, the multinomial logistic regression result shows a significant positive effect of responsiveness, reliability, system availability, speed, and convenience on customer satisfaction.

In this ever-growing competitive banking industry, understanding the effect of e-Banking service quality on customers' satisfaction and loyalty is the secret to being competitive and successful in the sector. e-Banking is transforming the financial services industry through supporting growth, promoting innovation, and enhancing competitiveness more effectively in the global environment by extending their products and services beyond the restriction of time and space. This study provides theoretical and practical implications associated with the factors that influence customer satisfaction and loyalty intention. The results of this study can be used as empirical evidence that explains the positive influence of service quality dimensions on customer satisfaction and the positive influence of customer satisfaction on customer loyalty. Hence, based on the findings of this study, it is recommended that policymakers and banks should focus on the factors related to responsiveness, reliability, system availability, speed, and convenience to maximize customer satisfaction. The adoption of e-Banking service that offers a meaningful guarantees takes care of problems promptly, provides services exactly as promised, is always available and quick delivery enables customers to be better satisfied and thus create committed and loyal customers.

Abbreviations

RSP	Responsiveness
RLB	Reliability
SAP	Security and privacy
SAV	System availability
ETU	Easiness to use
SPD	Speed
CON	Convenience
SRC	Service charge
CST	Customer satisfaction
CLT	Customer loyalty
ATM	Automatic Teller Machine
SERVQUAL	Service Quality
e-Banking	Electronic banking
E-S-QUAL	Electronic service quality

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Author contributions
SGA was involved in the planning and conceptualizing of the theoretical part, BAT performed the data analysis part, and BGY carried out the research design and data collection of the study. All authors contributed equally to the final version of the manuscript. In addition, all authors read and approved the final manuscript.

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Availability of data and materials
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Declarations

Competing interests
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