THE EFFECT OF E-SERVICE QUALITY ON CUSTOMER SATISFACTION OF CASH RECYCLING ATM USERS WITH TECHNOLOGICAL OPTIMISM AS A MODERATING VARIABLE

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Abstract: In business organizations there has been an increase in the use of information technology and rapid technological developments, including in the banking industry. Most banks have made technology-based self-service a solution to overcome barriers related to time, distance, and communication. One of them is the Automated Teller Machine (ATM). The purpose of this study is to explain the relationship between the five factors of e-service quality (reliability, security, convenience, functionality, and responsiveness) and customer satisfaction of Cash Recycling ATM users by including technological optimism as moderator. This study used quantitative methods with data analysis techniques using partial least square (PLS) structural equation modeling (SEM). The research was conducted on BCA bank customers in Bandung City, and data collection was conducted through a survey using google form. The findings of this study show a positive and significant relationship between convenience and customer satisfaction. However, reliability, security, functionality, and responsiveness were not found to have a significant effect on customer satisfaction. The study found no evidence of the effect of technological optimism on the relationship between the five factors of e-service quality and customer satisfaction.

Keywords: *Cash Recycling ATM, Customer Satisfaction, E-Service Quality, Technological Optimism*

1. Introduction

In recent years, business organizations have increasingly utilized information technology due to rapid technological advancements (Hendayani & Febrianta, 2020). The integration of automation machines with internet networks has led to improved production efficiency, increased productivity, competitiveness, and profitability (Fonna, 2019). In the banking industry, the rapid digital transformation and competition have made it necessary for banks to adopt technology-based self-service options to reduce barriers related to time, distance, and communication (Othman et al., 2020). Self-service Technology (SST) refers to interface technology that enables customers to perform self-service without the involvement of company employees (Lian, 2021). Banking SST options include Automated Teller Machines (ATMs), Internet Banking (IB), and Mobile Banking.

Automated Teller Machine or ATM is a convenient banking machine that enables customers to perform various banking transactions without the need to visit a bank branch, and it can operate outside of bank operational hours. Although ATMs were first introduced in America, Europe, and Japan in the 1950s-1960s, the exact origin of ATMs is still unknown. There are

several individuals and companies credited with inventing ATMs, including John Shepherd-Barron and James Godfellow from England, and Donald C. Wetzel and Luther Simjian from America. The rise of self-service systems in supermarkets, public transportation ticket sales, and gas stations in America and Europe coincided with the emergence of ATMs (Redaksi, 2022). In Indonesia, ATMs were first introduced by Bank Dagang Bali (BDB) in collaboration with Chase Manhattan Bank in 1984-1985, followed by Bank Niaga in 1986 (Isnaeni, 2017).

In 1988, Bank Central Asia (BCA) began using ATM services and developing banking products through ATM machines, making it the most innovative bank at the time (Isnaeni, 2017). Cash Recycling ATM machines were introduced as a technological innovation to meet the time-saving needs of today's society. With Cash Recycling ATM machines, customers can perform multiple transactions using a single ATM, which reduces queues at the ATM gallery, decreases the frequency of cash replenishment visits, simplifies operations, and increases ATM functionality.

In 2019, BCA was awarded the Muri Record for being the "National Private Bank with the Most Cash Recycling ATM Machines in Indonesia" (BCA, 2019). BCA currently serves 31 million customer accounts and processes approximately 62 million transactions daily. It operates through 1,242 branch offices, 18,065 ATMs, internet and mobile banking services, and a 24-hour Halo BCA contact center. Furthermore, BCA has been strengthening its ATM *Setor Tarik* (STAR) network within its ATM network, allowing customers to deposit and withdraw cash at any time of the day (Hera in (Mardiansyah, 2022)).

The availability of BCA Cash Recycling ATM machines is currently in many strategic locations and has spread in the Jabodetabek area and outside Jabodetabek. BCA Cash Recycling ATMs can also be found in various places in Bandung City. To find out where the location points are, customers can search through the BCA website which provides a search menu for the location of the nearest ATM, branch office, and weekend banking (BCA, 2022).

As one of the largest banks in Southeast Asia, BCA Bank continuously develops and prepares banking solutions for its customers by providing the same level of service to all customers, reviewing transaction convenience, offering consultations related to banking solutions, and measuring customer satisfaction. To enhance customer satisfaction, companies must prioritize the quality of their services and ensure that they can compete effectively in the industry (Putri et al., 2020). Therefore, the bank needs to be aware of customer complaints regarding e-service quality dimensions to improve service quality, especially in terms of technology-based services. Although the economy is increasingly integrating with online systems, such as e-money and e-cash, the role of ATM machines remains crucial for the microeconomy in Indonesia, as there is still a significant number of people who make cash transactions for purchasing goods (Rivan, 2015). Additionally, understanding customers' technology literacy is important to determine the extent to which their comprehension of technology strengthens when using technology-based self-service.

BCA Bank operates in the service industry, where service quality is of utmost importance. Therefore, the bank needs to identify customer complaints in the e-service quality dimension to improve service quality, especially in technology-based services. In the reliability dimension, customers have complained about network failures during transactions, leading to an unpleasant experience and customer dissatisfaction (Firdaus, 2021). In the security dimension, a customer lost their savings due to ATM skimming or card duplication committed by irresponsible individuals, raising concerns about security (Hardiansyah, 2022).

Furthermore, customers have also faced difficulties in accessing the nearest ATM machine due to the limited availability of Cash Recycling ATM machines in strategic locations (convenience dimension). Additionally, customers using the BCA Cash Recycling ATM have encountered a system error that displays the availability of the amount of money in the machine on top of the CRM screen (functionality dimension), leading to dissatisfaction with ATM functionality (Laucereno, 2020).

In the responsiveness dimension, customers may contact Halo BCA customer service if they encounter problems during their ATM transactions. However, there have been reports of customer service agents responding rudely and yelling in a high tone of voice, which can result in customer dissatisfaction (Firdaus, 2021).

Previous studies have discussed similar topics to this research. For example, Othman et al. (2020). The study found that three dimensions of e-service quality, namely "reliability, convenience, and functionality, have a significant positive effect on customer satisfaction. However, the security and responsiveness dimensions do not have a significant effect. Then technological optimism does not moderate the effect of security, convenience, functionality, and responsiveness on customer satisfaction. However, technological optimism was found to weaken the relationship between reliability and customer satisfaction."

Similarly, Zikrillah (2022) found that "the security dimension did not significantly affect predicting customer satisfaction." However, other studies suggest that the security dimension factor does have a significant effect on customer satisfaction (Aslam et al., 2019; Hammoud et al., 2018; Li et al., 2021).

Based on the research gap identified in several previous studies, it can be said that differences in research results related to e-service quality and customer satisfaction may be caused by variations in research objects and locations. Thus, based on the phenomena, data, and previous research explained, the authors are interested in studying the effect of e-service quality on customer satisfaction. This research can aid BCA bank operations and services, particularly for BCA bank customers who face difficulty making transactions during bank operating hours. The results can also serve as an evaluation material for companies to improve their services using self-service technology. Furthermore, understanding technology is also a crucial aspect that needs to be studied to gauge the extent to which customers' technological competence affects their usage of technology-based self-service.

This research seeks to investigate the relationship between e-service quality and customer satisfaction, with a focus on the moderating role of technological optimism. The results of this study could have significant implications not only for BCA bank but for other service companies that rely on self-service technology to serve their customers. Identifying the factors that contribute to customer satisfaction with SST could help companies improve their service quality and ultimately enhance customer loyalty. Furthermore, understanding the role of technological optimism could enable companies to design more effective strategies to promote the adoption and use of technology-based services among their customers.

2. Literature Review and Hypothesis Development

2.1. E-Service Quality

According to Puranda et al. (2022), e-service quality refers to the expertise required to expedite the process of purchasing and delivering goods to customers on e-commerce platforms. The concept of e-service quality is an essential component of overall service quality, which is associated with factors such as cost, customer satisfaction, retention, and loyalty (Gounaris et al., 2010). The e-service quality model serves as a fundamental framework for studying service quality, encompassing both off-site self-service technology (internet and mobile networks) and on-site self-service technology (automated machines, kiosks, etc.) (Othman et al., 2020).

2.2. Customer Satisfaction

In competitive markets, customer satisfaction is regarded as a crucial element of business strategy for acquiring and retaining customers. According to Mei et al. (2017), customer satisfaction refers to the positive emotional response felt by customers after using a product or service, and it plays a vital role in the success of a company. Furthermore, in order to enhance customer satisfaction, it is advisable to utilize information technology as an alternative delivery method while interacting with banking infrastructure, such as through the utilization of Internet Banking and ATM services (Indrayani et al., 2019).

2.3. Reliability

Reliability refers to a product's ability to operate as expected within a given time frame (Russell & Taylor, 2010). Gupta & Starr (2014) note that the reliability dimension is associated with consistent and dependable performance, offering a high level of assurance to customers. To enhance customer satisfaction, ATMs should prioritize technical and functional reliability, ensuring the provision of error-free services (Aslam et al., 2019).

2.4. Security

Security pertains to how safe customers feel from potential security and privacy risks, like identity theft, fraud, and loss of personal information. To address customer concerns about security, service providers must provide assurances that their personal data and privacy will be adequately safeguarded (Alfred & Dwomoh, 2017). Security is a crucial factor that customers need to consider (Indrayani et al., 2019).

2.5. Convenience

Convenience refers to the ease of accessing services provided by a company to its customers (Lin & Hsieh in (Shahid Iqbal et al., 2018)). Convenience is particularly valuable to customers when using technology, as it can save them time and effort (Puranda et al., 2022). Consequently, banks often place ATMs in strategic locations that are frequently visited by customers (Alfred & Dwomoh, 2017).

2.6. Functionality

Functionality refers to the useful aspects of self-service technology in streamlining transaction processes (Ahn & Seo, 2018). SST is designed to be effective and efficient, enabling customers to achieve their desired goals and create a more productive lifestyle (Othman et al., 2020). Therefore, customers expect SST to provide reliable and convenient services that meet their

needs. Additionally, Chong et al., as cited in Aslam et al. (2019), emphasized that a larger number of individuals would opt for electronic banking if they perceive it as stress-free and user-friendly.

2.7. Responsiveness

Iberahim et al. (2016) state that responsiveness focuses on the flexibility and speed of response as the readiness of the system to fulfill customer desires by providing fast service. Raza et al. (2020) unveiled that responsiveness is the primary variable that can be employed to assess the quality of banking services. Subsequently, customers evaluate the promptness of bank officers in responding to and addressing customer complaints (Indrayani et al., 2019).

2.8. Technological Optimism

Technological optimism is the belief that science and technology can solve current social and environmental problems (Alexander & Rutherford, 2019). In simpler terms, technological optimism refers to a positive and proactive attitude towards technology that aims to improve one's ability to control, adapt to, and perform tasks more effectively. In the study conducted by Wang et al., as cited in Othman et al. (2020), a robust correlation was discovered between optimism and satisfaction in utilizing self-service technology (SST).

2.9. Self-service Technology

Meuter et al. (in (Guan et al., 2021)) define SST as an interface technology that allows customers to serve themselves without direct employee involvement. SST provides customers with various options on when and how to receive services. For instance, ATMs have improved service accessibility outside of bank operating hours (Shahid Iqbal et al., 2018).

2.10. Cash Recycle Machine

Sumarauw et al. (in (Rahmawati, 2020)) state that the Cash Recycling Machine (CRM) is an advancement of the cash deposit machine (CDM). While CDMs can only accept cash deposits, CRMs can also provide cash withdrawal services. By incorporating the latest features of ATMs, CRMs offer great convenience and practicality in terms of time management for financial transactions (Duhita & Zubaedah, 2022).

2.11. Theoretical Framework

The framework depicted in Figure 1 has been adapted from Othman et al. (2020) and incorporates insights from several relevant previous studies.
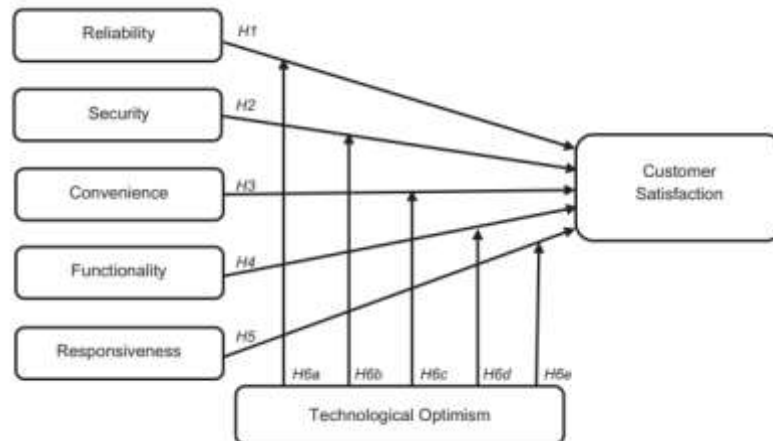
Figure 1. Theoretical Framework

2.12. Hypothesis

The hypotheses in this study are framed as follows:

H1: Customer Satisfaction is positively influenced by Reliability.

H2: Customer Satisfaction is positively influenced by Security.

H3: Customer Satisfaction is positively influenced by Convenience.

H4: Customer Satisfaction is positively influenced by Functionality.

H5: Customer Satisfaction is positively influenced by Responsiveness.

H6a: The effect of Reliability on Customer Satisfaction is moderated by Technological Optimism.

H6b: The effect of Security on Customer Satisfaction is moderated by Technological Optimism.

H6c: The effect of Convenience on Customer Satisfaction is moderated by Technological Optimism.

H6d: The effect of Functionality on Customer Satisfaction is moderated by Technological Optimism.

H6e: The effect of Responsiveness on Customer Satisfaction is moderated by Technological Optimism.

3. Research Method

This study employed descriptive research with a quantitative approach. The information was gathered from two sources: primary data (from questionnaires) and secondary data from articles, online news, and books. The study focused on three variables: customer satisfaction as the dependent variable; reliability, security, convenience, functionality, and responsiveness as independent variables; and technological optimism as a moderating variable. As part of the research, the Structural Equation Modeling (SEM) method was employed, specifically utilizing the Partial Least Squares (PLS) method (Mahadika & Hendayani, 2021). PLS-SEM proves valuable in examining the relationship between independent and dependent variables, aligning with the chosen model and research objectives (Haliza & Hendayani, 2021). The study focused on BCA bank customers residing in Bandung City, with data collection conducted through a survey implemented via Google Forms. A total of 114 respondents, who were BCA bank

customers and had utilized BCA Cash Recycling ATMs for their transactions, participated in the survey.

## 4. Results and Discussion

4.1. Results

4.1.1. Outer Model

According to Ghozali (2021), the constructs' measures (manifest variables) must exhibit a high correlation. The parameters employed to assess convergent validity in this study include the Loading Factor, Composite Reliability, and Average Variance Extracted (AVE). Figure 2 displays the loading factor values obtained through the PLS Algorithm calculation.
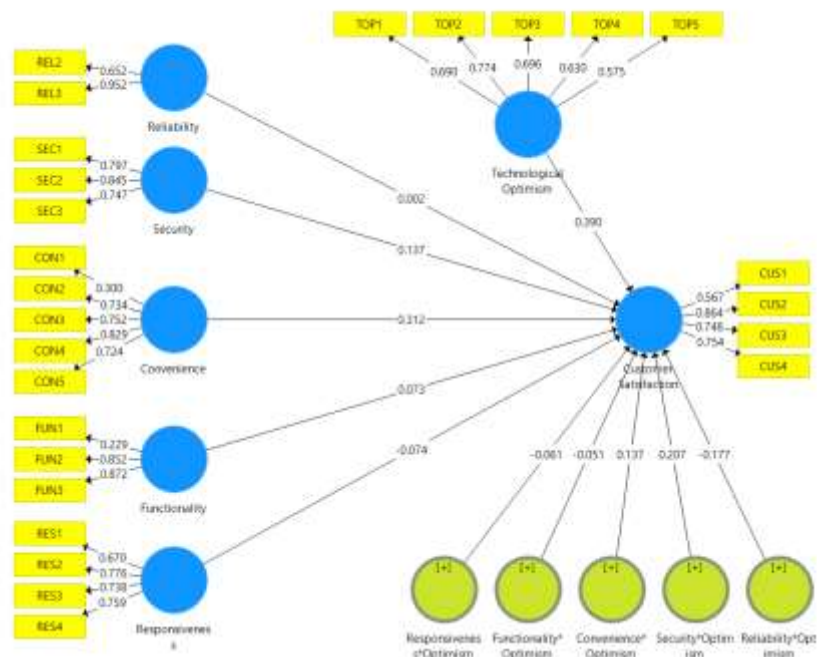
Figure 2. Outer Model

The resulting loading factor will be used to test the construct's validity. Based on general rules, a loading factor is considered valid if it has a value ≥ 0.7 (Haryono, 2016). Therefore, any loading factor value that is still ≤ 0.7 must be removed from the measurement model.
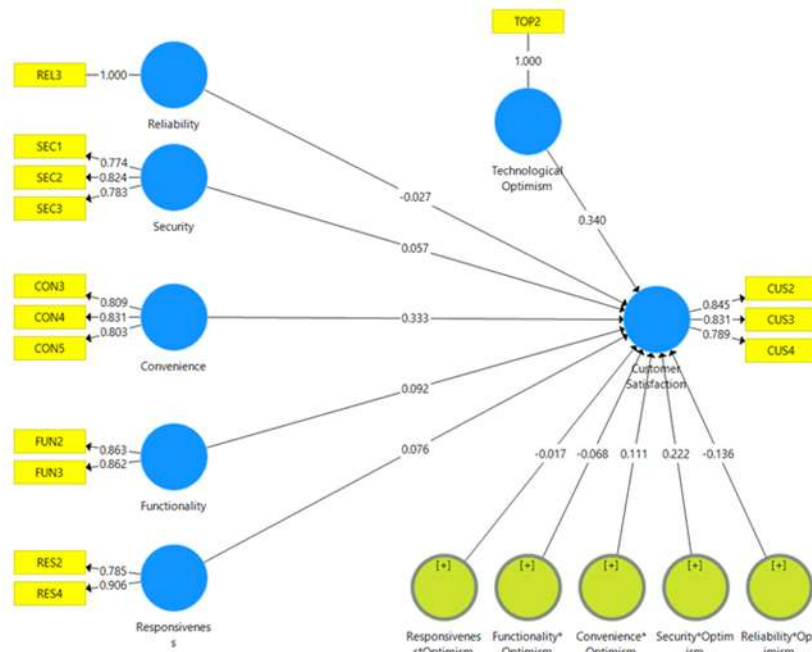
Figure 3. Outer Model (recalculate)

Based on the loading factor calculation results in Figure 3, it is evident that some indicators on the research variables were excluded from the model, namely CON1, CON2, CUS1, FUN1, REL2, RES1, RES3, TOP1, TOP3, TOP4, and TOP5. The PLS algorithm was processed three times in stages, until finally, it was observed that each indicator on the research variables had a loading factor value ≥ 0.7. This implies that "all indicators are valid."

Table 1. AVE and Composite Reliability

	Reliability	Security	Convenience	Functionality	Responsiveness	Customer Satisfaction	Technological Optimism
AVE	1,000	0,630	0,663	0,744	0,719	0,676	1,000
CR	1,000	0,836	0,855	0,853	0,836	0,862	1,000

Further, composite reliability value is in Table 1, each indicator on the research variable ≥ 0.7, ranging from 0.836 to 1.000. This indicates that all indicators used in the study are reliable, which is above the minimum threshold value of 0.7 suggested by (Hair et al., 2019). The validity of the construct can be tested using the AVE (Average Variance Extracted) value. Ghozali (2021) recommends that the AVE value must be ≥ 0.5, which explains 50% or more of the variance of the indicator. This indicates that all of the constructs have convergent validity, as evidenced by the Average Variance Extracted (AVE) values in Table 1 being greater than or equal to 0.5, with a range of 0.630 to 1.000.

The Fornell-Larcker Criterion was used to test discriminant validity at the variable level by comparing the square root of the AVE to the correlation between variables.

Table 2. Fornell-Larcker Criterion

	Convenience	Customer Satisfaction	Functionality	Reliability	Responsiveness	Security	Technological Optimism
Convenience	0,814						
Customer Satisfaction	0,568	0,822					
Functionality	0,37	0,349	0,862				
Reliability	0,221	0,214	0,383	1			
Responsiveness	0,337	0,301	0,249	0,393	0,848		
Security	0,372	0,385	0,453	0,348	0,671	0,794	
Technological Optimism	0,382	0,491	0,442	0,321	0,178	0,286	1

Table 2 reveals that the square root of the AVE value for each variable is higher than its correlation with other variables, as per the results of the Fornell-Larcker Criterion. Specifically, the root AVE of customer satisfaction (0.822) is greater than the correlation with convenience (0.568) and functionality (0.349), thereby indicating discriminant validity.

4.1.2. Structural Model Evaluation (Inner Model)
This model can be determined by checking two factors - checking the collinearity of the independent variables (inner collinearity) and testing the research hypothesis based on the path coefficient from the Bootstrapping calculation results (Yamin, 2021). In addition, measuring R-Square, Effect Size, and Q-Square Redundancy is also needed to determine the fit of the model.
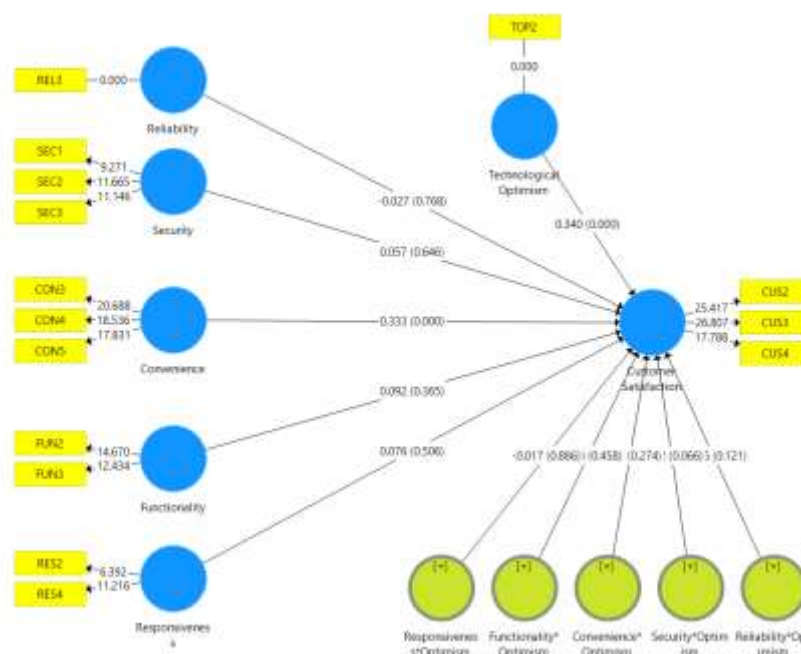
Figure 4. Inner Model

The inner VIF value of the reliability, security, convenience, functionality, responsiveness, and moderating variable technological optimism has a value ≤ 5, which is between the values of 1.458 to 2.711. Therefore, the level of multicollinearity is low (negligible). According to Hair et al. (2019), "a high substantive effect is indicated by an R-Square value of 0.75, a moderate substantive effect is indicated by a value of 0.50, and a weak substantive effect is indicated by a value of 0.25." The R-Square value in this study indicates that 48.5% of the changes in customer

satisfaction can be explained by the independent variables. This is not very strong and it means that there are other factors outside the study (51.5%) that also impact customer satisfaction.

In this study, the effect of convenience (0.137), reliability * optimism (0.028), and security * optimism (0.036) at the structural level is ≤ 0.15, which falls into the small category. The effect of technological optimism at the structural level of 0.154 falls into the medium category ($0.15 \leq f^2 \leq 0.35$). The rest of the variables have a value ≤ 0.02, which falls into the category of no effect.

The Q-Square measurement shows how well the model can predict customer satisfaction. In this study, the Q-Square value is 0.289, which means the model can predict customer satisfaction. Path coefficients are analyzed to assess the significance of relationships between constructs and determine the direction (positive or negative) of the relationships between variables (Siregar et al., 2022). The T-Statistic value from the Bootstrapping calculation results is used to determine the significance of the relationship between constructs. If the T-Statistic value is ≥ 1.96 or the P-Value is ≤ 0.05, the Path coefficient is considered significant (Haryono, 2016).

Table 3. Path Coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Convenience → Customer Satisfaction	0,333	0,339	0,088	3,776	0,000
Convenience*Optimism → Customer Satisfaction	0,111	0,111	0,102	1,093	0,274
Functionality → Customer Satisfaction	0,092	0,092	0,102	0,906	0,365
Functionality*Optimism → Customer Satisfaction	-0,068	-0,061	0,092	0,742	0,458
Reliability → Customer Satisfaction	-0,027	-0,023	0,093	0,295	0,768
Reliability*Optimism → Customer Satisfaction	-0,136	-0,139	0,088	1,552	0,121
Responsiveness → Customer Satisfaction	0,076	0,066	0,115	0,665	0,506
Responsiveness*Optimism → Customer Satisfaction	-0,017	0,001	0,122	0,143	0,886
Security → Customer Satisfaction	0,057	0,074	0,125	0,459	0,646
Security*Optimism → Customer Satisfaction	0,222	0,204	0,121	1,837	0,066
Technological Optimism → Customer Satisfaction	0,34	0,337	0,095	3,565	0,000

Table 3 reveal the results of the path coefficient analysis for the relationship between each variable and customer satisfaction. The p-value and t-statistics value were calculated for each variable, and hypotheses were accepted or rejected accordingly. The results showed that the hypotheses regarding the effects of reliability (H1), security (H2), functionality (H4), and responsiveness (H5) on customer satisfaction were rejected. However, the hypothesis regarding the effect of convenience (H3) on customer satisfaction was accepted.

Moreover, the study also examined the moderating role of technological optimism on the relationship between each variable and customer satisfaction. The results showed that all hypotheses (H6a-6e) regarding the moderating effects of technological optimism on the relationship between each variable and customer satisfaction were rejected, as the p-values were greater than 0.05 and the t-statistics values were less than 1.96.

4.2. Discussion

4.2.1. The Effect of Reliability on Customer Satisfaction

The study tested the first hypothesis (H1), that "reliability has a positive and significant effect on customer satisfaction." The results of the study showed that reliability did not have a positive and significant effect on customer satisfaction. However, this finding contradicts the results of previous research (Aslam et al., 2019; Hammoud et al., 2018; Othman et al., 2020; Pakurár et al.,

2019), where "reliability was found to have a significant positive effect on customer satisfaction."

4.2.2. The Effect of Security on Customer Satisfaction
The second hypothesis (H2) "security has a positive and significant effect on customer satisfaction." The study found that security had a positive but insignificant effect on customer satisfaction. The findings of this study are consistent with previous research conducted (Othman et al., 2020; Zikrillah, 2022), where "security was not found to have a significant impact on customer satisfaction."

4.2.3. The Effect of Convenience on Customer Satisfaction
The third hypothesis (H3) of the study "convenience has a positive and significant effect on customer satisfaction." The study found that convenience had a positive and significant effect on customer satisfaction. The findings of this study are consistent with previous research conducted by Othman et al. (2020), where "convenience was found to have a significant positive effect on customer satisfaction."

4.2.4. The Effect of Functionality on Customer Satisfaction
The fourth hypothesis (H4) of the study stated that "functionality has a positive and significant effect on customer satisfaction." However, the study found that functionality had a positive but insignificant effect on customer satisfaction. This finding contradicts the results of previous research conducted by Othman et al. (2020), where "functionality was found to have a significant positive effect on customer satisfaction."

4.2.5. The Effect of Responsiveness on Customer Satisfaction
The fifth hypothesis (H5) that "responsiveness has a positive and significant effect on customer satisfaction." The study found that responsiveness had a positive but insignificant effect on customer satisfaction. The findings of this study are consistent with previous research conducted by Othman et al. (2020) and Aslam (2019), where "responsiveness was not found to have a significant effect on customer satisfaction."

4.2.6. The Effect of Reliability on Customer Satisfaction with Technological Optimism as a Moderating Variable
The study found that "technological optimism does not moderate the effect of reliability on customer satisfaction," based on the results of testing H6a. This suggests that even if customers have high levels of optimism towards technology, it does not significantly impact their satisfaction with the reliability of BCA Cash Recycling ATMs. This finding contradicts the results of previous research conducted by Othman et al. (2020), where "technological optimism was found to weaken the relationship between reliability and customer satisfaction."

4.2.7. The Effect of Security on Customer Satisfaction with Technological Optimism as a Moderating Variable
Similarly, the study found that "technological optimism does not moderate the effect of security on customer satisfaction," based on the results of testing H6b. This indicates that high levels of technological optimism among customers do not significantly affect their satisfaction with the

security of BCA Cash Recycling ATMs. These findings are also in line with previous research by Othman et al. (2020).

4.2.8. The Effect of Convenience on Customer Satisfaction with Technological Optimism as a Moderating Variable

The study also found that "technological optimism does not moderate the effect of convenience on customer satisfaction," based on the results of testing H6c. This suggests that customers' level of technological optimism does not significantly impact their satisfaction with the convenience of accessing BCA Cash Recycling ATMs. These findings are consistent with previous research by Othman et al. (2020).

4.2.9. The Effect of Functionality on Customer Satisfaction with Technological Optimism as a Moderating Variable

Furthermore, the study found that "technological optimism does not moderate the effect of functionality on customer satisfaction," based on the results of testing H6d. This suggests that customers' level of technological optimism does not significantly affect their satisfaction with the functionality of BCA Cash Recycling ATMs. These findings are also consistent with previous research by Othman et al. (2020).

4.2.10. The Effect of Responsiveness on Customer Satisfaction with Technological Optimism as a Moderating Variable

Finally, the study found that "technological optimism does not moderate the effect of responsiveness on customer satisfaction," based on the results of testing H6e. This indicates that customers' level of technological optimism does not significantly impact their satisfaction with the responsiveness of BCA Cash Recycling ATMs. These findings are also in line with previous research by Othman et al. (2020).

5. Conclusion

The objective of this research was to examine how the quality of e-service factors, such as reliability, security, convenience, functionality, and responsiveness, affects customer satisfaction, while considering technological optimism as a moderating variable. The findings indicate that reliability (H1) did not have a positive and significant impact on customer satisfaction, while Security (H2) have a positive but with insignificant impact on customer satisfaction. Convenience (H3), on the other hand, had a significant positive impact on customer satisfaction, indicating that customers prefer Cash Recycling ATMs located nearby. Functionality (H4) and responsiveness (H5) had positive but insignificant effects on customer satisfaction. Additionally, the study found no evidence of an interaction effect of technological optimism on customer satisfaction (H6a-6e). Based on the results, the bank should prioritize providing easy access to Cash Recycling ATMs to increase customer satisfaction.

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