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Service Quality of ATMs and Its Impact on Customer Satisfaction of Algerian Commercial Banks

Abstract: Today, information and communication technology has become deeply integrated into various sectors of economic activity, particularly the banking sector, where several modern technologies and equipment have emerged under the umbrella of electronic banking. In this context, the present study was based on the ServQual model developed by Parasuraman et al. (1988), using an electronic questionnaire distributed to a sample of 113 ATM users. The research instrument included 45 items across three main sections measured on a five-point Likert scale, and the data were analyzed using SPSS 28 with a 5% significance level. Academic experts from the Universities of Annaba and El-Tarf confirmed the validity of the instrument. At the same time, its reliability was verified through Cronbach's Alpha (0.961), reflecting a high level of reliability. The findings revealed positive tendencies toward all dimensions of ATM service quality, with simple linear regression analysis showing that these dimensions explained 62.40% of the variance in customer satisfaction. Among the dimensions, empathy had the most significant impact (56.50%), followed by security (54.40%), then responsiveness, reliability, and tangibility. The study recommends strengthening empathy and security to improve customer satisfaction. It suggests that Algerian banks increase the deployment of ATMs, ensure regular maintenance, select suitable locations, and support the use of the Arabic language. Finally, the study concludes with future research proposals to further explore the relationship between ATM service quality and customer satisfaction in the Algerian context.

Keywords: ATMs, Banks, Customer Satisfaction, Electronic Banking, Service Quality.

Jakość usług bankomatów i jej wpływ na satysfakcję klientów w algierskich bankach komercyjnych

Abstrakt: Obecnie technologie informacyjno-komunikacyjne są głęboko zintegrowane z różnymi sektorami działalności gospodarczej, w szczególności z sektorem bankowym, w którym w ramach bankowości elektronicznej pojawiło się wiele nowoczesnych technologii i urządzeń. W tym kontekście niniejsze badanie oparto na modelu ServQual opracowanym przez Parasuraman i in. (1988), wykorzystując elektroniczny kwestionariusz dystrybuowany wśród próby 113 użytkowników bankomatów. Narzędzie badawcze obejmowało 45 pozycji w trzech głównych sekcjach, mierzonych przy użyciu pięciostopniowej skali Likerta, a dane zostały przeanalizowane za pomocą programu SPSS 28 przy poziomie istotności 5%. Trafność narzędzia została potwierdzona przez ekspertów akademickich z Uniwersytetów w Annabie i El-Tarf, natomiast jego rzetelność została zweryfikowana przy pomocy współczynnika alfa Cronbacha (0,961), co odzwierciedla wysoki poziom wiarygodności. Wyniki ujawniły pozytywne tendencje we wszystkich wymiarach jakości usług bankomatowych, a analiza regresji liniowej wykazała, że wyjaśniają one 62,40% zmienności satysfakcji klientów. Spośród badanych obszarów największy wpływ miała empatia (56,50%), następnie bezpieczeństwo

(54,40%), a dalej responsywność, niezawodność i namacalność. Badanie zaleca wzmocnienie empatii i bezpieczeństwa w celu poprawy satysfakcji klientów oraz sugeruje, aby banki algierskie zwiększyły liczbę bankomatów, zapewniały ich regularne utrzymanie, wybierały odpowiednie lokalizacje i wspierały ich obsługę w języku arabskim. Na zakończenie artykułu przestawiono propozycje przyszłych badań mających na celu dalsze zgłębianie związku między jakością usług bankomatowych a satysfakcją klientów w kontekście algierskim.

Słowa kluczowe: bankomaty, banki, satysfakcja klienta, bankowość elektroniczna, jakość usług

JEL: G21, L15, M3, O31

Introduction

The world of banking and business is currently undergoing a qualitative transformation that has reshaped the dimensions, objectives, and strategies of banks in recent decades. This shift is a logical outcome of the revolution in new information and communication technologies (ICTs) and the globalization of financial and banking markets. This has prompted banks and financial institutions to focus on providing new types of services that align with the characteristics of today's banking market, known as electronic banking services.

Automated Teller Machines (ATMs) are among the most prominent electronic banking technologies, currently performing several key functions, including: customer transaction processing, payment of purchases, fund transfers, account inquiries, requesting checkbooks and bank cards, cash deposits, check withdrawals, statement requests, message submissions, inquiries, and more (Karagama, 2021).

Recently, due to the global circumstances, particularly the spread of the COVID-19 pandemic, electronic payment transactions and the usage of bank cards and ATMs have surged significantly. This trend stems from the growing preference among people to avoid using traditional cash and direct transactions, which are among the primary means by which the coronavirus is transmitted and spread. This imparts utmost importance to the subject of this study.

Study problem

Discussing the topic of electronic banking in Algeria is a relatively recent development. It is a result of a series of reforms that affected the banking sector in Algeria, particularly during the 1990s, specifically the comprehensive banking reform known as the Money and Credit Law (90-10), issued on 14 April 1990, along with various subsequent amendments.

Since that time, Algerian commercial banks have been striving to implement electronic banking and transition to electronic banking operations, in line with the requirements of recent banking reforms on the one hand, and driven by their desire to benefit from the advantages of

electronic banking on the other. Within this context, Algerian banks have been working to offer their products and services through various modern electronic banking channels. Among these channels, Automated Teller Machines (ATMs) stand out, offering benefits such as speed, ease, convenience, security, and cost reduction.

The problem of this study can be formulated in the following central question: Do different dimensions of ATM service quality influence the satisfaction of customers of Algerian commercial banks?

Study objective

The primary aim of this study is to uncover how the quality of Automated Teller Machine (ATM) services impacts customer satisfaction in Algerian commercial banks. This topic is addressed within the context of a growing dynamism and evident development observed in the Algerian banking sector today, particularly in the field of promoting electronic banking. This movement is in response to various internal circumstances, foremost among them being the new directions of banking reforms in Algeria. These reforms emphasize the necessity of advancing electronic banking, culminating in the issuance of the New Monetary and Banking Law in 2023. Additionally, this movement responds to external conditions, particularly the positive reverse effects of the COVID-19 pandemic. This pandemic compelled Algerian customers and banks alike to engage in electronic banking transactions, resulting in a significant increase in all electronic banking indicators and statistics in Algeria. This stands as a clear testament to the impact of these external factors.

Theoretical framework

Quality of Banking Services and Its Dimensions

Banks strive to build and develop long-term relationships with their customers by offering a package of high-quality products and services that meet their needs and expectations. This ensures their survival and continuity in a dynamic environment.

Definitions of service quality have varied over time. Grönroos (1984) defined it as the result of customers' comparison between the service they expect and the service actually provided. Similarly, Parasuraman et al. (1985) defined service quality as the difference between customers' expectations and their perceptions of actual service performance.

Philip (1997) described service quality as the overall image of a service that satisfies explicit and implicit customer needs and desires. Lovelock and Wright (2002) defined it as a long-term perceptual assessment performed by customers of the service delivery process.

Parasuraman et al. (1985) initially identified ten core dimensions of service quality: credibility, security, ease of access, communication, understanding customers, tangibility, reliability, responsiveness, efficiency, and courtesy. Later, they consolidated these into five dimensions (Parasuraman et al., 1988):

- Reliability: Performing the required service dependably and accurately.
- Responsiveness: Providing prompt service and assistance when requested.
- Assurance (Security): Employee competence, courtesy, trustworthiness, and confidence.
- Empathy: Effective communication, understanding customers, and personalized attention.
- Tangibility: Physical facilities, equipment, and staff appearance.

It is worth noting that the revised model of service quality dimensions by Parasuraman, Zeithaml and Berry (1985) is one of the most renowned models in the field of marketing, in general, and service marketing, in particular. This model has gained widespread agreement among researchers and has been adopted in various studies, including the present one.

Automated Teller Machines (ATMs)

Automated Teller Machines (ATMs) emerged in the 1970s as an alternative to bank tellers, aimed at reducing transaction volumes within banks. It is widely agreed that the first ATM was installed on 27 June 1967, at the Barclays Bank branch in Enfield Town, London, by the Scottish inventor John Shepherd Barron (Hossain, Russel, Robedas, 2015). In the 1980s and 1990s, interest in ATMs expanded as banks sought to lower costs and gain a competitive advantage. Currently, these machines have undergone significant advancements due to the IT revolution, which has contributed to their proliferation and the diversification of services offered.

An Automated Teller Machine (ATM) refers to a device that operates as a bank teller, receiving and dispensing money to cardholders or users. This eliminates the need for customers to visit a physical bank branch or carry cash; instead, they can conduct their transactions using their credit or debit cards (Singh et al., 2020).

In other words, an ATM is an electronic device that serves customers automatically through pre-programmed software, catering to various banking needs 24/7, without the need for human intervention. This service is facilitated through an ATM card, a plastic card issued by the bank to customers upon request. The card contains customer information and a personal identification number (PIN) known and set by the cardholder only (Davies et al., 1996; Joseph, Stone, 2003).

ATMs offer several benefits to customers, including (Davies et al., 1996; Karagama, 2021):

- Time and effort savings, redirecting customers to other services.
- Reduction of the cost of checkbook printing and preparation.
- Contributing to the bank's profitability for shareholders.
- Maintaining the provision of outstanding services.
- Shortening waiting queues.
- Shifting customers to more efficient service channels and assigning minor tasks to ATMs, such as balance inquiries.
- Reducing workforce in individual branches, aiding the bank in achieving its banking strategy.

However, using ATMs also comes with disadvantages, including (Leblanc, 1990; Amene, Buta, 2019):

- Inability to use the ATM in case of forgetting the PIN.
- The possibility of system malfunctions or internet connection disruptions.
- Frequent commission charges for using ATMs.
- Customer card retention by the ATM due to technical issues.
- The possibility of cash being stuck in the cash dispenser while simultaneously being deducted from the account.

Quality of ATM Service

ATM service, considering it as one of the most prominent and innovative banking services, yields the following five dimensions of ATM service quality (Leblanc, 1990; Al Sawalqa, 2012; Idris, 2014; Khan, Abdullah, 2019; Amene, Buta, 2019; Singh et al., 2020; Tadesse, Bakala, 2021):

- Tangibles: Including factors like the number of ATMs, strategic placement locations, language diversity, screen quality, and visibility of the bank's name and logo on the ATM.
- Reliability: Encompassing factors such as the variety of ATM services, ease of use, service speed and accuracy, simplicity of procedures, and accessibility to ATM locations.
- Responsiveness: Including availability of sufficient cash in the machines, time and effort savings, acceptable wait time during usage, 24/7 availability, and alignment of card services with provided services.
- Security: Covering high levels of privacy and confidentiality, security during usage, safety of ATM locations, low occurrence of machine malfunctions, and provision of sufficient instructions for usage.
- Empathy: Encompassing low usage fees, bank staff cooperation in responding to inquiries and aiding customers during issues, as well as providing brochures and instructional guides for ATM usage.

Bank Customer Satisfaction

The primary objective of integrating marketing concepts in banks is to build, elevate, and maintain long-term relationships with customers that fulfill the goals of both parties. Satisfaction is a key determinant of the continuity of this relationship and a significant indicator of a bank's ability to meet its commitments to current and prospective customers.

Lovelock and Wright (2002) define customer satisfaction succinctly as "a short-term emotional response to a specific product or service performance". Meanwhile, Cronin and Taylor (1994) define it as "a temporary judgment that arises from a specific service encounter".

Hence, customer satisfaction in a bank is an observable and expressible phenomenon by customers, conveyed to the bank through written or unwritten messages. This behavior (satisfaction) results from the bank's provision of high-quality services. The interaction between the bank and its customers, along with the measurement of their satisfaction, will serve as an outcome to gauge the bank's effectiveness in achieving customer satisfaction and loyalty (Spreng, Mackenzie, Olshavsky, 1996).

To achieve customer satisfaction, banks should take several measures, including (Pezzullo, 1993; Smajlović, 2015):

- Developing existing banking services and introducing new ones.
- Focusing on the stages preceding, during, and after the sale of banking services.
- Prioritizing customer service and strengthening customer relationships.
- Addressing customer complaints and finding solutions.
- Leveraging modern banking technology to serve bank customers to the extent possible.

Literature Review

Numerous previous studies have examined the subject of this study or its various components. For example, Kauffman and Theisen (1990) conducted a study on the evolution of ATMs in the United States and their role in advancing the American banking sector. They analyzed various aspects related to ATMs, including subscriptions, changes in their numbers, ownership, and proliferation. The study concluded that a significant future breakthrough was anticipated for ATMs in the U.S., encompassing their software, service quality, performance, and fees. These factors increased customer interest in ATMs, leading to substantial cost savings.

In the same year, Leblanc (1990) studied the motivators and barriers affecting the usage of ATMs by customers of Canadian financial institutions. Based on a survey of 208 customers, the study revealed that the prominent factors influencing ATM usage were ease of use, avoiding waiting lines, service quality, cost reduction, and risk mitigation. Conversely, factors

discouraging usage included preference for personal interactions, complex procedures, and personal and financial risks.

Al Sawalqa (2012) evaluated the impact of dimensions such as low cost, security, privacy, and ease of use on meeting the financial needs of ATM users in Jordan. Surveying 132 individuals, the study found that privacy and security had a significant effect on meeting customers' financial needs. At the same time, low cost and ease of use did not exhibit such an impact.

Similarly, Idris (2014) assessed the satisfaction of Nigerian bank customers regarding various dimensions of ATM service quality. The study surveyed 106 customers from various commercial banks in Zamfara State and found that customers generally had positive attitudes toward the ease of use and accessibility of the services. In contrast, their attitudes toward security were negative.

Uddin et al. (2016) analyzed the attitudes of Omani bank customers towards using ATMs. Based on data collected from 200 customers of two banks, the study highlighted significant differences in customer satisfaction between the two banks. Common challenges faced by customers included machine malfunctions, long waiting lines, and difficulties in viewing screen data.

Weerasiri and Koththagoda (2017) examined the impact of ATM usage on customer satisfaction in government banks in Sri Lanka. Using a sample of 385 customers, the study found a positive effect of ATM usage on satisfaction and identified demographic differences affecting usage.

Matimbwa and Ochumbo (2018) explored determinants of customer satisfaction with ATMs in a Tanzanian bank. Based on responses from 340 customers, the study identified ease of use, process efficiency, security, reliability, responsiveness, and lower cost as crucial factors. The authors recommended effective strategies for encouraging customers to use ATMs.

In Pakistan, Khan and Abdullah (2019) investigated the impact of ATM service quality on customer satisfaction and loyalty. Surveying 360 ATM users in Karachi, the study found that fidelity, reliability, ease of use, security, and privacy significantly influenced customer satisfaction. However, convenience and responsiveness did not exhibit a significant effect. The findings also revealed a strong relationship between customer satisfaction and loyalty.

Amene and Buta (2019) examined the factors influencing customer satisfaction with ATM usage in Ethiopian commercial banks. Surveying 200 customers, they found time-saving to be the most critical factor, followed by responsiveness, efficiency, convenience, reliability, and

appearance. Challenges included network unreliability, limited daily withdrawal amounts, usage fees, cash shortages, card malfunctions, and long queues.

In Malaysia, Singh et al. (2020) conducted a study involving 380 residents in Kangar, Perlis, to assess customer satisfaction with ATM quality. The study found a positive correlation between all dimensions of ATM service quality (tangibility, reliability, responsiveness, empathy, and security) and customer satisfaction.

The current study stands out from previous research due to its focus on the Algerian context. Local studies investigating the use of ATMs to achieve customer satisfaction are scarce. Algerian studies have primarily focused on the adoption and importance of electronic banking services within commercial banks, with limited research specifically examining ATMs as a crucial electronic banking channel, particularly in the Arabic language.

Method and Procedures

Study Model

This study is primarily based on the renowned "ServQual" model of service quality developed by Parasuraman, Zeithaml, and Berry in 1988. Using this model as a foundation, the following theoretical model was developed:

Figure 1. Study Model

Source: Developed by the researcher.

Study Hypothesis

This study proceeds from the following main hypotheses: There is a statistically significant impact of the overall quality of ATM service on customer satisfaction with Algerian commercial banks.

The following sub-hypotheses fall under this central hypothesis:

- Sub-Hypothesis 1: There is a statistically significant impact of the tangibility dimension of ATM service on customer satisfaction of Algerian commercial banks.
- Sub-Hypothesis 2: There is a statistically significant impact of the reliability dimension of ATM service on customer satisfaction of Algerian commercial banks.
- Sub-Hypothesis 3: There is a statistically significant impact of the responsiveness dimension of ATM service on customer satisfaction of Algerian commercial banks.

- Sub-Hypothesis 4: There is a statistically significant impact of the security dimension of ATM service on customer satisfaction of Algerian commercial banks.
- Sub-Hypothesis 5: There is a statistically significant impact of the empathy dimension of ATM service on customer satisfaction of Algerian commercial banks.

Study Population and Sample

The study population consists of users of Automated Teller Machines (ATMs) holding bank cards affiliated with commercial banks operating in Algeria, whether public or private. The questionnaires were distributed randomly through electronic means (an online survey). Accordingly, the study sample was formed using the Convenience Sampling method, where 133 questionnaires were distributed, of which 113 were retrieved, all of which were suitable for statistical analysis. This is one of the advantages of the electronic survey.

Study Instrument

A questionnaire was designed as the primary tool for data collection and information related to the field study. It was developed by referring to previous studies that addressed the topic and by adopting the (ServQual) model. The questionnaire comprised three main parts, totaling 45 paragraphs, as follows:

- Part 1: Includes demographic data of the study sample, such as gender, age, educational level, occupation, and the bank they deal with.
- Part 2: Includes the five dimensions of ATM service quality (Tangibles, Reliability, Responsiveness, Security, and Empathy), with a total of 25 paragraphs, five for each dimension.
- Part 3: Includes a paragraph related to measuring bank customers' satisfaction, totaling 15 paragraphs.

The questionnaire was designed using a five-point Likert scale (Strongly Disagree with weight 1, Disagree with weight 2, Neutral with weight 3, Agree with weight 4, Strongly Agree with weight 5). The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 28, at a significance level of 5%.

Reliability and Validity of the Study Instrument

To ensure the reliability of the study instrument, Cronbach's alpha coefficient was used, and the overall value for the entire questionnaire was 0.961, which is a good value and higher than the minimum required value of 0.60. This indicates that the study instrument possesses good reliability and is therefore dependable.

Regarding the face validity of the study instrument, it was verified by presenting the questionnaire to a group of five expert and peer-reviewed professors from the universities of

Annaba and El Tarf in Algeria. The questionnaire was revised based on their suggestions and guidance

Results

Demographic Data of the Study Sample

The results showed that the majority of respondents were males, accounting for 57.50%, compared to 42.50% females.

The predominant age group among the respondents is the group aged 31 to 40 years, with a significantly high percentage of 48.70%. This is followed by the young age group (21 to 30 years), with a percentage of 26.50%, then the middle-aged group (41 to 50 years), with a percentage of 20.40%, and finally the elderly group (51 to 60 years), with the lowest percentage of 4.40%.

Most respondents have a university education, accounting for 51.60%. They are followed by those with a secondary education level, representing 33.20%, and finally the group with higher education levels (postgraduate diploma, master's, doctoral) at a percentage of 15.20%.

The majority of respondents are public sector employees, constituting 66.40%. Following this, private sector employees account for 15.90%, self-employed individuals for 7.20%, students for 7.00%, and retirees for 3.50%.

The distribution of the study sample according to the bank to which the respondents belong is illustrated in Figure 2.

Figure 2. Distribution of the Study Sample According to the Bank They Deal With
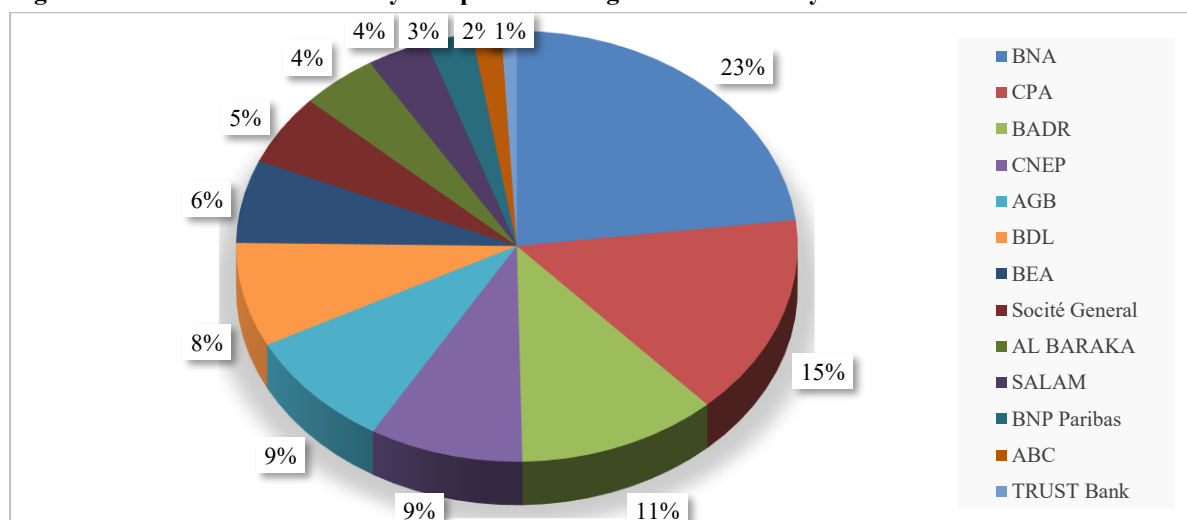
Source: Prepared by the researcher based on the outputs of SPSS version 28.

The results shown in the figure indicate that the overwhelming majority of respondents are customers of the six public banks (Banque Nationale d'Algérie, Banque de l'Algérie, Caisse

Nationale d'Épargne et de Prévoyance, Banque de Développement Local, Banque de l'Agriculture et du Développement Rural, Banque de l'Extérieur d'Algérie) with a combined percentage of 72.58%, compared to a small percentage of 27.42% for private banks. This is logical as the six Algerian public banks dominate around 90% of the total deposits and loans in the Algerian banking market (Bank of Algeria, 2022).

Descriptive Analysis of Study Variables

The results revealed positive inclinations among the respondents towards all dimensions of ATM service quality. Reliability ranked first, obtaining the highest mean score of 3.945 with a standard deviation of 0.713. On the other hand, Empathy ranked last, receiving the lowest mean score of 3.473 with a standard deviation of 0.871. Nonetheless, the overall mean score for all dimensions of ATM service quality combined was 3.714, which is higher than the hypothetical mean score of 3, with a standard deviation of 0.622. Table 1 shows the results of the descriptive analysis of ATM service quality dimensions.

Table1. Results of Descriptive Analysis of ATM Service Quality Dimensions

Dimensions of ATM Service Quality	Mean Average	Standard Deviation	Order of Importance
Tangibility	3.913	0.687	2
Reliability	3.945	0.713	1
Responsiveness	3.598	0.716	4
Security	3.638	0.751	3
Empathy	3.473	0.871	5
Total	3.714	0.622	-

Source: Prepared by the researcher based on the outputs of SPSS version 28.

Several factors contributed to these positive inclinations, as indicated by the sample's opinions. These factors include the ease of using ATMs, the simplicity of the usage procedures, the suitability of the machine screens, time and effort savings, the availability of a high degree of privacy during usage, and the security of ATMs, among others.

The results also demonstrated positive inclinations among the respondents towards the customer satisfaction variable. It obtained a total mean score of 3.389, which is higher than the hypothetical mean score of 3, with a standard deviation of 0.811. Table 2 shows the results of the descriptive analysis of customer satisfaction.

Table-2. Results of Descriptive Analysis of Customer Satisfaction

Dependent Variable	Mean Average	Standard Deviation
Customer Satisfaction	3.389	0.811

Source: Prepared by the researcher based on the outputs of SPSS version 28.

Several factors have contributed to these positive inclinations, the most prominent of which include: customers feeling comfortable during their interactions with the bank, alignment of the bank's working hours with customers' schedules, a warm reception, the quality of the bank's services, a sense of belonging and loyalty to the bank, and others.

Testing the Study Hypothesis

To test the validity of the central hypothesis of the study, which states "There is a statistically significant effect of ATM service quality on the satisfaction of customers of Algerian commercial banks", a simple linear regression test will be utilized, as indicated by the results shown in Table 3.

Table 3. Testing the Study Hypotheses

Hypothesis	F	Sig	R Square	Beta	Verification
Sub-Hypothesis 1	45.888	0.000	0.292	0.541	Confirmed
Sub-Hypothesis 2	65.959	0.000	0.373	0.611	Confirmed
Sub-Hypothesis 3	67.417	0.000	0.378	0.615	Confirmed
Sub-Hypothesis 4	132.318	0.000	0.544	0.737	Confirmed
Sub-Hypothesis 5	144.426	0.000	0.565	0.725	Confirmed
Main Hypothesis	184.067	0.000	0.624	0.790	Confirmed

Source: Prepared by the researcher based on the outputs of SPSS version 28.

Based on the information provided in the previous table, it is evident that the calculated F-value for the estimated model is 184.067, which is greater than the tabulated value of 7.07. Additionally, the calculated Sig value, representing the significance level, is 0.000, which is lower than the adopted significance level of 0.05. Consequently, it becomes apparent that there is a statistically significant relationship between ATM service quality and customer satisfaction. Moreover, the coefficient of determination (R-squared, R^2) has reached 0.624, indicating that the dimensions of ATM service quality can explain 62.40% of the variations observed in the variable of customer satisfaction for the studied Algerian commercial banks. The remaining 37.60% of these variations are attributed to other variables not included in the study model. Furthermore, the standardized coefficient of the regression Beta has a value of 0.790, suggesting that an increase in ATM service quality by one standard deviation will lead to a 79% increase in customer satisfaction for the studied Algerian commercial banks. Consequently, the central hypothesis of the study is accepted, indicating a statistically significant effect of ATM service quality on the satisfaction of customers of Algerian commercial banks.

Furthermore, the results in Table 3 also indicate that the dimension with the highest impact on customer satisfaction is the empathy dimension with a percentage of 56.50%, followed by

the security dimension with a percentage of 54.40%. The response dimension comes next with a percentage of 37.80%, followed by the reliability dimension with a percentage of 37.30%, and finally the tangibility dimension with a percentage of 29.20%.

Discussion

The results of this study revealed that all dimensions of ATM service quality (tangibility, reliability, responsiveness, security, and empathy) have a statistically significant impact on customer satisfaction with Algerian commercial banks, which is broadly consistent with the findings of most previous studies.

For example, our results confirm the positive effect of the security dimension on customer satisfaction, with an impact of 54.40%. This is in line with the findings of Al Sawalqa (2012) in Jordan and Idris (2014) in Nigeria, both of which emphasized the importance of privacy and security as key drivers of customer satisfaction with ATMs. This result also aligns with Singh et al. (2020) in Malaysia, who demonstrated that security is strongly and positively related to customer satisfaction.

Regarding the responsiveness dimension, its impact reached 37.80%, consistent with the results of Matimbwa and Ochumbo (2018) in Tanzania, where responsiveness was identified as one of the main determinants of customer satisfaction. However, our study diverges from the findings of Khan and Abdullah (2019) in Pakistan, which reported no significant effect of responsiveness, likely due to the differing institutional and environmental contexts between Algeria and Pakistan.

With respect to the reliability dimension, the results showed a significant effect of 37.30%, which corresponds with the findings of Weerasiri and Koththagoda (2017) in Sri Lanka, who highlighted the importance of trust in the service and accuracy of execution as essential factors in achieving customer satisfaction. This finding also aligns with Amene and Buta (2019) in Ethiopia, who identified reliability as a significant factor influencing customer satisfaction.

The tangibility dimension showed a relatively moderate effect of 29.20%, consistent with the conclusions of Leblanc (1990) in Canada and Singh et al. (2020) in Malaysia, both of whom emphasized that the external appearance of ATMs, screen quality, and ease of use significantly influence customer satisfaction.

Finally, our study found that the empathy dimension had the most potent effect on customer satisfaction, at 56.50%. This highlights the importance of the human element associated with ATM use, such as staff interaction with customers when problems arise and the provision of brochures or instructional guides. This result is consistent with Khan and Abdullah (2019), who

demonstrated that human-related factors like empathy significantly affect customer satisfaction. However, it contrasts with the findings of Idris (2014) in Nigeria, which found no significant impact of empathy, suggesting that the Algerian local context and banking culture play a key role in explaining this outcome.

Conclusions

This study concluded that the dimensions of ATM service quality have a significant impact on achieving customer satisfaction in Algerian commercial banks, with the results showing that these dimensions collectively explain about 62% of the variation in customer satisfaction. Among the dimensions, empathy had the most substantial impact, followed by security, then responsiveness, reliability, and finally tangibility. Despite these positive results, the overall impact remains moderate, which can be primarily attributed to several challenges faced by Algerian bank customers when using ATMs, such as frequent technical malfunctions, inadequate cash availability, and the fact that many ATMs are programmed only in French, without providing support for Arabic, the most widely used language among customers.

Practical implications and recommendations

Based on the findings, the study recommends:

- Conducting regular daily maintenance of ATMs to ensure uninterrupted operation.
- Expanding and diversifying the range of banking services available through ATMs.
- Providing Arabic language support for ATM software.
- Selecting safe and convenient locations for ATM installations.
- Increasing the deployment of ATMs in public squares, airports, and other strategic areas, rather than restricting them only to bank branches.

Limitations of the research

The study was limited to a relatively small sample of Algerian bank customers (113 users), which may restrict the generalizability of the findings. Moreover, it focused exclusively on service quality dimensions based on the ServQual model, without considering other factors that could influence customer satisfaction, such as cost or technological innovation.

Future research directions

In light of the current findings, future studies are encouraged to explore:

- The relationship between ATM density and distribution and customer satisfaction.
- The role of language and supporting services (e.g., Arabic interface) in enhancing ATM service quality.
- The impact of technical failures and maintenance frequency on customer loyalty.

- The effect of innovative ATM services (e.g., cardless withdrawals, cash deposits) on customer satisfaction.
- A comparison of customer satisfaction with ATM services between public and private banks.
- Demographic differences (age, gender, education level) in evaluating ATM service quality.

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